

From blended learning to learning onlife - ICTs, time and access in higher education

Anders Norberg



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Abstract

Information and Communication Technologies, ICTs, has now for decades being increasingly taken into use for higher education, enabling distance learning, e-learning and online learning, mainly in parallel to mainstream educational practise. The concept Blended learning (BL) aims at the integration of ICTs with these existing educational practices. The term is frequently used, but there is no agreed-upon definition. The general aim of this dissertation is to identify new possible perspectives on ICTs and access to higher education, for negotiating the dichotomy between campus-based and ICT-enabled education. The access options of BL are in focus for this dissertation, although BL is generally seen as a campus phenomenon, and shares a place perspective. The main research questions in the dissertation are 1) how BL can be understood in the context of increased access to education, moreover, (2) how time can be work as a more constructive perspective for designing ICTs in education, compared to place. The dissertation comprises five articles. The first is conceptual and concentrates on place and time in blended learning, and forms a time-based model and perspective, drawing on the tension between synchronous and asynchronous modalities instead of a place-based center-periphery model. The following article examines the differences between North American and European use of the term BL, in education and research, and finds that BL is not much used by European researchers, although the term is frequently used in educational environments. Two design and intervention studies, articles 3 and 4, make experiments using the BL time-based model. In article 3, a group of untraditional learners at a learning centre in Arvidsjaur attends a synchronous co-located study circle group and participates in an asynchronous and global Massive Open Online Course (MOOC). In article 4, nine students in a preparatory year for entering engineering studies volunteer and participate in a pilot distance course experiment, where prevention of procrastination is a high priority. For this, agile framework theory, constructivist learning theory and the time-based model are used in design and analysis. The last article (5) reconnects learning to place by discussing and adapting Triple- and Quadruple Helix theory for regional development in the knowledge society to four regional European cases. At the end of the synthesis, an outline of the access affordances with the time-based model is given, drawing on Adam's timescape theory. The discussion of ICT integration into education is made drawing on Floridi's Philosophy of Information, which provides many tools to view discourses of ICTs in education critically, and also envisions the concept of e-ducation in the infosphere, where other blend issues appear connected to weak artificial intelligence and the pervasive power of ICTs.

Keywords

Blended learning, distance learning, e-learning, online learning, ICTs, synchronous learning, asynchronous learning, philosophy of information, learning online

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*We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time
T. S. Eliot*

¹ Part of the poem Little Gidding, the Fourth and final of Elliot's Four Quartets, 1942

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Abstract

In contemporary times of information abundance and experience of constant change, an increasing array of Information and Communication Technologies (ICTs) are being used for quality-, cost-, and access adaptations and enhancements in higher education. Words and concepts such as *e-learning*, *online education*, *digitalisation of education* or *virtual campus* indicate new alternatives to the traditional or possible directions of development toward a thorough change.

Blended Learning (BL) takes a slightly different approach by focusing on *the integration of ICTs* into the mainstream of higher education. The term has many meanings and is frequently used by practitioners, although not much by European researchers. This dissertation focusses on the properties and affordances of BL in creating new access possibilities for education in the geographic area of Northern Sweden.

The population in Northern Sweden is very unevenly distributed, and the differences in education attainment and levels vary considerably. *Decentralised education*, *distance-* and *online learning* have provided temporarily increased access, but many arrangements have been short-lived, specialised and have come in the form of courses rather than programmes, thereby not increasing any sustainable or broader-widened access. By 2010, distance education had increased over a number of years, while recent reports indicate that distance education provision has decreased. In the same time, the proportion of students who combined campus- and distance education had, in fact, increased. This can be viewed as a sign indicating that BL has had an impact on students, as well as that development toward increasing access may have halted.

The student groups on which this dissertation focusses are not the traditional students from an academic family background who dominate campus populations. Instead, the focus lies on the new learners, consisting of younger students without an academic family background and older students with the need to attain a higher-education diploma or to enhance their credentials in lifelong learning. These students can encounter problems with access, even while living in a university city, though more so for those living outside of the daily commuting distance to a campus.

The aim of this dissertation is to identify and generate new, alternative perspectives on access to higher education when it is enabled by the ongoing and more sustainable integration of ICTs into mainstream education, which is sometimes referred to as BL. A subsequent aim is to determine how such

perspectives can be understood and used for the development of sustainable and inclusive education.

Article 1 scrutinises the term and phenomenon of BL, its roots and present state of development. It also considers how it can make more sense for students' understanding of and involvement in their studies, as well as for course design, by setting time before place as a perspective.

Article 2 studies the differences between the North American and European usage of BL as a term, as well as in practice and research.

Article 3 designs and researches an intervention in which non-traditional students at Arvidsjaur learning centre studied an asynchronous, globally-accessible Massive Open Online Course (MOOC) in a synchronous form that was designed around social study circles. It is an application and further development of the time perspective that is studied in Article 1.

Article 4 studies a pilot project within a preparatory year for engineering studies at Luleå University of Technology. The article explores and further develops the time model, which guided the design of the pilot.

Article 5 focuses on four European regions that have addressed problems with the implementation of the Triple Helix regional development model. In this model, the state, universities, business and public sector organisations come together to set up local and regional development plans with adjusted models. The article addresses knowledge-based issues through a time and place perspective that gives universities an innovative role in regional development.

This research adopts a critical methodology. It departs from educational needs and the right of individuals to access education as rights-holders versus the means that universities have to act as society's duty-bearers. As the author of this dissertation, I am personally engaged in this perspective, as I have been working with increasing access to higher education for many years. My vantage point is not from within a university's central campus and its direct surroundings. Rather, I consider studying from the perspective of less favoured communities, with lower levels of education and more problematic access to higher education in Northern Sweden.

The adopted methods for the articles are mainly qualitative and include conceptual analyses, literature reviews, surveys and semi-structured interviews. Mixed methods are also applied in two of the papers. The empirical data have been analysed with the use of a qualitative content-analysis approach. In the theory and discussion sections of the synthesis, conceptual analysis has been used.

The theories that are adopted in the articles vary depending on their particular focus. Articles 3 & 4 draw on theory that informs design interventions, while Didaktik and Fach-Didaktik theory are used in article 2,

combined with Instructional Design theory. Glonacal theory informs the discussion in Article 3, while article 4 adopts Constructivist learning theory and Agile framework theory, together with the time model from article 1. Article 5 discusses Triple- and Quadruple-Helix theory. In chapter 7 in this synthesis, Barbara Adam's social theory of time (timescapes) is used for contextualising the results, and Luciano Floridi's Philosophy Information is used for discussion of ICTs in education in chapter 8.

In my conceptual work, I scrutinise the frequent understanding of ICTs in education in spatial terms, as place (distance learning), in which ICTs enable increased reach and access in a centre-periphery frame. I proceed to consider e-learning as a re-tooling of education and online learning as learning in a new alternative environment or space. I propose that these aspects, with their advantages and disadvantages, follow on to BL as well.

I continue by altering the perspective on ICTs in education, from place to time. This time perspective is contextualised as an important human dimension, drawing on Adam's social theory of time, and used for abstraction and deconstruction. However, space and time presuppose one another and must be reassembled into new space-times of education. As I argue, the time perspective can play a greater role than at present. Articles 3, 4 and 5 contribute to this re-assembly: a task which I continue to synthesise in the results section.

Based on the presented articles, the current study is still only a deconstruction and reconstruction of the vanishing present and forms the basis of a suggestion for alternative perspectives in designing accessible courses. In the discussion section of this dissertation, I use Floridi's Philosophy of Information to further discuss distance-, e-, and online-learning as well as their appearances in BL. Living in an ICT-integrated environment does not only change our work and practices but also our self-understanding as humans. How can, will, does or should education processes change in this new ICT-integrated environment? I revisit the BL approach and explore how Floridi's e-education concept can help to understand and reformulate questions in education.

Finally, I summarise and comment my results in light of the research questions and discuss ethical and political implications. As rights-bearers, individuals have the right to claim equal access to higher education from a society's education providers, at the best of the ability of the provider. The role and responsibilities of the universities as providers may have changed, when access can be increased by a design of the mainstream campus courses to also include students with time- and place obstacles. ICT-integrated approaches for education provision in higher education can become a more inclusive normality.

Abbreviations

BL	Blended Learning
DBR	Design Based Research
DL	Distance Learning
EL	E-learning
ICT(s)	Information and Communication Technology(-ies)
LMS	Learning Management System
MOOC	Massive Open Online Course
OL	Online Learning

Sammanfattning på svenska

Från *blended learning* till lärande onlife

Denna avhandling har som huvudfråga hur Informations- och Kommunikationsteknik (IKT) kan förbättra tillgängligheten till högre utbildning genom IKT:s integration med det vanliga utbudet av utbildning på campus, vilket vanligen kallas *blended learning* (BL). Denna fråga skiljer sig något från frågan om hur IKT kan användas för tillgänglighet i *distanslärande, e-lärande och online-lärande*, vilka tidigare mest använts på sidan om det vanliga utbudet på campus. Min andra forskningsfråga gäller om tid kan vara ett mera konstruktivt perspektiv än plats då det gäller att beskriva och designa IKT i lärande, och i så fall hur?

Fokus läggs på de områden i norra Sverige utanför universitetsstäderna som har gles eller ojämnt fördelad befolkning, långa avstånd, ofta låg utbildningsnivå, men också människor som gärna vill utbilda sig om de bara kunde hantera t ex tids- och rumshinder. Jag tänker i första hand på dem som inte flyttar till en universitetsstad direkt efter gymnasiet utan får utbildningsplaner senare i livet, och de som måste uppgradera sin utbildning för att umecklas i arbetet eller byta arbete. Dessa grupper är också mycket värdefulla för det lokala samhällets kompetensförsörjning.

IKT används numera i nästan all utbildning på allt fler sätt, både av lärare och studenter. Allt oftare är detta ett led i en medveten strävan för att höja kvaliteten, sänka kostnaderna eller öka flexibiliteten och tillgängligheten. BL ses vanligen som en blandning mellan klassrum och online-miljö, mellan muntlig och digital kommunikation, eller mellan gammal och ny teknik med klassrummet som nav. Detta tolkar jag som ett arv efter distans- e- och online-lärande-formerna.

I artikel 1 provar jag och mina medförfattare med hjälp av konceptuell analys ett tids- och processperspektiv istället för ett platsrelaterat perspektiv, för att förstå IKT-integration i en BL-kurs. Vi finner tidsperspektivet mycket användbart för att beskriva IKT-användning i en kurs, och för att designa nya utbildningslösningar. Istället för blandning mellan klassrums- och online-miljö, så får vi en spänning mellan två modaliteter, det synkrona studiearbetet, det som görs samtidigt i en lärandegrupp, t ex i klassrummet eller i videokonferens, och det asynkrona studiearbetet, att läsa och göra uppgifter när det passar. Detta perspektiv utgör också en abstraktion där klassrummet har blivit ett verktyg för synkron kommunikation; det viktiga är

då inte en plats att kommunicera på, utan kvaliteten på kommunikationen lärare-student, student-student och student-lärandestoff i kursen. Här använder jag konstruktivistisk lärandeteori tillsammans med tidsperspektivet. Jag undersöker sedan i artikel 2 mera om begreppet BL och undersöker dess status i Europa i jämförelse med Nordamerika och finner att europeiska forskare inte så ofta använder begreppet BL, vilket kan förklaras med olika forskningstraditioner kring undervisning och lärande, som europeisk *Didaktik* och nordamerikansk *Instructional Design*. Även europeisk universitetspersonal läser nordamerikansk litteratur, vilket kan förklara den frekventa användningen av termen i praktiska lärandesammanhang även i Europa. BL är också en inbjudande rubrik att göra sina egna experiment under.

Artikel 3 och 4 beskriver design, implementering och resultat av två designexperiment med tidsperspektivet som utgångspunkt. I artikel 3 kombineras en asynkron globalt tillgänglig Massive Open Online Course, MOOC-kurs, med en lokal grupp otraditionella studerande som träffas i klassisk studiecirkelform på lärcentrat en gång i veckan. Resultaten utvärderades genom examination och semistrukturerade intervjuer som analyserades. Studieresultaten blev goda, och deltagarna förklarade i intervjuerna att de hade haft stor hjälp av de synkrona mötena för att klara kursen. Den enkla kursdesignen fortsatte också sedan att användas i lärcentramiljön i Akademi Norr, då den också gav det lokala lärcentrat nya möjligheter. I artikel 4 designas en del av en fysikkurs i ett distansförsök för tekniska basåret. Nio studenter på basåret väljer detta försök som alternativ till de pågående vanliga studierna. En målsättning med designen var att förebygga att studenter nyttjar flexibiliteten i upplägget till att skjuta upp det som känns svårt till senare. Kursen designas med hjälp av tidsperspektivet i artikel 1, konstruktivistisk pedagogisk teori och agil projektmetodik från mjukvaru- och programmeringssektorn, där utprovade strategier för en jämn och hälsosam arbetstakt finns utvecklade. Studerandes upplevelser och erfarenheter samlades in genom semi-strukturerade intervjuer och analyserades genom kvalitativ innehållsanalys. Resultaten av det analyserade materialet visade att kursdesignen hade fungerat väl för att understödja en jämn arbetstakt. Den planlagda samtidigheten i studierna dag för dag verkar inbjuda till kommunikation och interaktion mellan studenter, även om de studerar rumsligt åtskilda från varandra.

Slutligen, i artikel 5 återvänder jag, och medförfattare från tre länder, till begreppet *plats*, som ju måste vara en del i all mänsklig aktivitet. Artikeln behandlar fyra regioner i Europa som inte har optimala förutsättningar för Triple-Helix-samverkan i kunskapsekonomin, t ex därför att det inte finns något universitet i närheten, eller att den offentliga sektorn eller näringslivet

i regionen är svagt utvecklade. En Quadruple-Helix-teori utformades och exemplifieras genom fyra regionala fallbeskrivningar, för norra Sverige Skellefteås byggande av en multi-institutionell campusplattform som lokal studiemiljö.

I denna kappa som inleder och omsluter de fem artiklarna går jag igenom syfte och forskningsfrågor (kap. 1), bakgrunder (kap. 2), blended-learning-begreppet (kap. 3), teorifrågor (kap. 4) och metodfrågor (kap. 5). Sedan sammanfattar jag tid som perspektiv på IKT i utbildning med hjälp av Adam's sociala tidsteori (kap. 6) och diskuterar IKT i utbildning kritiskt genom att använda Floridi's informationsfilosofi (kap. 7) för att diskutera nuvarande tänkande och framtida scenarier för IKTs integration i utbildning. Floridi's filosofi provocerar fram nya tankar på utbildning, i vad han kallar *e-ducation*, vilket sker i ett informationssamhälle där vi börjat uppfatta oss själva och världen på nya sätt. Detta hjälper mig också att formulera en annan typ av blended learning-problematik, med möjligheter och problem. När IKT-applikationer kan bearbeta information specialiserat och självständigt, blir frågan hur detta kan användas i utbildning och hur vi vill att arbetsfördelning mellan människa och maskin ska se ut.

Till sist sammanfattar jag och kommenterar mina resultat utifrån forskningsfrågorna och reflekterar över vidare forskning. Jag diskuterar också etiska och politiska frågor kring tillgänglighet till högre utbildning. Jag aktualiserar frågor som a) Har individens situation som rättighetsinnehavare till utbildning förändrats genom IKTs möjligheter? b) Har universitetens roll och uppdrag som den högre utbildningens utförare i samhället förändrats när IKT kan ge nya möjligheter att designa mera tillgänglig utbildning som normalitet?

Abstracts of included articles

Article 1:

Norberg, A., Dziuban, C. & Moskal P. (2011), *A Time-Based Blended Learning Model*.

Abstract: This is a conceptual paper that builds on the premise that ICT integration in education has become so commonplace that we are approaching a new normality in which ICTs are used in most courses. Despite this, there is great ambiguity in our understanding of the terms that are used. Thus, in this paper, we problematise elements in the contemporary use of the term *blended learning* (BL) and identify some conceptual problems with the use of BL definitions. The term *blended* needs specification, as no blending theory appears to be involved. Rather, the blending refers to combining, most commonly by traditional and digital approaches, implying a combination of places (as in online and distance learning) or a combination of the use of technology and traditional tools. Regarding learning, we propose that most of the literature refers to the organisation of teaching, rather than learning theory or students' own organisation of learning. We attempt to find another way by which to understand ICTs in a course, by outlining a time-based strategy for BL. In our model, the course design and delivery frame students' learning opportunities in synchronous and asynchronous modalities. It deconstructs the evolving components of BL to identify changes that are induced by digital technologies for enhancing teaching and learning environments. Blended learning may be traced back to early medieval times when printed material provided the first asynchronous learning opportunities. However, the digitalisation of contemporary learning environments results in a de-emphasis on teaching and learning places. When time becomes the primary organising construct for education in a technology-supported environment, blending possibilities emerge around five components: migration between modalities, support, location, learner empowerment and flow. This study enables the readers to conceptualise BL as a combination of modern media, communication modes, and times and spaces in a new kind of learning synthesis that takes the place of traditional classrooms and technology, and in which the teacher serves as a facilitator of a collective learning process. The major implication of this paper is that modern learning technologies have freed students and educators from the lock-in of classroom space as the primary component of BL, thereby emphasising learning rather than teaching in the planning process. As a result, this paper proposes a new

model of BL in which physical teaching environments give way to time. Time and synchronicity become the primary elements of the learning environments. Additionally, the authors suggest that the time-based model as an educational *new normal*, results in technologies that are enablers rather than disruptors of learning continuity.

My contribution in this paper has been the problem of identification, the main part of the concept analysis, the time model and the unpacking of its usefulness for describing ICT integration in courses. My coauthors undertook to pursue the main work in the introduction and background, in order frame the paper within current research and debates on BL. The discussion and conclusions were developed in close cooperation.

Article 2:

Norberg, A. & Jahnke, I. (2014) ***Are You Working in the Kitchen? – European Perspectives on Blended Learning.***

Abstract: As with other ICT-related terms, blended learning (BL) is used in daily conversations at universities in most countries. This book chapter explores and describes the different understandings and approaches to BL between North American and European practitioners and researchers. Though this question is under-researched, it is highly significant, as different understandings of the debate have direct implications for the construction of particular theoretical, methodological, pedagogical and technical approaches to the implementation of BL practices. Our approach to this core question is first to interpret it, clarify it and divide it into sub-questions: BL as a term in educational practice and BL as a research term. Secondly, we have designed the research on the basis of a mixed-methods approach that entailed the following: (i) systematic searches of the practical uses of the term BL on university websites; and (ii) an email survey designed for European experts on BL (researchers and project managers in the field of BL and ICT higher education). The aim of the survey was to review the definitions and understandings of the term, and the practice of BL, in order to establish the most dominant theoretical, pedagogical and technical approaches that are used. The subsequent aim is to systematically review and evaluate the differences in the use of BL-related terms and practices between North-America and Europe. Finally, we used the analysed materials from (i) and (ii) in order to launch web-forum discussions that proved fruitful for the generation of new questions for further research. The main findings of this research suggest that continental European (including Scandinavian) researchers and universities draw primarily on the theoretical roots of

Didaktik in their approach to both defining and operationalising ICTs in higher education, and the BL concept is not much used. In North American settings, the research and theories that inform BL approaches instead come from Instructional Design, and the possibilities it offers for the integration of ICTs in higher education. However, our research provides evidence suggesting that there are signs of convergence between the two approaches, as the North American literature is used increasingly within university settings in Europe, especially in relation to practical implementation issues. At the same time, the experienced *need for pedagogy* within instructional design contexts in North America can respond to what European researchers call Didaktik.

My contribution in this book chapter was first to cooperate with the co-author in researching the design and in choosing experts to survey, as well as the main part of data collection and the analysis of the empirical material. We cooperated on the analysis by interpreting the results in a way that created a tension between Instructional design and European Didaktik. The discussion and conclusions were elaborated together.

Article 3:

Norberg, A., Händel, Å. & Ödling, P. (2015) *Using MOOCs at Learning Centers in Northern Sweden.*

Abstract: This paper describes the adjustment and use of globally-accessible Massive Open Online Courses (MOOCs) in addressing the needs of local learners at community learning centres in Northern Sweden. Building on the concept of a *time-blended learning design*, we examine access to learning from a critical perspective and place it against the theoretical discussion of Marginson and Rhoades' *glonacal agency heuristics*. The research for the article is based on a case-study design in which a learning centre located in Arvidsjaur in Northern Sweden became a pilot, as part of a larger Nordplus Horizontal Project 2014-2016. Three Nordic countries were involved in the broader project, thereby aiming to develop theoretically-informed models for the development and use of MOOCs in learning centres and organisations. We employed the Scandinavian *study circle* concept and used it to facilitate the studying of MOOCs, thereby forming *blended* and *glonacal* courses, and taking into account the significance of geographic and space limitations, as well as possibilities. The impetus for the research came from systematic reviews suggesting that, although the technical possibilities for Swedish universities to offer accessible education are steadily increasing, most universities do not

prioritise courses for off-campus students. The available web courses in asynchronous formats are also difficult to master for untraditional learners, leaving the local learning centres with limited possibilities. As a result, we developed a theoretically-informed design for using a MOOC course in a study circle form for students with unconventional educational backgrounds. We designed in-depth interviews with the participants of the case study, in order to understand their motivations for engaging in the study, their experiences and difficulties with the course, as well as its uses, the significance of the course for their future education and career plans, and the additional benefits that they acquired as a result of their participation. The material was analysed through content analysis. The findings suggested an overall high degree of satisfaction with the course, which developed (a) new study skills, (b) increased confidence for learners and the desire to engage in further similar activities, (c) new social competencies, and (d) improvement in the self-esteem of weak learners. Simultaneously, the findings highlight difficulties for the course designers in relation to (i) maintaining the balance between meeting academic goals and keeping weak learners in the course, and (ii) meeting the needs of diverse learners from very different age groups, language backgrounds and levels of education. Overall, the research points to the usefulness of the synchronous local study-circle design format as a way to utilise asynchronous MOOCs, with the case study showing a highly successful application of the blended design. In addition, the particular case study shows the new functions that local learning centres acquired, pointing to a promising future approach to blended adaptations of MOOCs to local education provisions.

My contribution in this paper was to set up the broader project and the course design that was used, as well as research design, data collection through interviews and the main work regarding the analysis and interpretation of the material. The analysis of MOOCs in both global and local settings and the background research, discussion and conclusion were done in cooperation.

Article 4:

Norberg, A., Stöckel, B. & Antti, M-L. (in review) *Time Shifting and Agile Time Boxes in Course Design*.

Abstract: The integration of Information and Communication Technologies (ICTs) into higher education courses is often called *blended learning* (BL), although texts on BL often relate to education design. Blended learning is usually understood as a place category: a combination of

traditional classroom-based sessions and Internet-enabled *distance learning* practices. In this paper, we develop an alternative understanding of ICT integration, constructed as time categories, in which ICTs are viewed primarily as process- and project- enhancing. Three such design frameworks are presented conceptually and then used together in a pilot case study on *flexible learning* at the preparatory level for entering engineering programs in a Physics department at a university in Northern Sweden. The frameworks draw on the following: a) Constructivist learning theory, b) time shift mechanisms between synchronous and asynchronous learning modes in the course process and c) agile framework mechanisms adapted from work process developments in the software industry that are used to enhance workflow. The data collection was based on in-depth interviews with students, analysed using thematic content analysis and interpreted through a constructivist learning theory approach. The findings suggest that the particular course design and the way in which it was implemented were effective, and we discuss the applicability and generalisability of the particular model, as well as its possible limitations. We suggest that the time-shift and agile modelling that forms the building blocks of the design are transferable to higher education courses in general. In particular, the elements of the design that were highlighted as useful by the participants and which have a grounding in the theoretical and research literature on learning, refer to the overview functions of work and to the segmentation possibilities of studying in time frames, as well as in regular synchronous and asynchronous shifts.

My contribution to this paper was firstly the theory-based design of the critical workflow sections in the course design that was implemented in relation to the time-based model of BL and to agile framework theory, as well as data collection and main work on analysis and interpretation. The background research, introduction, discussion and conclusion were pursued cooperatively.

Article 5:

Kolehmainen, J., Irvine, J., Stewart, L. Karacsonyi, Z., Szabó, T., Alarinta, J. & Norberg, A. (2016) ***Quadruple Helix, Innovation and the Knowledge-Based Development: Lessons from Remote, Rural and Less-Favoured Regions.***

Abstract This paper addresses the dynamics of a knowledge-based development of remote, rural and less-favoured regions, and is the product

of the EC Interreg IVC project UNICREDS 2010-2012. Many of the regional strategies and policies aimed at developing innovation emanate from policymakers in centrally located urban conurbations and are assumed to be universally applicable. Such policies and their assumptions have led to the development of the *Triple Helix Model* and its successors for economic development. They are based on the idea of universities, business, and public-sector organisations coming together to foster innovation and economic prosperity in a region. In many remote, rural and less-favoured localities, there may not be a university or other knowledge-intensive institution, which makes a difference for local development agendas. In many regions, the business community may also be scattered and insufficiently developed regarding innovation. Moreover, this kind of region may also have a weak public sector in enhancing innovativeness. In such regions, social and community groups may often play the dominant entrepreneurial role. The community may also play a significant role in remote, rural and less-favoured regions where the basic elements of the triple helix model are present. Within this context and having identified the problematic nature of the existing assumptions on the basis of which local innovations and policies are built, we develop the alternative *Quadruple Helix Model*. Innovation processes are becoming increasingly open to different stakeholders. In this paper, we examine and analyse four cases of knowledge-based development processes and policies in remote, rural and less-favoured regions. In our analysis, we use a *Double-Coin Model* of knowledge-based processes, which place the quadruple helix model at the very heart of knowledge-based regional development. Cases from four different European regions (in Finland, Hungary, Scotland and Sweden) are presented as illustrations of the proposed models. Our analytical point of departure is that the knowledge-based regional development should not be viewed as a set of traditional top-down policies but as a complex, place-based, multi-actor discovery process. Following this premise, we adopt a critical analytical perspective on the concept of knowledge-based development, and the role that technology can play in the development of local and peripheral economies. Throughout the four cases, we examine and evaluate the complex relationship between institutional and multi-institutional learning environments, as well as the context within which they operate: the geographic space, local infrastructures and capacities, and the use of technology to access non-traditional students. Our findings from all four case studies show that the quadruple helix approach can and has been applied to support the knowledge-based development and innovativeness of remote, rural and marginalised regions. More importantly, positive developments cannot take place without deliberative and decisive actions: regional development calls for actors and activity. The cases also pointed to

further questions and notions concerning the quadruple helix and regional development. We conclude with policy recommendations.

My contribution to this paper was to work with the first author on the background research and the literature review, as well as the further development of the Double-Coin Model that was elaborated earlier in the project by the first author. I was also responsible for the case study on the multi-institutional campus in Skellefteå. The introduction, discussion and policy recommendations were written in collaboration.

1. Introduction

This dissertation adopts a critical approach to researching the integration of Information and Communication Technologies (ICTs) into the mainstream of higher education. It builds on the premise that more uniform access to higher education over the whole of Northern Sweden (and beyond it) can be implemented with a more versatile use of ICTs, by addressing time and place concepts in education. Distance Learning (DL), E-Learning (EL) and Online Learning (OL) have emerged as *alternatives* to traditional educational practices, and have been accompanied by blended learning (BL) and similar concepts that *aim to integrate* ICTs into campus practices. I am, looking back, critical about these terms and some of the ways in which they have been used, though I can see new constructive possibilities if the existing perspectives on the uses and applications of ICTs are refreshed and discussed.

Through the published articles and this synthesis, I examine BL and the sustainable integration of ICTs in higher education as a possible new normality which can enable flexibility and access in new ways. I argue that some limiting understandings of ICTs can be overcome by bringing ‘time’ together with ‘space’ in new technology-enabled solutions. An outcome can be that BL can cover some of the needs behind DL and OL by using new EL technologies, as well as time modalities and places in creative ways.

Contemporary discussions, research terminology, conceptualisations and research agendas on ICTs in higher education run in many directions, and cover and combine many disciplines and perspectives. Furthermore, on the practical level, this occurs in a rather synchronised way over the globe and does so in pace with pervasive and global ICT trends. Simultaneously, in different parts of the world, the research that theorises, designs and supports these developments draws on different research contexts and traditions on which to build.

There is a possibility that more and different perspectives on the development of ICTs in education are feasible, useful and even necessary. Equality of opportunity to access education is, at least in policy, a cornerstone of democratic societies. Nevertheless, the demographics of higher education students are not representative of a country’s citizens in any country, as is the case also in Sweden (SCB, 2014). In Sweden, all higher education is state funded, with no tuition fees for Swedish and EU citizens, thereby reinforcing the democratic and rights-related dimensions of access. However, this policy has some minor drawbacks that are directly related to the state support. Universities in Sweden have each at their disposal a maximum number of student places and cannot easily expand by recruiting

more students if they have already met the number for whom the enrolment will be paid. Separate arrangements for increased access outside central campuses can subsequently become less prioritised. Separate organisation of flexible forms of education for off-campus use is also considered as costly. However, a creative use of ICTs in mainstream education programs can be designed in more inclusive terms for students that face time- and place²-related obstacles. For this to become a reality, however, universities need to organise ICTs as an organic part of existing provisions and not as separately organised or add-on arrangements. This is the line of thought on which this dissertation draws, and on which the conceptual analysis, intervention experiments, research and discussions are built.

² A comment concerning the of the terms *space* and *place* in this dissertation can be helpful. Space is mostly used for signifying impersonal general coordinates in three dimensions in which anything can *take place*. Place is somewhere in this space which has acquired a meaning for us in lived experience. We attach feelings and experiences to a place, but not to space – if we do, it becomes a place. Good examples of places can be home or school. In some cases any of these words can be used. In other cases they are part of expressions, which do not follow this distinction.

2. Aim and Research Questions

2.1 Aim

The aim of this thesis is to identify, understand and generate new, alternative perspectives on and models for access to higher education, enabled by the ongoing integration of ICTs into mainstream education. Hence, the aim of the research is mainly conceptual and uses empirical studies and literature reviews to inform and construct the conceptual dimension.

2.2 Research questions

The questions that have guided the research and discussion for this dissertation are the following:

1. How does blended learning, understood as the integration of ICTs in mainstream higher education offerings, affect access to education, especially in relation to time- and place-related obstacles to participation?
2. To what extent does *time* offer a different teaching-learning design perspective when compared to a *place* perspective?

2.3 Development from articles to discussion

In this collection of articles, the first begins with a heuristic alternative perspective on BL and ICTs in mainstream education, by presenting a time-based perspective on BL as a possible abstraction. Article 2 offers an examination of the concept BL and its relevance for educational research in Europe versus North America. Studies on time as a perspective in the use of ICTs in education are carried out in articles 3 and 4, which explore the time perspective in interventions and research, as an integral dimension of ICTs in education. Article 5 deals particularly with considerations of place in Triple Helix theory.

Chapter 3 in this synthesis presents two contextual backgrounds that frame the research: (1) The sociodemographic context of Northern Sweden in relation to education and (2) A review of the distance learning (DL), e-learning (EL) and online learning (OL) concepts, on which it is necessary to draw for the main section reviewing the concept of BL, which follows in chapter 4.

In the research design and implementation section of the synthesis (chapters 5 and 6), I describe the designed composition of my five research papers. In chapter 5, I explain my choice and use of theory, and in chapter 6, I explain my choice and use of methodology and methods, and discuss questions around the validity, reliability and credibility of the results, and my approach to research ethics, as adopted in the articles. In chapter 7, I synthesise my results on BL, and time and access to higher education with the help of Adam's social theory of time. In the discussion section, chapter 8, I use Luciano Floridi's Philosophy of Information to discuss contemporary concepts in ICTs and learning through a new dimension, followed by a discussion of my own results in this new light. A finishing chapter 9 with my concluding remarks, returns to the aim and the research questions and offers some final reflections.

2.4 An uncharted spot on the map?

In this research, *access* in BL setups, arrangements and solutions are approached as the uncharted spot that is found on the research knowledge map: to research, describe and report. However, the metaphor of human knowledge as a map with uncharted spots is viewed by Alvesson and Kärreman (2011, p. 23) as conceptually retired in social research. The map metaphor is overly influenced by positivism. Social research is not a project with a final goal in sight, working toward a future in which all knowledge gaps have been filled to render a complete map. However, metaphors can be useful despite their flaws. In the long-term, we may not at any time have a common final map, but we can continue to invest our efforts into interpreting and describing the world.

Karl Popper discussed research objects within different traditions as *clocks* or *clouds* (Popper, 1979), where clocks represented research objects with regular, orderly and highly predictable systems, while clouds represented highly irregular, disorderly or less predictable systems. The natural sciences once took as given that by pursuing research, in due time, all clouds will prove to be clocks, but have since modified that position. Social researchers have the important task of studying everyday events, which often appear as agreeing with common sense, as normal and clear, and problematise them to uncover new dimensions and complexities. Clocks become more cloud-like. In this dissertation, I scrutinise some commonly-used terms and concepts from the field of ICTs in education, from DL, EL and OL to BL, and attempt to show that they are not as clocklike as many practitioners may think. Subsequently, I attempt to make it possible to handle these cloud of ICTs and education in thought and action.

3. Contextual Frameworks

In this section of the synthesis, I provide two contexts for my research and reflection on the use of ICTs in education, which bring together my empirical and conceptual approaches. The purpose of these contexts is that they act as background frameworks for the research, and facilitate the positioning and understanding of the articles, and of my theoretical discussions and reflections. I examine the following:

- 1. Sociodemographics and education in Northern Sweden**, in relation to the need for and the access to higher education in the region. This provides a spatial context for the research, given the challenging geography and demography of Northern Sweden. Exploring the spatial distribution of education provision at all educational levels helps to understand the strategies and aspirations of municipalities, the institutional dimensions and designs of universities for higher education provision, and the organisational questions of delivery and logistics. This spatial and sociodemographic approach brings issues of social justice to the fore, particularly in relation to who has access to which provision and how.
- 2. Review of Distance-, E- and Online learning concepts**
This contextual framework is analytical and conceptual, and concentrates on terms such as DL, EL and OL and their use in relation to time, space and access. It constitutes a background for reasoning about the further integration of ICTs into mainstream educational offerings (BL).

These two areas provide contextual frameworks, firstly for the ensuing chapter 4, which provides a literature review on BL, as well as a critique of the term and applications of the concepts of BL. I will revisit these two contextual frameworks in the discussion section in order to elaborate on further dimensions within which to frame my research.

3.1 Sociodemographics and education in Northern Sweden

3.1.1 Demography and education levels

Northern Sweden faces a number of structural challenges to the provision of higher education.³ In comparison with other European countries, Sweden is sparsely populated as a whole, with an average of 20 inhabitants per km². In the two counties covering the upper North, Västerbotten and Norrbotten (with a total of 513,111 inhabitants), the population is mostly concentrated along a narrow coastal strip of the Bothnic Gulf, which leaves the inland and mountain regions very sparsely populated: the municipality of Arjeplog has an average of 0.23 inhabitants per km² (SCB, 2016).

The education levels for 2015 that are used here are percentages of individuals aged 25-64 who have *a total of 3 years of post-upper-secondary education or more*, but not necessarily an exam, or only university studies. The Swedish average for this group in 2015 (SCB, 2016) is 26% but ranged from 57% in Danderyd in the Stockholm area to 10-11%, as in Dorotea, located in Västerbotten.

The education level percentages in the two cities with a main university campus, Umeå and Luleå, are 38% and 30% respectively. In Skellefteå, with a commuting time of two hours to the Umeå or Luleå campuses, it is 21%. In general, the longer distance to a campus, the lower educational level with some variations (Holm, Karlsson, Strömberg & Westin, 2013, pp. 44-48; Lovén, Hammarlund & Nordin, 2016, pp. 25-37; SOU 2017:1, p. 118; Frenette, 2004). There are then naturally also considerable regional differences in present recruitment to higher education (UKÄ, 2014; 2015b), and it is explicable that “young people from metropolitan areas are more likely to study” (title of press release, UKÄ, 2015a).

3.1.2 Education as a centralising factor

It has commonly been assumed that there is a direct correlation between the growth of larger cities in a region relative to the depopulation of smaller communities around them. This correlation is not obvious today. Urbanisation has been taking place for a long time, and population pyramids now look very different in cities and rural communities and thereby birth rates in relation to death rates (SKL 2015, p. 8). Cities also attract more people from other regions and countries, moving into work and study.

An interim report from Landsbygdskommitten (SOU 2016, pp. 115-126), reports that municipalities with weak education access lack sufficient numbers of educated people to take the jobs that are available and that increasingly fewer jobs suit the people with lower education levels

³ The following does not discuss the university cities of Umeå, Luleå, Sundsvall, Östersund and their directly surrounding areas, where education access is less problematic, but rather the rest of Northern Sweden.

(Pettersson, 2011). If public services such as health and education in a region cannot find qualified people to hire, these services often become centralised and thereby not as directly available to the local population. Östh (2016), who studied the centralisation of state and regional jobs, found that education and health services centralise much more quickly than similar services in the private sector. Rather than stating the common idea that “services decline because people have moved away”, it is more accurate to say that “people must move because services have moved”. This further decreases the attraction of and the interest of businesses to move to or grow in less populated areas (SOU, 2016 p. 117, Företagarna, 2016). The given reason for centralisation is often effectiveness, but Östh (2016) argues that this development and strategy is not based on evidence, but on ignorance about conditions and possibilities in rural areas.

Higher education is a national system in Sweden and shows a similar pattern of centralisation, both in course provision for lifelong learning (Landell, 2015, pp. 16, 20, 22) and in off-campus infrastructure for higher education that is run by Swedish universities. The earlier university-driven branch campuses in the Swedish cities Boden, Vänersborg, Uddevalla, Sandviken, Örnsköldsvik and Härnösand are no longer run by the universities of which they once formed part, but as campus platforms or learning centres that are run by their municipalities, who regard them as inalienable.⁴

3.1.3 Locally driven learning environments

Local communities that lie far from a university campus suffer not only from low education levels but also from ongoing brain drain. The classic brain drain is considered to be normal, unavoidable and even positive: upper-secondary school graduates from a traditional family background leave for a university town. The local community has a number of options available to counterbalance this by taking measures to educate a part of the remaining potential students. These students can often only be attracted to education solutions that permit them to stay where they are living: DL or OL solutions, or possibly commuting to a campus whenever possible. Personal constraints that come with age, family, accommodation and economic liabilities prevent

⁴ An interesting case is the proposed closure of the Borlänge campus of Dalarna University, as a result of its centralisation to the campus in Falun. The minister of higher education, Helene Hellmark Knutsson, interfered in the university decision process and reported that the government had decided that Borlänge campus should be kept in operation, because “the state should not abandon people and communities” (<http://www.dt.se/opinion/debatt/ministern-om-hogskolan-dalarna-manniskor-och-orter-ska-inte-overges-av-staten-hela-landet-ska-leva>). The vice chancellors of the Swedish universities protested jointly and instantly, regarding this as an attack on university autonomy (<http://www.dt.se/opinion/debatt/35-rektoreryter-regeringsbeslutet-om-hogskolan-dalarna-en-principfragga-med-langtgaende-konsekvenser>). The minister replied that she did respect autonomy and academic freedom, but that education access and provision are a national, political responsibility. Borlänge campus is situated 22 km from the main campus of Dalarna University, in Falun: a short distance in comparison with the general conditions in Northern Sweden.

these groups from acting as free-moving students (SOU, 2016, pp. 250-252; Lundholm, Garvill, Malmberg & Westin, 2004).

The situation of community learning centres is described in the background section of article 3. Part of this research has been an active collaboration with Akademi Norr, an association of 13 municipalities with learning centres that serve DL students from their own and the surrounding communities. Most of these municipalities are situated outside of a reasonable daily commuting distance to a campus.⁵

With 72,000 inhabitants, Skellefteå is in a similar situation to that of smaller inland communities regarding the supply of competence. It has a work market in the IT and industry sectors with a considerable need for an educated workforce. A multi-institutional campus, *Campus Skellefteå*, was built and maintained by the municipality for hosting a branch unit of Luleå University of Technology and decentralised educations from Umeå University, while also providing general learning-centre and campus services. See article 5. Cities in Sweden with a similar situation and similar campus strategies are Boden, Örnsköldsvik, Härnösand, Västervik and Varberg.

A new hope for troubled communities and the potential second-chance students who live in them may be that modern higher education is nevertheless under transformation, enabled by ICTs, to become more accessible, inclusive, place-independent and flexible in time. Alternative and innovative understandings and models of what ICT can do are very welcome, in both education and society at large.

3.1.4 Off-campus education provision

The term *education logistics* is used here to relate to the organisation of activities and the instruments of an education provider to offer access to education to its target groups of potential students. The archetypal education provision forms that have been used in recent years in Northern Sweden are the following:

- a) *Conventional classroom-based education* on a central campus, not critically dependent on ICTs.
- b) *Decentralised education* - education in classrooms outside of the main campus and with travelling teachers.
- c) *Synchronous video-conference education* - taught from a video studio at a central campus, or recently also from classrooms with students, to a studio at a learning centre in the region or to homes and workplaces.

⁵ The total population of these 13 municipalities in Akademi Norr (www.akademinorr.se) constitutes about 1% of the Swedish population, but the area covers over 18.2% of Sweden's land area (based on calculation on data from SCB, Statistikdatabasen, 2016).

- d) *Asynchronous web-based education* - flexible education with time frames but no specific times or places to attend.
- e) Increasing *mixes and blends* of the above.

In this overview, (a-c) forms refer to an underlying centre-periphery model, in which the use of ICTs become more advanced the further away from a centre a student is located. However, the courses described in (d) are more place-independent and also attended by campus-based students or local working students. At the University of Central Florida, Dziuban and Moskal found that for most students, “a course is a course is a course” (2011, p. 236) and the most important issues affecting students’ uptake of courses are convenience and the personal life puzzle. Students who live near a university campus, but have time obstacles during the day, can be as limited in their capacity to participate in (a) as the very remote students, due to time- rather than place-related obstacles.

Asynchronous education (d) seems at first glance to be suited to substitute both decentralised (b) and video-conferenced (c) education provisions. For some students, this form works well (Ericsson, 2006), but can be quite demanding for students with no previous higher-education experience (SOU 2017:1, p. 128). Study skills, study discipline, self-confidence, strong motivation, communication skills and courage to ask for help are important and can be more challenging for young or inexperienced students following asynchronous courses (Simpson, 2008, Duranton & Mason, 2012, Guri-Rosenblit, 2006, p. 165). The set of offerings in asynchronous education has also been rather narrow, with more short courses than programs. Asynchronous studies also often take the local learning centre out of the loop, so that it cannot effectively support local students.

3.1.5 Recent developments

In the last decade, the following developments in education provision in Northern Sweden can be noted:⁶ Decentralised education (b), with teachers travelling to remote students in local classrooms, has almost disappeared in 2016. To some extent, this was expected since central campuses increased their use of ICTs. To have teachers travel to classroom-based students located two hours away is a rather resource-consuming practice, so education is instead centralised or runs in parallel campus- and distance- or online versions. A quite recent development is the parallel operation of distribution forms (a) and (c). Instead of a separate decentralised operation (b), there are synchronous broadcasts from a classroom with students at a central campus to a remote location, such as a video studio at a learning

⁶ This is my own account as a professional working actively with these questions; it can likely be supported from combining information from education catalogues, policy documents and statistical reports, which goes too far for this synthesis. No research publication has, as far as I know, covered these issues.

centre. These studio facilities for synchronous video conferencing have become less of necessity because broadcasting can now occur directly to homes and workplaces, or because it is available asynchronously online. The learning centres have thereby lost much of their social functions in hosting meetings. Article 3 presents a design and study attempting to regain traction for the learning centre as a meeting place.

A mixing of the education-distribution forms (b-d) is currently developing. Campus groups use Learning Management Systems (LMSs) and *flip the classroom* with recorded lectures, asynchronous courses use some synchronous components (which Art. 4 considers in more depth), and the global provision of asynchronous courses and local social arrangements can be combined (Art. 3). The use of lecture capture technology in the HyFlex model (Beatty, 2007), blended synchronous learning (Bower, Kenney, Dalgarno, Lee, & Kennedy, 2013) and the organisation of student options for access in a multi-access pattern (Irvine, Code & Richards, 2013) provide further examples.

The provision of education categorised as *distance education*, which includes both asynchronous and synchronous solutions, has overall diminished in Sweden since 2011 (Landell, 2015, p. 15; UKÄ 2015b, p. 30), partly due to new funding schemes. Universities now receive funding when a student completes courses and very little funding at the stage of student registration. In 2016, distance education provision was reported to have stabilised, though at a lower level than earlier periods (UKÄ, 2015b, p. 34). This, together with a situation of the universities' full use of state-funded student places, has led to a higher concentration of programmes on campuses, attracting primarily young people and conventional full-time students. It can, however, be the case that the parallel synchronous operations between campus classrooms and learning centres described above, are not listed as separate distance educations, and that student-made solutions of flexibility also increase (Norberg, 2012).

To summarise; Northern Sweden is characterised by long distances and a sparse population with lower levels of education than the national average, outside of the university cities. In a developing knowledge society, an increasing number of jobs, also in smaller communities, demand higher education, but these positions can be difficult to fill. Simultaneously, local potential students, including young as well as second-chance learners, can be recruited to education if it is possible to study close to home. ICT-enabled education has indeed provided increased access, but not on a broader and sustainable basis. The flexible education that is offered consists more often of stand-alone courses than programmes (Amneus, 2011, p. 13), often appears just once and cannot continue due to reasons such as lack of extra resources and the demand for filled classes.

3.1.6 Policy signals in early 2017

The first of the Swedish Government Official Reports in 2017 (SOU 2017:1), on January 4th, was the final report from *Parlamentariska Landsbygds-kommitten* (The parliamentary committee for rural issues). The report states that "access to higher education in the local area is an important factor for the development of business life and public sector" (p. 117). If a university campus is too far away from the place of living, many potential students will refrain from higher education (p. 118). An access dimension of higher education can be added to Swedish university law (p. 120), and universities can be given assignments to increase access in the whole country, by distance education and via local education centres. The report states that development of education access has been slowing down in recent years, as many universities have concentrated their actions around their central campuses. The universities have seen strategical reasons to do so, to strengthen research environments and reach economies of scale in education. The state, however, is responsible for education access in the whole country. Universities are proposed to increase the access to higher education, addressing especially areas with low educational levels and lack of educated workforce in municipalities far from central campuses. Universities can be demanded to report yearly on progress on these issues in their budget dialogue with the state. Nine proposed measures in the report (nr 31-39) addresses the national supply of competencies and skills over the whole country.

The term *decentralised education* seems to be taken back into active educational policy use (SOU 2017:1, p. 118-120). The report recommends the universities to work through educational centres close to citizens in regions far from university campuses. The government will, so is proposed, support the establishment of such centres where they are missing, and also provide basic funding for the work at educational centres. Working via educational centres is prioritised because of the better study results for students who get support at centres and campuses, in comparison with results of students in other distance- or online solutions. This difference is regarded as crucial (p. 128). The educated workforce who settles in defined regions with extra needs of competence will also be able to write off their study loans under more favourable conditions.

The background research for these proposals in the report (Lovén et al., 2016) suggests there is a realisation at the national and local levels about the importance of connecting local educational developments to national higher education infrastructure. In line with the current research, the report highlights the needs to connect local access to education to a moving workforce that has high skills and levels of competence.

3.2 Review of Distance-, E- and Online learning concepts

3.2.1 Introduction

In the following section, I will focus on the concepts of DL, EL and OL as frames of understanding, by drawing on particular assumptions about access in time and space. All three of these concepts are also a necessary background for reasoning about BL (Goodyear & Ellis, 2008, p. 142), and the following is not intended as general reviews of DL, EL and OL, but instead focussing on what these concepts are bringing into the BL concept.

Currently, DL, EL and OL are dependent on ICTs. With the usual risk of categorisation, DL is focused on access to education over geographical distances, EL emphasises ICTs as new tools for teaching and in learning processes, and OL adds a focus on new environments for learning by using ICTs and addressing the needs of DL.

3.2.2 Distance learning

DL is a concept with old roots and many ICTs before the digital age (Holmberg, 1995). Many definitions agree that the teachers' and students' different locations are the main characterising element of DL. However, there are considerable differences between asynchronous DL (both as correspondence studies and web-based asynchronous courses) and synchronous DL that is implemented through video conference. Kaufmann (1989), writes about three historical generations of DL (1989, p. 5), characterised by increasing levels of learner control. Moore and Kearsley (1996) take a longer media-related perspective and write about five generations of distance education, but Heydenrych and Prinsloo (2010) has shown that also this description has weaknesses.

Peters (1967) considers DL as an *industrialisation* of the education process in an assembly line, whereas Holmberg (1983) emphasises the importance of *didactic conversations* between the tutor and the remote individual student in both synchronous and asynchronous forms. Moore (1993) problematises distance as *transactional distance*: the cognitive space between instructors and learners in a DL situation, also dependent on factors other than geographical distance, such as structure, dialogue and learner autonomy. Garrison (1990) discusses DL based on *interactions and transactions* in three dimensions; between student-student, student-teacher and student-content, while Anderson (2003, 2008) emphasises the student-content dimension in his *Interaction Equivalency Theorem*, suggesting that if one of three types of interaction is on a high level, the other two could be on a lower level or even non-existent. Higher levels of the two other interaction types result in a better learning experience but are not as cost- and time-effective.

In practice, DL and especially synchronous DL is not necessarily flexible. Both time and place dimensions can be specified, but the place of the student is remote, and the perceived flexibility is consequently a new possibility to participate remotely. If an LMS is used alongside synchronous sessions, the setup is sometimes called OL instead. This is especially the case for recorded lectures and when both the place and time of participation become optional within given time frames.

Time demands for DL have often shown to be a not fully expected shock to learners (Leeds, 2014). If the time and place demands of a campus are absent, learners may imagine that remaining time demands are low. They are often in for a temporal culture shock when coming into a DL course (Leeds, 2014, p. 187).

For BL, the DL tradition contributes mainly with the idea that an increasing spatial separation between teacher and learners is possible. BL adopts this DL idea for constructing a more negotiable teaching and learning situation what concerns teacher and learner presence and interaction. The DL as a centre-periphery metaphor indicates that teaching has to be transported (Meyer, 2005), but in BL this can be negotiated. The idea is not commonly to create a half-distance education but to optimise learning, flexibility and economy.

3.2.3 E-learning

Research on EL is interested mainly in how new ICTs can contribute to learning. As ICTs can handle an abundance of information in many forms, the cognitive load on students can become heavy (Mayer & Moreno, 2003; Bradford, 2011). Cognitive load theory (Mayer & Moreno, 2003), based on working-memory research, is used for studying how different content can be accessed, presented, designed, chunked, sequenced, presented in multiple media forms and internally related in order to facilitate learning, and preferably deeper learning, when possible. On the learner side, there is a need for motivation, control and overview, personalisation and feeling of presence, and freedom of expression for deep learning (DeRouin, Fritzsche & Salas, 2004). Later, communication tools and platforms for interaction and collaboration became increasingly important, as more and better enabling ICTs became available.

Many existing learning theories have been developed and adapted to theorise and research EL, including behaviourism, social constructivism, constructionism, activity theory and cognitivism. Some models have also been influential, such as Lave and Wenger's *Situated Learning and Community of Practice* (1991) which emphasises that the ideal social context for learning is the the learner's context of application; a workplace, not a school setting. Laurillard's *conversational model* (2002) stresses the

importance of learning feedback loops between teacher and students. Salmon's *e-moderating model* (2004) is designed for fostering social interaction in EL. Garrison, Anderson and Archer's *Community of Inquiry model* (CoI) (1999) accentuates the combination of three forms of presence, namely *cognitive, social* and *teaching* presence, which together form the educational experience. The CoI model builds on Dewey (1915, reprint 2004) and Lave and Wenger (1991).

In its beginnings, EL was mainly associated with *delivering* structured content for personal learning *anytime and anyplace* (Henry, 2001). This accorded well with what the Internet could provide at the time and with its use before the arrival of social media. Access to and dissemination of content and information was later to be followed by more interactive functions such as forums and online collaboration. EL has been used in order to increase access in space and time, but the concept itself does not suggest or state this clearly, as is the case for DL and OL. Salmon states, in a more problematising way, the following:

E-learning is in a rather extraordinary position. It was bought as a 'tool' and now finds itself in the guise of a somewhat wobbly arrow of change. In practice, changing the way thousands of teachers teach, learners learn, innovation is promoted and sustainable change in traditional institutions is achieved across hundreds of different disciplines is a demanding endeavour that will not be achieved by learning technologies alone. It involves art, craft and science as well as technology (Salmon, 2005, p.201).

In practice, EL is not primarily interested in places, times and access, but rather in use of ICTs for learning, which in turn can provide, among other effects, flexibility in space and time, as time and place become negotiable with the use of ICTs. E-learning does not prescribe an alternative place for learning, but rather provides the affordances that are to be evaluated and taken into use for course design in DL, OL and campus courses. From its beginnings, EL has also a root in older unconnected and standalone digital training applications such as Computer-Based Training, CBT. Since long, it uses the Internet as its platform, with rich and accessible material online and abundant communication and interaction possibilities.

For BL, the EL tradition contributes with an instrumental and technical emphasis primarily on learning enhancement but also for flexibility in space and time.

3.2.4 Online Learning

OL theory draws on EL theory but relates it to a study of the new shared *online environment* in which EL is practised, thereby also addressing some

of the place-related needs behind DL. New dimensions are however added by this new environment, namely questions about social presence (Tu, 2002), privacy, interaction, behaviour and ethics (Anderson & Simpson, 2007). It also raises questions about the design of an online learning environment, in relation to the Internet as a whole and to the traditional physical-social everyday environment in which we live, sometimes called In Real Life, IRL. For Carlen & Jobring (2005), the online learning environment forms a *community* for participants. This social participation with shared goals is an important aspect in understanding and developing OL (Jaldemark, Lindberg & Olofsson, 2005; Hrastinski, 2009).

According to Söderström, From, Lövgvist and Törnquist (2012), OL as a practice in Sweden is largely substituted DL by 2010. Online learning is generally seen as time- and place-independent and thereby very accessible, provided that the individual has access to appropriate IT equipment and communication. The flexibility can have limitations if it offers synchronous sessions at specific times, for which there can be good reasons: for instance, a mix of synchronous and asynchronous interactions are a good match in a learning process (Hrastinski, 2008; Sheail, 2015; Black, 2010). However, OL does not solve problems of a local place to study for the student. From a management perspective, this is considered to be easy to solve by students independently. This may not be the case; Rye and Støkken (2012) point to the student's local context as very crucial also in online education, and Raddon (2007) views both the place and time of the local online student as continuous negotiations between demands of education, work and family situation. Sheail and Ross argue that place in online learning should be made more visible (2016).

3.2.5 Summary

In surveying academics in 12 countries, Moore, Dickson-Dean and Galyen (2011) found that the terms DL, EL and OL often appeared to mean approximately the same for their respondents. An explanation may be that they are primarily viewed as ICT-enabled alternatives or competitors to traditional classroom teaching and learning, which draws attention from the differences between them.

DL, EL and OL are, as shown above, related differently to time, place and access, but the concepts are nested into one another. One aspect they have in common is that they are often perceived as alternatives (Moore et al., 2011), disruptions or deviations from the ordinary events and practices in classroom and campuses (place, technology and alternative environment), which is currently often called face-to-face classroom (Meyer, 2003), not to be confused with anything remote, digital or online.

Allen and Seaman (2003) point out that the OL and DL concepts have continuously been troubled by widespread doubts:

One of the most frustrating factors facing the early advocates of online learning was the perception that the quality of these offerings would always be inferior to that of face-to-face instruction. Whether this was based on experience with earlier generation "correspondence courses," or a belief that the essence of teaching is the irreplaceable quality of face-to-face interaction was unclear. What was clear, however, was that the belief that online learning was of lower quality was widely held. (Allen & Seaman, 2003, p.3).

The expressions *distance learning*, *e-learning* and *online learning* with various definitions and integrations with one another, are all representing ideas of what ICTs can do for education and how they modify education. The three concepts discussed here, DL, EL and OL, are the most visible on the Internet as well. In what follows, I present a statistical table that is based on a review of expressions found on the Internet with Google searches, in which the noun is a conventional education noun and the preceding modifier is ICT-related, as in "digital classroom", thereby indicating an ICT-related change of the traditional concept. A similar table is presented for integration expressions in chapter 4 (such as "blended", "hybrid", "seamless").

Table 3 shows the occurrences of combined expressions with an old educational noun, like *learning*, *teaching*, *classroom*, *education*, *course* and *campus*, preceded by an ICT-related modifier as *digital*, *virtual*, *mobile*, *online*, *e-*, *cloud*, *distance*, *Internet*, *net*, *web* and *flexible*. These combined expressions were searched within citation marks, "digital learning" with Google search, on 2016-02-18. The inclusion criterion was >1,000 occurrences in all combinations, so some similar expressions were excluded.

Learning is the most attractive word to modify for all but two modifiers, which is interesting when it is apparent that a lot of what is behind does not primarily concern learning theory or adaption of practices from the student perspective. For a discussion of the increased recent use of the term learning, see Biesta, (2015, p. 62-64).

Table 1. Occurrences on the Internet: ICT and education expressions⁷

	LEARNING	TEACHING	CLASSROOM	EDUCATION	COURSE	CAMPUS
DIGITAL	3 230 000	237 000	438 000	514 000	171 000	262 000
VIRTUAL	2 130 000	64 300	685 000	362 000	207 000	617 000
MOBILE	1 600 000	50 300	165 000	334 000	61 600	150 000
ONLINE	20 200 000	4 940 000	515 000	13 500 000	14 100 000	477 000
E-	53 300 000	266 000	222 000	508 000	572 000	518 000
CLOUD	95 600	16 300	26 700	63 600	26 100	76 500
DISTANCE	22 100 000	347 000	5 810	12 700 000	447 000	8 690
INTERNET	334 000	63 200	34 500	366 000	192 000	45 300
NET	240 000	114000	58400	41000	399 000	182000
WEB	246 000	67 500	42 500	189 000	239 000	143 000
FLEXIBLE	586 000	99 000	32 000	86 300	306 000	4 130

⁷ Yellow shows the most frequent expression overall in this data set, namely “E-learning”. Green show the most frequent noun for the modifier (if not yellow) for Internet, namely “education”. Blue shows the most frequent combination partner for the modified education noun (if not yellow) for teaching, namely “online”. The most frequently used expressions are three modifiers which are combined with the noun learning, namely “E-” (53,300,000), “distance” (22,100,000) and “online” (20,200,000).

4. Blended Learning: Conceptual Issues

4.1 Origins of the term

BL is a term that refers to a concept, a set of practices, but also a research field. It should be understood against the background of DL, EL and OL (Goodyear & Ellis, 2008, p. 142), in which ICTs enable education to be constructed and delivered in new ways, and are often aimed at new groups of students. Blended learning, on the other hand, uses ICTs for integration into that which is existing, mainstream or traditional.

The term BL has been used in higher education for at least 15 years, but Sharpe, Benfield and Francis (2006, p. 29) claim that it was established within the context of the UK Open University, already in the late 1980s, as a result of a combination of workplace-based and campus-based learning. Bonk and Graham (2006) write that BL is “part of the ongoing convergence of two archetypal learning environments” (p.5); the face-to-face classroom environment and the distributed distance environment. At the outset, these environments existed separately, were intended for different learners and used different methods. ICTs were not critical for the campus teaching operations, but necessary for the distance environment. The background to this convergence can be viewed from both archetypal environments. Campus teachers and students began to use more digital tools for effectiveness and smoothness when it was observed that students in the distance and online settings had good use of Internet content and communication, and also when ICTs were beginning to be commonly used in everyday life. The digital tools were no longer reserved for the non-campus students and for overcoming distances. Rather, the focus was on how to use the new technology within the mainstream environment for campus-based students: EL could contribute to the campus environment (Scagnoli, Buki & Johnson, 2007).

From within the research and practice groups operating on distance environments, disappointment was growing. Between 2001 and 2003, there had been a fast growth of EL offerings from both public and commercial, as well as old and new stakeholders at the beginning of the new millennium. The UK E-learning university is one example, with increasingly many other university consortia with similar provisions (Bates, 2005, p. 33-40). Courses failed to recruit or lost many of their students, often lifelong learners and second-chance learners, due to their (frequently) limited competence in using the technology. Guri-Rosenblit (2006) observed a paradox in that “second-chance and unprepared students are less qualified to use information and communication technologies for their purposes”, despite them being the students that most strongly needed access to EL (2006, p. 165). In the early 2000s, there were calls for slowing down and even

temporarily reversing the all-too-fast EL tooling of distance courses and instead adding some face-to-face meetings again (Sharpe et al., 2006, p. 20). In the corporate sector, the hopes for savings and effectiveness gains in training with content-based asynchronous EL saw a similar turn-around (Finkelstein, 2006). Within this context, BL was viewed as a smoother introduction for a later transition to EL, especially in relation to corporate learning (Driscoll, 2002). A common term at this time was subsequently “blended e-learning” (Sharpe et al., 2006, part of title).

4.2 Definition questions

The term BL appears to have initially caught on without any great controversies, although it can appear as neither ‘high-tech’ or particularly ‘academic’. In an earlier phase of the period in which BL discussions were new and aspirations for its applications were high, the conceptual articles that attempted to define BL were many, as expected. The ideas were dispersed, especially about what components should be considered to be *blended* (see table 2).

Garrison and Kanuka (2004) write that “at its simplest, BL is the thoughtful integration of classroom face-to-face learning experiences with online experiences” (p. 96). But, they also argue that BL faces considerable complexity: “...in its implementation with the challenge of virtually limitless design possibilities and applicability to so many contexts” (p. 96). The vast scope of options makes BL a challenge. Garrison and Kanuka (2004) issue a warning against merely adding new approaches or methods to traditional ones, and recommend teachers and course designers to carefully reflect and try out functional combinations of learning environments and technologies. There is much to gain, for example, from a “simultaneous, independent and collaborative learning experience”, in which learners can be independent of space and time, yet remain together. They also find their known constructivist learning model, Communities of Inquiry (CoI), to be useful in classrooms as well as in online or blended settings (Garrison and Kanuka, 2004, p. 97; Garrison & Vaughan, 2008).

One of the most general and inclusive research definitions comes from Graham (2006): “Blended learning systems combine face-to-face instruction with computer-mediated instruction” (p. 5). It is noteworthy that Graham defines not BL, but *BL systems* in order to enable a frame for understanding this phenomenon more broadly. This also enables research on practises that are called BL, in addition to discussions of any inherent or ideal meanings of the term.

Table 2: Some occurring dimensions of BL⁸

The blend concerns	What is being blended?	Component A	Component B
<i>Delivery</i>	Instruction, content	Face-to-face education	Distance education
<i>Technology</i>	Tools for instruction and learning	Analogue tools	Digital and web-based tools
<i>Chronology</i>	Interventions, modalities	Synchronous	Asynchronous
<i>Place I</i>	Learning environment	Classroom	Online environment
<i>Place II</i>	Learning environment	Classroom-based	Practice-based
<i>Roles</i>	Groupings of learners	Multi-disciplinary group	Professional group
<i>Pedagogy</i>	Pedagogical approaches	(As a one-to-many approach)	(As a problem-based or peer-to-peer approach)
<i>Focus</i>	Aims	Content, knowledge	Skills
<i>Direction</i>	Actors directing learning	Instructor-directed	Autonomous or learner-directed

Salmon (2005) notes another critical difficulty in the concept of a 'blend': "To date, the differences and similarities between online, traditional distance and physical-based teaching have been little understood, leading to confused notions of the panacea of 'blend'" (p. 202). If one does not know clearly what one is blending, the result will continue to carry such uncertainties. Oliver and Trigwell (2005) raise a similar point about the problematic nature of technology and our understanding of its role in relation to all learning, rather than its electronic form exclusively:

As soon as a principled position is taken, the term 'e-learning' becomes problematic. From an activity theoretic perspective (Kuutti, 1996), for example, all activities involve a technology of some sort and there is no particular reason to distinguish between those with and without the 'e-' prefix. Equally, there is no definition of 'traditional' learning (p. 19).

⁸ Developed in part after Sharpe, et al. 2006, p. 17.

4.3 BL as a pragmatic term

Sharpe et al. (2006) found three basic kinds of BL in their review of about 300 BL projects, reports and publications in the UK, specified as follows:

1. The *online provision of supplementary resources* besides traditionally managed courses.
2. *More transformative practices with radical course designs* making use of new technology to facilitate learning.
3. *Students' self-developed practices* when "taking a holistic view of the interaction of technology and their learning". This third type of BL is viewed as "both under reported and under-researched" (p. 2-3).

Their recommendation was clear, although unusual in its motivation and formulated as follows:

Use the term blended learning. Although difficult to define, the term 'blended learning' is finding acceptance among higher education staff. We suggest that the advantages of the term include its poor definition - which allows staff to negotiate their own meaning - the implication of the protection of face to face teaching, and the implication of designing for active learning (p. 4).

Blended learning appears to have been an inviting and inclusive term. Many ideas were generated and developed together in teaching and learning practices. Laumakis, Graham and Dziuban (2009) understand the variety of BL interpretations combined with the unity, in future expectations, with boundary object theory, which they describe in the following quote:

Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use (Star and Griesemer, 1989, p. 393).

According to Laumakis et al. (2009), BL could be such a boundary object, for instance in expressions such as "the net generation", which also accommodate a variation in meaning and simultaneously a degree of general unity. Similarly, Driscoll (2002) finds that "the point is that blended learning means different things to different people, which illustrates its widely untapped potential" (p. 1). Still, it is clear that the affordances with BL are considered in various ways: better learning (Means, Toyama, Murphy, Bakia & Jones, 2009), increased access and customizability (Mayadas & Picciano,

2007) and solving direct and defined problems in a specific education in crisis (Twigg, 2003).

4.4 Critique of the BL expression

The expression BL has been criticised, for example by Oliver and Trigwell (2005), who find that the term, despite its increasing popularity, is ill-defined, lacks clarity and is being used inconsistently (p. 24). There is no blending theory on which to build BL and *learning* is not something that can be *blended* in any meaningful sense. Most of what is written about BL is about teaching arrangements, rather than about learning. The authors suggest that “the word ‘learning’ (should) be rightfully returned to the learner” (p. 24) and propose using variation theory instead (Runesson, 2005), as a guide for how to choose and utilise ICTs and customise them so that they can be useful in enhancing student learning. It should, however, be noted that Oliver and Trigwell (2005) are not at all opposed to the use of ICTs in enhancing mainstream education. On the contrary, the question is rather whether referring to this as BL helps in understanding such an integration of ICT. Oliver and Trigwell (2005) also recommend that we imagine the *unblended* pedagogic situation and start conceptual work from there⁹. In imagining what is blended while not viewing *learning* or *teaching* in isolation either, Vygotsky’s concept of *обучение* (*obuchenie*) (1980, pp. 79-90) as the teaching-learning activity can be useful. The direct translation of *obuchenie* to English has proved to be no easy task (Cole, 2009). Biesta (2015, pp. 62-64) scrutinises the increased use of the term *learning*, as a marketing-motivated “new language of learning”, or *learnification* of education.

4.5 ‘Blended learning’ - a research term?

The BL research field overlaps with other fields, such as Computer Supported Collaborative Learning (Dillenbourg, 2002), Technology-Enhanced Learning (Dror, 2008), Fach-Didaktik (Hudson, 2009) and T-PACK theory (Mishra & Koehler, 2008). These are described in more detail in the literature review in article 2.

In article 2, we found no major difference between Europe and North America in the usage frequency of the BL expression while exploring

⁹ I have made an attempt to imagine such an “unblended” teaching and learning situation in an invited blog post, on <https://blended.online.ucf.edu/morning-blend/a-back-to-basics-thought-experiment-about-blended-learning/>.

university websites for North American and European universities. Teachers and administrators appear to use the term in both regions. In the research reviews, however, we observed significant differences. Generally speaking, BL is not a research term that is of importance in Europe, as researchers there prefer other disciplinary categorisations and traditions, compared to North America. Similarly, there is in Europe not much corresponding to the research traditions of instructional design and instructional technology in North America. ICT questions in education in Europe are often addressed in computer science and informatics, and by teachers who research their own teaching practice, besides educational researchers. Biesta (2011) argues that education in Europe is a research subject, not only a research object.

BL research has initially worked with definitions and categorisations, but also increasingly with models: Graham proposes a value-adding categorisation in enabling, enhancing and transforming blends (2006); Picciano and Dziuban (2007) introduce a conceptualisation of BL as variable on a scale from fully online to fully conventional face-to-face; Garrison & Vaughan (2008) adapt *Communities of Inquiry* as a BL model (Shea & Bidjerano, 2010); BL models for *Course Redesign* address specific problems (Twiggs, 2003); Graham presents the challenge for BL in combining the *best of two environments* (2006); and Khan's *Octagonal framework* for BL (2005) also covers organisational perspectives on BL. In the corporate sector, BL was interpreted and applied by using many components in a designed blend, such as *IBM's Four Tier Model* for BL (Hall & LeCavalier, 2000); Clark's *multiple component concept* of BL (2003); Carman's *multiple ingredient blending* (2002) and Bersin's *sequential program* approach versus the *core-and-spoke* approach (2004).

Recent research about blended learning, besides many case studies, has dealt with questions about institutional adoption and implementation of DL (Moskal, Dziuban & Hartman, 2013; Graham, Woodfield & Harrison, 2013; Porter, Graham, Spring and Welch, 2014). Other research has focused on the construction of student and faculty experience of blended learning, as for example ambivalence concerning online and blended learning, related to convenience and social priorities (Dziuban, Moskal, Kramer & Thompson, 2013). Recent bibliographic reviews of research trends in BL comprise overviews of the most-frequently cited research articles (Halverson, Graham, Spring & Drysdale, 2012) and dissertations (Drysdale, Graham, Halverson & Spring, 2013).

BL research seldom deals with questions about access to education: these questions still tend to be considered to be part of the DL, EL and OL fields, as BL is commonly viewed as a campus-based phenomenon. The access, gains or losses with BL arrangements are considered to be incidental and seldom researched or theorised, although there are a few examples in this direction (Mayadas & Picciano, 2007; Power 2008). This dissertation

focusses on access: can we hope that BL, interpreted as ICT-integrated sustainable forms of teaching and learning, will be designed as more inclusive, for instance by enabling conventional full-time campus students to study together with working students who are located far from the physical campus?

4.6 Broadening the scope of BL concepts

There are other concepts in research and practise that are similar to BL, which emphasise the integration of ICTs with traditional education in one way or another, rather than presenting alternatives to traditional education (as in table 1). In comparison, table 2 below presents the online occurrences of expressions or concepts that are built from a new ICT-related modifier and a traditional educational noun. Here, combinations of *blended*, *hybrid*, “*seamless*, *boundless* and *flipped* occur together with conventional nouns that refer to education, namely: *learning*, *teaching*, *classroom*, *education*, *course* and *campus*.

Table 3. Occurrences on the Internet: ICT integration expressions

	LEARNING	TEACHING	CLASSROOM	EDUCATION	COURSE	CAMPUS
BLENDED¹⁰	4 690 000	40 700	79 200	40 200	137 000	3 820
HYBRID	270 000	22 900	16 500	22 200	190 000	2 510
SEAMLESS	47 000	2 200	1 380	41 200	5 560	1 330
BOUNDLESS	21 000	21 900	636	10 700	1210	252
FLIPPED	398 000	27 200	443 000	10 800	8 460	216

The most common expressions in table 3 are *BL*, followed by *flipped classroom*. *Blended* is the most popular modifier and, as in table 1, *learning* is the preferred educational noun to modify. In this dataset, there may be more hidden and irrelevant noise than in the previous set, as expressions can

¹⁰ Yellow shows the most frequent expression found overall for “x y” Google searches on 2016-11-02 in this data set, namely “blended learning”. Green show the most frequent combination for the modifier (if not yellow), which for “flipped”, is “classroom”. Blue shows the most frequent combination for the modified noun (if not yellow or green), which for “course”, is “hybrid”. An inclusion criterion for integration expressions was >100 occurrences for any combined expression.

arise randomly. A course may be called blended or boundless while not referring directly to ICT or learning.

Blended and *hybrid* appear to have quite related meanings, while the latter has about half the occurrences of the former. Interestingly, for the noun *course*, *hybrid* is more common as a modifier, while *blended* is more often used for modifying the meaning of *classroom*. *Seamless* is a modifier which relates primarily to the individual's personal learning process, the self-design of learning in a personal time and place flow, and the student's transition between time modes, places, media and types of communication. It also includes the smooth transition between formal and informal learning (Wong, 2012). The modifier *boundless* can have a similar meaning, connected to the learning *activity* (as in Jaldemark, 2009). A separate reference of boundless learning is solutions for integration of open text content in LMS:s (Fitzgerald, 2013). The modifier *flipped*, as in *flipped classroom*, emerged on a larger scale around 2009¹¹ and soon became a popular term. Many of the first applications concentrated mainly on inverting the use of place for functions in teaching and learning while watching or listening to lectures became mediatised and moved to the home environment. What was earlier viewed as homework activities (as doing assignments), moved to the campus setting. If one-way lectures are taken away, the use of the concept is not as obvious (see literature review in Bishop & Verleger, 2013).

4.7 Blending and integration?

Determining whether a course can be described as blended is dependent on the definitions that are held and the positions that are taken with regard to the uncertainties that are inherent in these definitions. On a local and practical level, in discussing course design and describing and classifying the characteristics of courses, a practical situation is at hand to make the discussion more sensical. Below are some examples that are mentioned in the literature:

1. A course is blended if ICTs are at all used in a course, in addition to traditional tools and methods (Allen & Seaman, 2003, p. 6)
2. If a course has reduced seating time in classrooms, due to the use of DL, EL or OL, it is called blended (Baepler, Walker & Driessen, 2014, p. 227).

¹¹ Popularity of a concept as a Google search term from 2004 until the present can be examined as a trend graphic at <https://www.google.com/trends/>.

3. If a course uses the online environment instead of the classroom for more than x % of the instruction, it is called a blended course (Allen, Seaman, Poulin & Straut, 2016, p. 4).
4. A blended course is a course on a scale between a fully face-to-face course and a course that is fully online: a continuum of EL implementation (Garrison & Kanuka, 2004, p. 96-97).

Only propositions 1 and 2 are measurable but do not offer any meaningful insights. Nr 3 demands that instruction or possible content volume is measured percentage-wise in relation to classroom practices, which is not helpful. Nr 4 demands that online use is measured, which can be done by adopting criteria, thereby becoming a technicality. None of these address increased access directly. In all of these suggestions, the balance between using a traditional common physical place and DL, EL and OL tools and environments seem crucial, and direct the focus on technical or spatial blend proportions. The Spanish translation of BL as *aprendizaje semipresencial* (a half-present mode of learning) mirrors this. The blend in practice appears to be aimed at balancing quality, access and cost. In a longer, historical and more abstract perspective, few would object to the view that BL also concerns a long-term integration of ICTs into the normal, which in turn can be expected to change. Translations of the BL term, such as *Integriertes Lernen* (German) or *Solatuva oppinem* (Finnish) are indications of such a later *integration interpretation* (see Art. 2 on national terms for BL). French, Olrech, Hale and Johnson call BL “An ongoing process for Internet integration” (book subtitle, 2003).

For research purposes in this dissertation, I have chosen to consider BL as *the ongoing long-term integration of ICTs into the normality of education practice* which may also affect how this normality is perceived and constructed. I consider this move to be a necessary way of freeing thought from the limiting demands of physical place or technology use in other interpretations of BL.

5. Theory

5.1 On theory

As a term, theory has many separate and overlapping references and is also very elastic within some disciplines (Sayer, 2010, p. 49). References range from meanings in everyday talk, in which theory can stand both against *fact* and *practice*, to physicists aiming to develop a one-and-only theory by which to explain and predict observations. In social-science theory, Abend (2008) distinguishes between the following seven meanings of theory:

- 1) Propositions about relationships between variables.
- 2) Explanations of a specific social phenomenon.
- 3) Strategies for making sense of a defined part of the empirical world.
- 4) Interpretations of writings by main authors in the field.
- 5) Overall perspectives from which a researcher observes and interprets the world.
- 6) Accounts having a basic normative component, such as feminist or critical theory.
- 7) A distinct use of the word theory to refer to general discussions in a discipline.

These meanings stand in describable relations to one another. Abend argues that theory and data do not exist as independent parts of the observed world. They are only convenient analytic distinctions which make communication between researchers easier if they are used wisely. Theory is a relative term, and its usefulness in communication varies. Examples of Abend's varying meanings in research on ICT and learning can be (1) Measurement of ICT-enabled learning results in comparison with classroom-based learning, (2) Explanations of experienced learner isolation in distance learning, (3) Moore's theory of transactional distance, (4) McLuhan's concepts on the use of emerging media, applied on Internet technology, (5) Activity theory, (6) Critical Pedagogy and (7) Learning theories, such as behaviourism, constructivism, sociocultural theory, connectivism and constructionism.

Abend's list of meanings appears first as an exhaustive description, but Sayer (2010) makes it more complex by working with a tension between three meanings:

- 1) Theory as an *ordering framework*, which permits data from observations to be sorted and utilised for explanations or predictions.

- 2) Theory as *conceptualisation*, where theory is a way of bringing the objects of observations under a concept – or using observations (also concept-dependent) to form a new concept.
- 3) Theory meaning the same as *hypothesis or explanation* (which reconnects to commonly held understandings in common language).

If these three meanings are compared with Abends seven, most of them are what Sayer refers to as ordering frameworks.

Sayer (2010) advises not to equate or interchange (1) and (2), as they are different. In (1), the data must have rather unproblematic meanings and internal relations to other data in order for it to be used, or else risk being disregarded as useful or relevant data. Theory allows one to view some materials as data, while not others and research becomes *theory-laden*. In (2), the sorting of data is not the priority, but the *conceptualisation* of that which is observed before it becomes data, is. The focus lies on the meaning or understanding of that which is observed, and the ordering of data is secondary to the conceptualisation of that which is observed. But if not data, should facts be more important than concepts? Sayer refutes this, arguing that we never pick up facts themselves but rather formulate and use our factual statements about the world, which are not unproblematic in relation to concepts which already affect us. From the onset, our concepts affect what and how we observe, and if observations do not fit, we must become conscious of it and problematise our concepts in order to change them. This is not easy, as observation is conceptually mediated (p. 51). We can never suppose we observe the world unbiased. Concepts also affect the distinction between the observable and the unobservable, and humans with different concepts make different observations, not only concerning characteristics but also existence. In this light, the commonsensical expression “I wouldn’t have believed it if I hadn’t seen it” may be better expressed as “I wouldn’t have seen it if I hadn’t believed it”.¹² Observational data may change our understanding, but only through re-conceptualisation. As an ordering framework or conceptualisation, theory has different priorities in social-science frameworks: Sayer mentions that economics often uses theory as an ordering framework, while sociology associates it more with conceptualisation. From Sayer’s discussion on conceptualisation, it can be concluded that in considering theory as conceptualisation, it is not viable to state that in order to study x today, I use theory y and get results z (which makes more sense if viewing theory as an ordering framework). Many layers of conceptualisation may be involved. However, researchers must try to make conscious use of theory as conceptualisation. This entails adopting one

¹² Einstein, quoted in Pruzan (2016), p. 143.

theory for guidance in all work, or choosing theory according to what should be done in a study, or both on different levels and in covering different aspects of a research topic. Another takeaway is that using a chosen theory as a convenient sorting framework is practical if it is easy to handle and visible for the researcher. The straightforward use of a theory does not, however, take away the researcher's responsibility to question and work with conceptualisation. Concepts are also the building blocks of theory; without well-defined concepts and ongoing critical conceptualisation to revise these if needed, theories are at risk.

Floridi and Sanders (2004), and Floridi (2008a) underline the importance of roles and intentions in understanding how concepts are formed. This understanding lays the focus on agency: how we from our roles, interrelate to professions, interact with and cause change to a system and thereby to the world. His examples are practical, such as a car mechanic, a car insurer, a car designer and a car buyer whom all observe the same car, but form different *observables* and hence, theorise differently. Their sets of observables can be *nested* or *disjoint* with one another, meaning that they can have some observables in common, or not. There is no good absolute question that can be posed about the car, but each epistemic agent has a *level of abstraction* for his extraction of data. I find Floridi to be very helpful at this point, as I experience myself as primarily having a role as a researcher, which entails a profession and an agency by which to make education more accessible in Northern Sweden by using ICTs. This affects what I consider relevant and significant and how I conceptualise the research objects.

Haraway (1988) has a similar view when reasoning about epistemology in feminist studies; researchers should not pretend that they are doing “the god trick of seeing everything from nowhere” (p. 581). The most objective researcher may be one who declares his perspective, is aware of its limitations and tries to variate perspectives (Sporre, 2007, p. 57).

5.2 Use of theory in articles

The different papers in this dissertation use different theory, the usage of which has progressed during the work. A common question that I received in discussing my research with others regarded which learning theory informs this research. My research does not draw heavily on learning theories in relation to ICT. In articles 3 and 4, Garrison and Vaughan's constructivist model for blended teaching and learning and Communities of Inquiry (2008) are used to inform the design and interpret results. All practitioners, ranging from behaviourists to cognitivists, constructivists, constructionists and sociocultural theorists can, and do, use ICTs to develop characteristics in course design. Some of these designs increase access, while others do not. In

this dissertation, I am primarily interested in access in space and time to any education in which a student may wish to participate. Furthermore, I do not consult common theorists on education, such as Dewey, Bourdieu or Bernstein. Their theories could be and have been applied to education access in many ways, especially for critically analysing differences in access to education for social groups. For the potential students that I have in mind, namely those in sparsely populated parts of Northern Sweden, I am primarily interested in understanding new access possibilities, against obstacles of time and space. In accessing education, people may have conditions other than being remotely located, such as those related to family background, ethnicity, handicap and gender, which may have an adverse impact on their capacity to study. This dissertation does not include an exploration of these interrelations or their intersectional effects on education.

Instead, the articles that are included in this dissertation use theory explicitly in the following ways:

1. Adaption of theory by the re-conceptualisation of basic concepts.
2. Drawing on tensions between theories to analyse data.
3. Combining theoretically-informed models for design purposes.
4. Analysing phenomena or results of empirical research.

Adaption of theory by re-conceptualisation.

The time-based model for BL (Art. 1, used in 3&4) was not explicitly theory-driven. Rather, it was driven by the authors' (i) understanding and knowledge of teaching and learning theories as these underpin ICT in education, and (ii) critical approach to the field. Drawing on these two dimensions, we evaluated the BL concept as being too unclear, under-theorised and often superficial to be operationally useful in designing courses that are informed by theory, as well as in identifying openings for increased access to under-represented students. Simultaneously, BL refers to something important which needs further research, study and theorisation, namely the integration of ICTs into mainstream courses, rather than viewing ICTs as a technology driver of alternatives to them. A conceptual analysis and an element of heuristics led us to refresh an older time perspective on the educational process, which stands in contrast to the contemporary emphasis on the place-related perspective that we identified. By abstraction, the blending, or rather integration, of ICTs into the mainstream is understood as synchronous and asynchronous modes of communication, and as a shift in the consecutive time flow between these modes. Through this time perspective, we argue that the use of ICTs can be more clearly understood.

In article 5, the concern is that *Triple Helix Theory*, the functions of which are commonly viewed as a necessity for regional development in the knowledge society, does not work if one or more of the factors is weak or non-existent. Triple Helix theory relies on an analysis of institutions in a particular geographic area and on their combined interactions in a complex set of organisational development dimensions. Regional development is the result of such successful interactions but relies on the effective and highly functioning combination of factors that are not always present. A region may lack a university, or the existing university may not be sufficiently interested in regional development, or there may be a weak business sector or a rather inactive local government. In this article, we describe and analyse the situation in four European regions that we classify as ‘less favoured regions’, given their geographic characteristics, the level of economic and social development, and existing higher-education institutions and access provisions. The four regions are represented by authors from four different countries, following the Double Coin model. On the basis of our analysis, we design adaptations of the malfunctioning Triple Helix model, resulting in a design of an extended Quadruple Helix theory which we exemplify with four case studies from our respective countries and regions.

Drawing on tensions between theories to analyse data.

In article 2, the data that were gathered through a survey and literature review show a different frequency in use and differences in the kind of use of the term BL, while comparing European and North America research. We seek to understand this difference by comparing *Instructional Design* theory in North America with *Didaktik* and *Fach-didaktik* in continental Europe and Scandinavia, as research traditions in which it can be meaningful or not to use the term BL in referring to theory and the construction of new theoretical ideas. We find that researchers in the European *Didaktik* tradition often had limited interest for the use of technology in teaching and learning. The technologies that were used and combined for teaching were not an important general focus for *Didaktik* as a theory. The more recent tradition of *Fach-didaktik* has shown to have more interest in questions about the use of technology in its ambition to shape subject-specific teaching and learning methods. On the other hand, North American *Instructional Design* is a theory that sprung from the discipline of instructional technology and which placed questions about the effectivity of instruction that is aided by technologies in the centre of attention. On this basis, we consider what kind of researchers in education, there are in Europe versus North America. We find that, in most European traditions, education is itself the research object for education researchers, whereas in North America, education is a field with objects for research in other disciplinary areas, such as psychology, sociology, statistics, history and philosophy, as well as instructional design.

The roots of these differences are found in the paradigms that frame the understanding of education practice and theory, as explored by Biesta (2011), in which the Anglo-American tradition draws on education as a field of practice that relies on other disciplines for its definition and that the majority of other European traditions follow the Germanic conceptualisation of education as *Erziehung* (the study of *Pädagogik*) and *Bildung* (the study of *Didaktik*) (see also: Keiner, 2002; Schriewer & Keiner, 1992).

Combining models for design purposes.

In articles 3 and 4, the time model for BL from article 1 is adopted for course design and underpinned by constructivist learning theory, according to Garrison and Vaughan's Community of Inquiry model for BL (2008). Both studies began by adopting a mode of Design-Based Research (DBR) as a method. In cooperation with a teacher and an instructional designer (Art. 4), and a study-centre manager (Art. 3), I analysed problems and possibilities and developed a design, by adopting the role of education designer. The evaluation was subsequently performed by adopting the role of researcher. Design-Based Research accentuates that it is important to distinguish these roles if the same person carries out both of them.

In article 3, the main question regards the need of learning centres in developing new forms of education provision, in which the centre could be an active agent in facilitation and in providing a physical meeting place for social presence. The actual course implementation was built on constructivist learning theory (Garrison & Vaughan, 2008) and combines a globally-accessible and asynchronous MOOC course with a synchronous local study-circle concept, for use by local learners. The BL time model (Art. 1) was used as an instrument in designing the shifts between course content and study-circle meetings. The MOOC phenomenon as such was also interesting as part of the design but was not yet much theorised at the time, but the more discussed in media.

Article 4 is based on the Communities of Inquiry model (Garrison & Vaughan, 2008) and combined the concept of BL from the time perspective in article 1 with the *agile framework model* for project work in software development. This was done because procrastination was identified as being a considerable risk with the pilot course being in a flexible form. Mechanisms from agile frameworks proved to be apt for combination with the time model, as both include elapsing time in relation to their focus on results.

Analysing phenomena or results.

In article 3, we theorise MOOCs as a global phenomenon and examine how they can be applied and understood in local contexts. In this way, MOOCs

range from elite universities which claim global research excellence in course subjects, to local active use by local learners (as in the example of Arvidsjaur in Northern Sweden). We wanted to understand more about the interactions between agency and structure in this kind of development, and considered it unsatisfactory to only refer to a shared global online world in which teaching and learning were said to happen anytime and anyplace. People's reality is also both physically and culturally embedded in local contexts, and elite universities' MOOCs are culturally-dependent forms of teaching. We found Marginson and Rhoades' *glonacal agency heuristics theory* (2002) to be well suited for interpreting, discussing and theorising MOOCs' role in globalisation, as it works with both institutional and individual agents at three or more interacting levels, namely the global, the national and the local.

In article 4, the same model for *agile frameworks* that we had operationalised in design was used in analysing the results, driven by our interest in how students experience the flow of courses over time, their learning within specific time frames, as well as their strategies for coping with the pace of courses, including dimensions of procrastination.

Chapter 7 adopts Adam's social theory of time (2006; 2008) in order to synthesise and contextualise results, and the discussion (chapter 8) of this synthesis adopts Floridi's Philosophy of Information (2012) in discussing and questioning the results, and in envisioning a new context for and other kinds of blend.

6. Methodology and Methods

6.1 On methodology and methods

Methodology and *methods* are terms that are sometimes used interchangeably. When they are not, methodology often constitutes an overarching approach to the research and a particular approach to research design, while methods are then the actual tools that are chosen for that methodology.

In this dissertation, a critical methodology is used, which questions current and common understandings of, and perspectives on ICTs and education, attempts to de- and reconstruct them and to provide possible alternative understandings and applications. Critical methodologies are characterised by the application of perspectives from the vantage point of structurally disadvantaged and powerless groups who are not favoured by the current social and economic arrangements. Habermas (1986) argues that the research and development of knowledge are grounded in human interest. A critical methodology has a strong aspect of social justice.

Methods should be appropriate for answering research questions. That does not necessarily mean that quantitative questions should be managed only with quantitative methods or qualitative questions only with qualitative methods. Alvesson and Kärreman argue that this kind of orthodoxy in research, combined with a narrow research question, runs the risk of producing very few interesting new theoretical insights (2011, p. 16). They prioritise the need to “explore how empirical material can be used to develop a theory that is interesting rather than obvious” and recommend the use of empirical material as a critical dialogue partner in theory development: “how empirical inquiry can be used to challenge assumptions” (p. 17). They also suggest that researchers need to *defamiliarise* themselves with the research environment. Bell, Blythe and Sengers (2005) view defamiliarisation not as a scientific method in itself, but as a process that shed new light in which to view designs and practices of which the researchers are part (p. 154). The problem should be developed to a *breakdown* in understanding (Alvesson & Kärreman 2011, p. 19), which should be solved by restoring understanding and applying new theory, hand in hand with empirical work of the kind that is needed. Hence, the matter at hand is not the exploration of the empirical situation, but also its adherence to or misfit with the challenging new theory. Though it is tempting to use the term *hypothesis* here, it may lead associations to a more positivistic form of fallibilistic natural science (as in Popper, 1959). Social science is about understanding. To theorise something is here understood as Alvesson and Kärreman’s notion of *disciplined imagination*. Empirical data, methods and theory development have a

preventive effect toward developing ideas carelessly and arbitrarily (2011, p. 18).

The research questions in this dissertation are partly of a conceptual kind and need conceptual analysis as a method, along with more empirical methods, as Design-Based Research in education (DBR Collective, 2003), as well as mixed-methods research (Cresswell, 2003, pp. 208-225; Cohen, Manion, Morrison & Bell, 2011, pp. 21-26, 162.) including both quantitative and qualitative methods. Adopted here are common methods for surveying, interviewing and analysing qualitative results (Cohen et al., 2011, p. 559-560) by qualitative content analysis (Mayring, 2014). The following table offers an overview of this and of the uses of DBR and Conceptual Analysis.

Table 4. Use of methods in articles, overview

Article	Methods used	Comments
1. A time-based blended learning model	Literature review Conceptual analysis	<i>See description below</i>
2. Are you working in the kitchen – European perspectives on blended learning	<i>Mixed methods:</i> Literature review Email-based survey Word-frequency counts Comparisons on university websites	Word frequency counts were performed as a general reference and orientation. Email survey with 67 experts, of whom 33 replied
3. Using MOOCs at learning centres in Northern Sweden	Literature review DBR Intervention study Interviews Content analysis	Work began with DBR, which became a case/intervention study in lack of iteration. <i>See description below</i>
4. Time shifting and agile time boxes in course design	Literature review DBR Intervention study Interviews Content analysis	Work began with DBR, which became a case/intervention study in of lack of iteration. <i>See description below</i>
5. Quadruple Helix, Innovation and the Knowledge-Based Development	Literature review Conceptual analysis Minor case studies as examples	Conceptual analysis was used for adaption of theory

DBR= Design-Based Research

6.2 Design-Based Research in education

DBR (DBR Collective, 2003; Wang & Hannafin, 2005) is a rather recently developed research strategy which is possible to combine with a critical methodology. The underlying idea is to develop cooperation between teacher, teaching team or instructional designer and a researcher, who is acting in two separate roles of designer and researcher (DBR Collective, 2003; Wang & Hannafin, 2005). The intention of DBR is to depart from the possibly irresponsible role of a researcher when acting as an experimenter who implements something new to solve a problem in a teaching-learning

situation or only tests a new technology or strategy, collects data and leaves to analyse the results and to publish.

DBR is a pragmatic research strategy in which both qualitative and quantitative methods can be used, in accordance with the research questions and objects of study. The focus lies on enhancing the studied activity by an empirically and theoretically-underpinned and adapted design, quality gain, and a responsible relation between those who are involved and the researcher. DBR is similar to action research but has a stronger emphasis on iterative development.

There are weaknesses in the approach, especially in relation to the long-term sustainability of the research situation which DBR demands. Quality enhancement demands long-term relations, in which the researcher can work with the course in several iterations. The results after one design-implementation cycle are analysed and discussed, and a new altered design is made for a second cycle, data are collected and analysed, and the design is adjusted, after which a third cycle begins, and so forth. This kind of parallel design and research work takes time, and in the best case, university courses repeat themselves in the following semester or study year. There are many changes that affect the research, including closed-down courses, changes of teacher, teaching team or instructional designer, new students and so forth. Iterations of courses in higher education are not as customisable for the educational researcher as new generations of banana flies are in genetics.

Two of the articles began as projects with DBR design, namely article 3 on MOOCs in learning centres and article 4 on time shifting and agile frameworks. They became intervention case studies instead, without the planned iteration, as for article 3, the waiting time for a meaningful iteration was too long and complex to fit into a PhD project. The design element is rather general here and represents an asset for teacher-less groups, but is also difficult to variate and implement. For the pilot course in article 4, the planned iterations could not be executed due to discontinued project funding.

Even though the research as it features in articles 3 and 4 evolved in different ways, DBR remains relevant as it was the methodological framework on the basis of which those two articles were constructed.

6.3 Conceptual analysis

Conceptual analysis is a method in which the characteristics of a concept and its relation to other concepts are sorted out and clarified. As an example from philosophy, the definition of knowledge as *justified true belief* has been tested and discussed with many thought experiments (Floridi, 2004; Turri, 2011). This form of concept analysis is traditionally viewed as contemplative,

philosophical work with very central concepts, such as *truth*, *knowledge*, *cause*, *mind*, *matter* and so forth. It adopts internal logical analysis and thought experiments in order to discuss a concept, but the task is largely an *a priori* one, namely to describe what the concept must logically mean after flaws such as self-contradictions and unnecessary uncertainties are removed. Levering (2002) argues that iterative thought experiments and falsification attempts *are* empirical methods. Putnam (1975) indicates that empirical research can sometimes have direct consequences even for this kind of philosophical, conceptual analysis. That the shortest distance between two points is a straight line was long considered to be a clearly necessary and *a priori* knowledge that was unrelated to the empirical world, in the same way as we do not need empirical evidence for the proposition *bachelors are unmarried* (as it carries its own truth conditions). However, non-Euclidian geometry proposed that the shortest distance between two points could be a bent line, which can be demonstrated empirically. The earlier assertion is only necessarily true within the scope of Euclidian geometry.

Unlike terms such as *knowledge* and *matter*, BL is not the same kind of central philosophical term for human knowledge and existence, following human thinking through the history of ideas. Rather, it is a discipline- and practice-specific concept which may in later evaluations prove to be a concept that forms a transition between understandings. As with newly emerging phenomena, we see what stands out from the normal. The practice that BL describes is in constant development and the world of education changes and adapts in terms of the expectations, pressures and connections to other institutions. There is a developmental and empirical side to BL and the actual use of the term by practitioners and researchers, as well the change in such usage over time cannot be disregarded and must inform the conceptual analysis. Concepts of this kind are dependent on the historical, socio-political and institutional context within which they emerge, develop and change, all of which are very much applicable to the concept of BL.

Nuopponen (2010a) points out that achieving conceptual clarity for discipline-specific central terms is a matter of uttermost importance to all research. She also observes that there is very little guidance available on how to make a conceptual analysis of concepts within research fields and that theorists on concept analysis and development often write that all methods of concept analysis must be adapted according to the purpose and context of analysis. Within the context of professional work, this tends to lead the precision of terminology use, visible in glossaries or databases. But definition entries in glossaries are not necessarily the direct results of conceptual analysis: they can be descriptive, stipulative or normative, relate more indirectly to research and, in some cases, be randomly constructed but widely accepted. If classic philosophical analysis of terms as knowledge is situated on one end of a continuum, then terminological questions,

definitions and classification are situated on the other. There is, however, need to better develop and establish methods for terminological concept analysis, as Nuopponen argues (p. 5). Conceptual analysis is involved in terminological work, though this is not always particularly visible. Näsi¹³ (as adapted and referred to in Nuopponen, 2010a; 2010b) argues that it is impossible to establish any exact steps in a terminological concept analysis. He suggests that the following four elements should be used in conceptual analysis, all of which can be interwoven and iterated:

- 1) *The creation of a knowledge foundation* around the term by starting with a literature review of research
- 2) *External analysis* (to localise the term among similar concepts, as well as among super- and subordinate concepts and to sort out non-related uses of the term for the analysis)
- 3) *Internal analysis* (to break apart the concept, discuss the parts and fragments, analyse different views on the concept and re-assemble it with differing meanings)
- 4) *Forming of conclusions* (accepting or modifying old concepts or forming new ones, making recommendations, proposals and guidelines, and so forth).

What follows is a description and exemplification of how we used conceptual analysis in article 1, in accordance with this strategy for it, as it is central to the thesis.

(1) Firstly, we constructed a knowledge foundation through our work background of work experience, literature reviews and agreed on the view that BL is beginning to appear as a new normality, thereby making it important to better understand the term.

(2) We made an external analysis and found several definitions and propositions for components of BL, and also found recommended strategies, case-based studies and accounts of effective implementation of BL. We approached these steps through a systematic analysis and a review of the similarities between BL, DL, OL and EL as concepts and as practices. This was followed by a critical analysis of their applications in what we argue are often the not appropriate contexts of learning there where the context of teaching would be more appropriate and relevant.

(3) Throughout our reviews, we found synonyms to BL, such as *hybrid learning* and *mixed mode*, and deconstructed these concepts as part of an internal analysis in which we scrutinise each term independently. This showed that the *blend* that is implied in the terms *hybrid* and *mixed*

¹³ Näsi's original work is from 1980, in Finnish and hard to retrieve (apparently only in print). Nuopponen adapts Näsi's model and compares it with other models for conceptual analysis in two sequential papers. (2010a, 2010b).

presupposes *components*, such as classroom environment and online environment, classroom communication and mediated communication, analogue media and digital media, collocated participants and remote participants, and so forth. We found that these components were commonly only of two categories for each understanding or definition, with a possible exception in corporate BL, in which they were instead often constituted of multiple categories of media or communication (Hall & LeCavalier, 2000; Clark, 2003; Carman, 2002; Bersin 2004). We find the BL concept itself to be very general in indicating how these components should be combined. Although there are many descriptions of priorities to bear in mind, and many sets of advice and ways of reaching learning objectives through a blend, on a theoretical level, there was seldom any description of blending processes regarding how these categories of components should be combined. There was also an absence of another expected semantic side of the blend, namely what the result of the blended process is expected to be: a sum of its components, an *emulsion* as a forced blend or a *solution*, i.e., something which transcends the sum of its components?

We identified a notable characteristic that features in most of the literature on BL, namely that one of the components in the blend is old, traditional and physical, while the other is related to digital ICTs in some form, or a state enabled by ICTs to communicate remotely. One major semantic problem appears when we reassemble the parts: is it a serious proposition that *learning* should be *blended*, and if yes, from whom and why? How can this not be a category mistake (Ryle, 2009) in the use of language? We also find that the BL term would be better suited to cover students' holistic personal strategies for learning, but this possibility has been abandoned by the current most dominant and widely-used understandings of BL. A term other than learning would be better suited, such as teaching, but a term for activity which is a successful combination of teaching and learning would be preferred.

We observe that three dualities are constructed in BL:

(A) A *place duality* is a blend of here and there, classroom and remote location. We note that there are also traditional learning processes that contain frequent elements of individual and flexible studies, dependent on the availability of asynchronous media.

(B) A *technology duality* is a blend between the technical and the non-technical, which leads to a questioning of where to draw the line between technologies and non-technologies.

(C) A *presence duality* in which with the participants are present and non-present in various configurations in different environments, leading to the question of how communication and mediation relate to presence and a dualistic world view.

We then applied a time-historical view and questioned whether BL is new. Throughout education history, we found recurring processes in which new technologies were integrated into education. The introduction of print is a good example (Hajnal, 1959) as well as the introduction of dedicated learning spaces in classic Sumer (Kramer, 1949; Robson, 2001). We followed up on this time perspective and looked at a teaching-learning process, such as a course, from an *abstracted time perspective*, which provided the possibility for interesting and powerful explanations, such as synchronous and asynchronous *time duality*.

(4) As a recommendation, in the last step of Nási's model for concept analysis, we found that the term BL can be considered from a time and process perspective onto how different ICTs can be integrated into the synchronous–asynchronous shift pattern in the educational process. At first, we thought that this might be a too mundane and old pattern, but also found it highly relevant in times of rapid technological developments. Consequently, previous traditional practices are also blended by their use of older ICTs, and the choice between using a digital or a printed text becomes less dramatic. In a time perspective, the classroom becomes just one of the synchronous information and communication technologies, with print being an asynchronous ICT, although none of them is digital. The borders between the two domains are thereby redefined: both are old and new, technical and less technical. We suggest that by the integration of ICTs into the teaching and learning process, the possibilities of design to variate and adapt the process to different needs multiply. This process of conceptual analysis, as exemplified here, allows us to return to a model that is traditional and known to all teachers, namely that of involving synchronous lectures and asynchronous homework, which is followed up by next synchronous session. We list five new affordances that are acquired with *digital* ICTs from this perspective and conclude that the only non-blended models that remain are a purely synchronous or a purely asynchronous teaching and learning process.

6.4 Reliability, validity and credibility of results

In this section, I briefly discuss the concepts of validity, reliability and credibility and illustrate, through selected examples from the articles, how these concepts were understood and incorporated into the research. Reliability and validity are quality criteria that are most clearly understood and developed for quantitative methods. Both Golafshani (2003) and Stenbacka (2001) argue that, in essence, reliability and validity are positivistic concepts that do not have the same straightforward meaning in qualitative research. Quantitative research typically examines a single,

context-free, observer-independent objective reality against which cause-and-effect hypotheses are tested. Quantitative research treats multiple context-dependent and observer-dependent realities and is aimed at understanding and construction. Instead, in qualitative research, reliability and validity often become conceptualised as rigour, trustworthiness, quality and credibility (Golafshani, 2003, p. 597; Graneheim & Lundman, 2004).

Researchers who use qualitative approaches are nonetheless highly aware of reliability and validity as demanded quality criteria and understand reliability and validity in ways that can be adapted to qualitative methods. Reliability and validity are also increasingly used as criteria in qualitative research, partly due to the users of research results in society, namely policymakers and practitioners who want to *know* if a practice or a policy is *evidence-based* (Hammersley, 2008, p. 287). Biesta (2010) considers speaking about *value-based* instead of *evidence-based* educational research, as the evidence-based practice concept has deficits in qualitative contexts, stating that “In the epistemological domain there is a knowledge deficit, in the ontological domain an effectiveness or efficacy deficit and the practice domain an application deficit” (p. 500).

Reliability refers mainly to the repeatability of a transparent research process in replicating the results of a study. Repeatability or replication has its limitations in qualitative research as people and contexts differ in time, and also as interviewing the same person again about the same situation can generate new and different responses, as is the case when a different interviewer or analyser gathers the same data. Nevertheless, the transparency of the method that is used and the researcher’s awareness of his/her own non-neutral role as an interviewer or observer is relevant. Researchers should be able to tell colleagues and readers how they used the chosen method in the data-generating situation and what the underlying deliberate decisions were.

Validity as a criterion concerns *if what was to be measured was actually measured*. Qualitative researchers seldom measure anything in the classical meaning of the natural sciences, but rather scan for patterns in the data that create or reveal something new which furthers understanding. Stenbacka (2001) writes that “In qualitative research, the answer to the question of how to generate good validity is actually very simple”, in that the researcher is interested in “another person’s reality based on a specific problem area” (p. 522). The articles that used interviewing methods followed this approach in relation to validity. The understanding of the phenomenon is valid if the person is allowed to speak freely, and if it is well and strategically chosen as part of the problem area. In addition, validity as ‘truth’ is the extent to which the researchers convince their audience that their interpretation is as close

as possible to the intended meaning of the participants who were interviewed (Hammersley, 1991).

Quantitative studies: Here, I exemplify how the concept of reliability was used in the research that is presented in article 2. The necessary task in this paper was to acquire an estimation concerning the use of the term BL among administrators and teachers at European universities. This was done through searches within university websites by using their search engines, as well as through Google site search. The first sample was chosen from the Times university ranking order for European universities, for which we selected the first 10 on the list. For a second sample, we found listings of non-ranked universities per country in alphabetical order and chose number 2 for the sample, for each of 47 (out of 49) countries for which such lists were available. The terms we searched were *blended learning* and *hybrid learning*. We also tried to search the translated terms in national languages, which showed to be unnecessary in most cases, as the national terms were commonly so unestablished that we almost always found BL in English as well within brackets beside the national term in the texts. We considered this to be a reliable approach with internal consistency, and possible to replicate. We tried to ensure validity through our selection of terms and collection sites and by checking the quality of the occurrences; so for example, we excluded library catalogues or other websites. Our assumption was that the presence of expressions as BL in university websites had a fairly strong relation to internal realities within universities, as experienced and enacted by students, teachers and administrators.

In article 2, we also designed and carried out an email expert survey. A survey of a sample of experts can be seen as a quantitative method, but our aim was qualitative. We wanted to acquire leads for further work with detecting patterns of any possible European versions or perspectives on blended learning, if there was one, by asking about the experts' general reflections (1) on the term, if they had any literature recommendation (2) and how they more explicitly saw the term in a North-American – European perspective (3). The aim was not to get a representative image of how European experts in the field of ICT and learning viewed blended learning. In our first phase of data collection for the literature review, we had searched for (a) cited authors on “blended learning” and “hybrid learning” (and known translations) on general databases, but also made searches limited by national Internet domains (such as .se, and .fr) of European countries (Bologna signatory countries). In the correspondent, national Internet domains, we tried to identify also (b) researchers with published and cited articles in ICT and learning more widely; using terms as e-learning, Computer-Supported Collaborative Learning (CSCL), Technology-Enhanced Learning (TEL) and online learning. From some countries we could not find

authors in both (a) and (b), or not at all, possibly due to our language shortcomings, but there were also other difficulties, as if the question of nation-belonging of research in an increasingly europeanised Europe with complex global interactions and co-authorships was a meaningful categorisation. With its limitations, this material was used for choosing authors in 10 European countries in a so well-spread sample as possible. We wanted to balance those who used the term BL actively or as keywords on BL since it was with the help of them any European version could begin to unpack. We included ICT and learning researchers who did not use the term blended learning actively, or not at all, for acquiring a more distanced and critical view of the term in a European context. The border was not sharp; many authors not using the expression otherwise can mention something like a “blended learning situation” without having any elaborate thinking behind, just because the term is commonly used at many universities. A third category (c) was project managers of EC projects addressing blended learning, as there had been a number of them between 2005 and 2012. From them, we expected some kind of policy input. These managers were often researchers as well. In all, we sent the survey to 67 experts, and received 33 replies, resulting in a 49% response rate. In addition, we went out with these questions at two web forums for discussion, and received additional input, in all about 50 contributions in total. This did not form any representative sample, but as our intention was to acquire leads for the further work with literature review and for formulating better and more detailed questions about BL in Europe in relation to North America, and as such it was very helpful and contributed to our understanding and further analysis.

Articles 3 and 4 included interview studies where we were interested in the perceptions and experiences of participants in courses. In both cases we constructed semi-structured interview schedules (Cohen & Crabtree, 2006; Mayring, 2014), with the intention to encourage students-participants to first talk as openly freely as possible about their experiences and perceptions of the course, but with a possibility for the researcher to follow up and ask for more information on relevant issues when needed. The material from the interviews in article 4 was analysed through qualitative content analysis (Mayring, 2014) and showed that the participants had significantly similar experiences. We followed a number of steps in order to ensure that the data that we collected covered the relevant areas of the course and the participants’ participation (guided by our research questions). Firstly, we discussed the interview schedule with the manager of the study centre (in article 3) and the pilot course coordinator (in article 4) before the start of the interviews and adapted our schedule where necessary. Secondly and at the end of the first few interviews, we revisited the questions and areas for discussion in order to ensure that our schedule covered the issues that the interviewees raised as being important to them, which meant that some

questions were abandoned, while others were changed or added for subsequent interviews. Finally, during the analysis, we followed the same procedures for the analysis of each transcript and compared categories across interviews (Hammersley, 1991).

Conceptual analysis is a fundamental part of articles 1, 2 and 5. At the very core of conceptual analysis lies the attempt to define terms and concepts in their abstract meaning and in relation to their practical applications, in this case around BL and how it is used for higher education access. Hence, the principles of validity and, where applicable, reliability are at the root of this approach to analysis. The way in which these principles have been embedded in the conceptual analysis is through the systematic deconstruction of the relevant BL concepts, and through the careful definition of their conceptual parts and their practical applications throughout the research.

6.5 Ethical considerations

In the empirical elements of these studies, the respondents were participants in adult education and volunteered their participation to the studies and interviews in separate decisions. They were informed before the beginning of their participation through documents that described the research (see attachments). At the beginning of the interview they were again informed about the general aim of the study, the voluntary nature of their participation and their right to not respond to individual questions or to withdraw from the interview if they wished. Participants were also given assurances around the protection of their identity in the published works, as well as in discussions with other participants or teachers, and around the safety and use of the recordings and transcripts, which would only be used by the researchers and be kept in secure storage. Throughout the research, we applied the principles of ethical research and practice as provided by the Swedish Research Council (Vetenskapsrådet, 2011). Beyond these formal steps by which to conform to established ethical requirements of research practice, we were highly sensitive in all of the empirical work that involved participants, to issues of wider responsibility toward the courses' students and teachers. This sense of responsibility emerged as a result of our positions as researchers who also are (or have been) teachers. We committed to faithfully convey the concerns and experiences of students about issues that are of high importance to them. In addition, the core problematic in this research is rooted in critical perspectives around access to education in relation to non-conventional students who live in less advantaged regions. By definition, this carries a high degree of ethical responsibility toward the

participants of the research. All of the researchers in the published articles brought this sense of responsibility toward participants and regions with limited access to education, as well as the commitment to respond with empirical work that will have a practical and developmental capacity.

7. Time, Access and Education

7.1 Introduction

This chapter positions time as the main perspective in research on BL, which is the model that is presented in article 1 and used in articles 3 and 4. It offers a background in time philosophy, science and culture, as well as of the use of time in social research, and provides a literature review of research into time and education. It ends by synthesising the time model for BL and clarifying how it relates to access to education.

7.2 Time in philosophy and natural science

Arguably, time lies at the centre of human experience, as Lucas describes, “If we are aware of anything, we are aware of the passage of time” (1973, p. 8). McLuhan argues that “For tribal man, space was the uncontrollable mystery. For technological man it is time that occupies the same role” (McLuhan, 1951, p. 85).

On one level, time is very concrete and easy to grip; clocks, calendars and time until lunch break, the weekend, the next summer or a work deadline. This level of experience is based on biological and astronomical cycles. Clocks are precise instruments, but cannot be said to measure time as it is experienced, but rather as measuring clock speed in covariance with astronomical and biological cycles.

On another level, time is also utterly abstract and complex, invisible, impersonal and difficult to define or grasp. St Augustine of Hippo’s problem formulation is well known, namely “What, then, is time? If no one ask of me, I know; if I wish to explain to him who asks, I know not” (Augustine, 1923, Book XI, Ch. 14). The distance between the experienced, utterly self-evident biological and astronomical cyclicity with clock time on one hand, and the opaque and very complex “what is” question on the other, may be unique in its semantic span. Lucas has an interesting twist on this, stating that “We cannot say what time is because we know already, and our saying could never match up to all that we already know” (Lucas, 1973, p. 4).

Newton viewed time and space as absolute and independently-existing reference scales, which were guaranteed by God (Knudsen & Hjorth, 2012, p. 30). Leibniz questioned time as absolute and considered it instead to be relational: time as a way by which to compare one event to another (Falk, 2009, p. 131-134). Kant later pointed out that all of our empirical data are experienced in space and time, never outside of them, and draws the conclusion that they are part of epistemology, as human filtering and

ordering tools for impressions (1781, 1998). Modern physics, with relativity theory and quantum physics, by default disregard the concept of time as anything other than a characteristic of human experience. The main reason is that equations of physics are necessarily considered to be symmetrical in time, working in both directions, with no real difference between past and future. This forms the deterministic *block universe* (Ellis, 2007, pp. 50-51) in which all data are present but experienced by humans in personal trajectories. Minkowski made a mathematical model of spacetime, as a one and only dimension (1918). Einstein was still worried about the strong human experience of the flow and arrow of time (Falk, 2009, pp. 293-296), the perceived direction from the past, through the present to the future. McTaggart attempted to define this problem by his A- and B-series of time (1908). The A-series or the tensed view of time consists of the past-present-future, in which our individual perspective is from the present, or the now. The B-series of time focuses on relations between spots on a line, as *earlier than* or *later than*, but *the now never enters* into it. It is only as the *here* on a map and only of subjective personal interest. The flow of time can be viewed as common sense, which, as our intuition, is a product of biological adaption. It appears, however, that there are irreversible laws of nature that support the feeling of a flow and the direction of a time arrow. One of them is the *second law of thermodynamics* (Popper, 1957). While the first law states that energy is constant within a closed system, the second states that, with time, energy becomes unusable by the progress of entropy. Quantum theory has an opening for less determinism with the notion of *probabilistic determinism* for individual particles or entities, in which it is not possible to determine which entity will be affected by a cause, but only that a percentage of them will (Falk, 2009, pp. 176-179).

The quantum cosmologist Lee Smolin and the philosopher Roberto M. Unger have recently questioned the timeless and deterministic block universe of physics (Smolin, 2014; Unger & Smolin, 2015). They place *time as the most fundamental reality* in the universe and consider space to be secondary and emerging, consequently being obliged to sacrifice the belief in a timeless and unchanging nature of natural laws. With this, they also want to re-institute a causality which enables human agency to affect the future in approaching possibly fatal environmental threats such as global warming. There is a future that we as humans can affect: the now can shape the future (Smolin, 2014 p. 257; Unger & Smolin, 2015, pp. 364-365).

This kind of belief sounds like a necessary one for the education sector as well. If we do not believe that people have at least some agency to make their lives meaningful and the world a better place and that education can affect the world, what then is education and what are we doing working in this field?

7.3 Time, change and culture

Change is tightly associated with time. Without change, the concept of time has little or no meaning, and without time, change would never be experienced. If time just stopped and everything froze for an hour, and then continued as before, we would never notice it. We view a change from the perspective of the present, the now, which instantly becomes the past as we move slightly into the future. We often view *the now* as the only state in time which is fully real, in comparison with the past which is no more and the future which we do not know. People often feel assured that the presently experienced now is not the critically decisive now for us. It can be tough to live with the idea that every now or “every day is a personal Doomsday”¹⁴. We postpone and procrastinate. Falk remarks that “Relativity makes all moments equal, but to be human is to declare them *unequal*” (2009, p. 284).

The experience of time is highly culturally dependent (Falk, 2009, pp. 79-100). We speak about different mindsets for respecting set times in different cultures, but this is only the tip of the iceberg. The Jewish-Christian linear time; history as a meaningful line from beginning to the end of the world, is together with clock measurement, two of the most successful and conflict-free cultural exports from the Western to other parts of the world. However, below this, there are old layers of experience of time. Event time in parts of Africa, says that time only runs when something happens, we have the infinite circular time of Hindu and Buddhist religion, the complex Chinese partly astrological and partly political time, the Dreamtime of Aboriginal culture in Australia where initial happenings with ancestors shaped the patterns of life that then are repeated but deteriorates. The Aymara in Chile can point behind their backs when talking about the future, which we see as highly counterintuitive as we point forward, but is quite logical: we cannot see the future, but we know the past. McLuhan and Fiore (1967, p. 74-75) as well as Benjamin (1974) write about Western versions of this attitude toward the future; we drive or are blown into the future backwards, blindfolded.

7.4 Research about time and education

Time in education has, as to be expected, been previously researched and discussed. The larger part of it appears to be research on concrete and applied time-resource ratios for teaching and learning in levels K-12, and in different subjects and school forms (for a Swedish study, see: Nyroos, Rönnerberg & Lundahl, 2004). Other researchers take a perspective on the

¹⁴ R. W. Emerson: “No man has learned anything rightly, until he knows that every day is Doomsday”. Emerson (2005), *Society and Solitude, Work and Days*.

school day, school year or the whole education situation for an individual. In North America, interest is also about the effectiveness of schooling in connection to the science of instructional design (instructional time) and is often also viewed from an angle of global competition, questioning if time in school is used well in the context of a global knowledge race. U.S. presidents often appoint school commissions to address contemporary school crises and in 1994, a special commission on time in schools drafted the report *Prisoners of Time* (2005), indicating that U.S. pupils have about half of the time in school compared to those in other countries. The report starts with the following:

Learning in America is a prisoner of time. For the past 150 years, American public schools have held time constant and let learning vary. The rule, only rarely voiced, is simple: learn what you can in the time we make available. It should surprise no one that some bright, hard-working students do reasonably well. Everyone else—from the typical student to the dropout—runs into trouble (2005, p. 5).

Disadvantaged students do not learn enough in the allocated time, but the system rolls on, and disadvantage grows. In his model of school learning, Carroll (1963; as cited in Carroll, 1989) identifies time as the central variable for learning. Both the teaching quality and the focus of the student on learning must be optimised to attain the best results. For long, there has been a parallel tradition of arguing for mastery learning (Bloom, 1968), but this has complex organisational and social consequences within the mainstream school system. Bloom (1974) writes:

Spending extra hours of time within the same calendar period to attain the same level of achievement as one's contemporaries leaves the student with a belief that he is doing as well as others. There are psychic and motivational rewards when a student believes he is doing as well as others in the group. Spending extra years in attaining the same level of achievement as one's contemporaries leaves the individual with the belief that he is inferior to others, and he is likely to suffer frustration and decreased motivation for school learning (p. 683).

Drawing on earlier research, Bloom proposes a rule of thumb stating that the fastest 5% of students in a class use only a fifth of the elapsed school time that is needed for the slowest 5% (1974, p. 684) to learn the same thing. This

is not primarily due to cognitive ability, but to different social backgrounds and to differing time-on-task, or how well time is used by students.

If not more scheduled learning time can be added, other approaches are possible. Walberg (1988) discusses the effects of the spacing of teaching instead of direct sequencing, observing that two lessons that lie some time apart appear to yield better learning results than when the same two lessons follow one another.

There are various studies on time in higher education, but as time-on-task for older students develops into the sector of personal responsibility, the discussions on time allowance are different. Compensation for excessively fast teaching in a classroom can be studying more at home, provided that there are asynchronous media and time and energy is devoted. If much of the central course content is only orally mediated, this becomes more complex. Stein and Irvine (2014) discuss how ICTs and classrooms can interact in a *lossless learning* process. Romero focuses on time in EL, DL and game-based learning settings (Romero & Barbera, 2011; Romero, 2011; Romero & Usart, 2013). For time in game-based learning, see also Rughiniş, 2013; Capdeferro, Romero, and Barberà, 2014, who review and discuss polychronicity in online learning. Kumpulainen and Rajala (2016) build on Bakhtin's chronotope concept, a spacetime in literature theory, for studying ICT-enabled collaborative learning on campus. McEwan (2012) discusses and questions some classic beliefs about teachers and time. Kakkori (2013) builds on Heidegger in modelling education and time. Giroux points at democratic problems in the use of time: "As higher education becomes increasingly corporatised, public time is replaced by corporate time" (2003, p. 150). Sharma (2013) criticises a technology-imposed "speed culture" in higher education, where we are led to believe in a false equal possession of time, and envisions a critical time perspective where time is seen as "multiple, relational, and deeply uneven" (p. 312). Sheail (2015) scrutinises the *anytime-anywhere* discourse brought into the digital university by online and mobile learning and argues for a more honest and complex time approach in higher education.

7.5 Adam's social theory of time

Barbara Adam argues that social researchers should take time at least as seriously as space and matter, even though time is more abstract and invisible. She criticises social science for being too focused on questions about space and matter, and using time only as an instrumental factor for comparing two states, as before and after a change: "Take space and matter, add on time and stir" (Adam, 2008, p. 1). Hence, time mostly serves to set the comparable space situations apart. It is very easy to occasionally

emphasise one isolated aspect of time and make a specific point. Instead, argues Adam, we ought to be aware of and try to unpack many aspects of experienced time at once, stating that “Timescapes are analogous to landscapes because they include the temporal features of socio-economic events in a variety of socially constructed contexts.” (Adam 2000, p. 137). The aim of timescapes thinking is not to define time, but to “understand interpretative views of time” (2008, p. 1). Time is not an abstract vector of some combination of physics, clocks, and ageing; it is a thick and rich concept, overflowing of characterisations and understandings, which social researchers often disregard.

Adam has used her social theory on time for studying “culture, education, environment, environmental economics, food, globalisation, gender, health, international relations, management, media, risk, technological innovation, transport and work”¹⁵. Studies on education illustrate how it teaches clock time to pupils for functionality in society (1995, pp. 59-65).

To help our understanding of temporality on the way, Adam has listed seven *timescapes*, which all are seen as *facets* of the *invisible temporal dimension*. See Table 5 where Adam’s timescapes are in column 1, her question for identifying a timescape in column 2, my examples of the timescape applied on education in column three, my examples of timescape questions in column 4 and referrals to my articles in column 5.

However, the demand to study all of the possible facets of temporality at once to make time a thick concept is all but straightforward. Moran (2015) is also troubled by Adam’s demand to work with temporality as a holistic complexity for understanding time in everyday experience. He argues that “a time is a social practice that translates temporality into meaningful codes and organises temporality’s material influence” (p. 283). Moran writes that temporality works by many distinct functions (p. 286), but that these can hardly be brought in under a one and only framework. He presents *duration*, *access* and *inevitability* as interesting dimensions of the temporal. Duration is something *between* states of time, but more characterised by consciousness and becoming than clock measurement. Access is instead a *property of* states in time; the specific possibility to access something by synchronisation, something that is accessible at one time but not at other. Interaction is one example. Earlier, communities measured time differently as they had no possibility of instant interaction with one another. Today it becomes a failure of communication to not be synchronised, to not be able to translate temporality into time. *Inevitability* is different from both duration and access. It “has the certainty of the past but will only occur in the future” (p. 288) and can be regarded as a fact of the present. Mortality is just one example which affects our daily temporal experience.

¹⁵ <http://sites.cardiff.ac.uk/experts/professor-emerita-barbara-adam/>

Table 5: Adams seven timescapes commented

1. Timescapes	2. Adam's question	3. Applied to education, example	4. Question generation	5. In articles¹⁶
Time frame	In which time frame?	X years of child and youth education, length of course, time until break or summer, life expectancy, etc.	How much should learning be collectively time framed? How are time frames best designed, big or small?	Art. 1: A course as a process within a time frame Art. 3: Week and course frame Art. 4: Day, week and course frame
Temporality	How?	Learning makes people grow while they age, the half-life of knowledge teaching methods become outdated.	Is youth education the finish or start of education? Learning? Which up-to-date demands should we have on teaching?	(Art. 1, 3, 4) BL as a historic first phase of digital ICT integration into the mainstream of education.
Timing	When?	Synchronise studies with peers, study progress with the exam, coordinate needs and resources for learning, etc.	How to find the best time for learning? How to coordinate social learning? How to peak learning trajectory at the exam?	Art. 4: Scheduled and limited flexibility creates simultaneity between learners, enabling natural interaction.
Tempo	At which speed?	Study pace in course, too much homework until Friday, not prepared for speed of instruction	How to compensate outside lecture for excessively high pace? How to optimise learning within frames? How to relate to peer-learning tempo?	Art. 4: Students appreciated to determine their own tempo within the frame, while a lecture hardly can be halted.
Duration	How long?	Instantaneity (no duration), lesson, education programme, boredom, temporal distance	How to prevent procrastination? How to handle bad timing for learning? How to use dramaturgy in courses?	Art. 4: Procrastination is addressed with social and agile mechanisms.
Sequence	In which order?	From A-Z mastery learning? Core-and spoke sequence, start from any direction?	How much does a subject discourse correspond to learning stages? Can it be learned in another order? What if mastery is not achieved before continuing?	Art. 4: Friday synchronous meetings should assure enough mastery for proceeding to next week.
Temporal Modalities	When?	Past, present, future, synchronous and asynchronous social modalities in a time flow or process	How does my past affect my learning now? Does mental time travel motivate learning? What learning is best done in social synchronicity or asynchronously?	Art. 1, 3, 4: The shift between synchronous and asynchronous modalities is central for the time-based model.

¹⁶ For further elaborations on timescapes, and ICT and learning in the same context, see “A back-to-basics thought experiment about blended learning” concerning the relation between media and temporal modalities, and “Edu-Sync”, a working paper about using global simultaneity (as duration) and transparency of common courses as a future affordance. https://www.researchgate.net/profile/Anders_Norberg

7.6 The time-based BL model

The time-based model for BL has been formulated, adjusted, used for course design and discussed in articles 1, 3 and 4. In what follows, an overview and synthesis are given, starting from the shortcomings of a place perspective on BL. Although it is an open and versatile term, BL appears to have met a need for the integration of DL, EL and OL into the normality of teaching and learning. Elements and strategies from DL, EL and OL, are tried out but anchored in the concrete classroom situation. The place-based understandings of BL have certain distinct disadvantages. There are dimensions of learning, teaching and technology that a place perspective does not acknowledge, cannot explain or design. From a place perspective, the following aspects are invisible:

1. **Time and processes.** Educational technologies are used in an educational process, not only as transport vehicles. Whether these technologies are digital or not cannot be a disruptive distinction. What is more crucial is how technologies contribute to a development process rather than their categorisations in opposite domains.
2. **Similarities between old and new ICTs.** Reading a text from paper or from the screen has some differences, but a digital text can be printed, and a paper can be digitalised.
3. **Education history.** ICTs have been previously integrated into perceived normalities of education, at many stages in history. In place-based BL, ICTs appears as a something that is completely new and different.
4. **Use of ICTs within the classroom.** ICTs within the classroom have become very common for most agents. A student can be online in the classroom, with all of its implications.
5. **The classroom as an ICT itself.** In a place model of BL, the classroom is a monolithic component, independently of what goes on within it, as long as some ICTs are used in combination. Can the classroom be another ICT, to be varied in use as well?

Article 1 proposes a *time- and process-based perspective* for studying and designing the integration of ICTs in teaching and learning. The question of who has access to a BL course must thereby not be related to regular access at a default gathering place (campus, classroom), but to having time, a local place to study and the possibility of interaction. The question of access becomes one of who can be included to interact in a process, not about who can access a place regularly enough.

A fundamental idea here is that even if digital ICTs are new, their use in BL settings is not very different from teaching a similar course about 30

years ago. A time perspective is used that is compatible with Adam's temporality focus; an abstraction is made of what is happening with the help of time modalities, and ICTs are classified according to their temporal functions independently of digital form or not. The results in article 4 suggest that synchronicity can form a kind of presence that is built on synchronous time, rather than on place, and through interaction. This finding is compatible with Floridi's re-definition of presence in the infosphere, as is discussed in the following chapter.

Figure 1 illustrates the time-based blended model presented in article 1. There are two social domains or modalities, namely synchronous and asynchronous as social facets of a time framed line. In its core, this model is traditional and well known, and includes lesson meetings with peers and a teacher in a room, readings, assignments or at least reflection as homework until the next meeting, and so forth. Every teacher knows and practices some form of time-development planning model such as this one. But what have ICTs added to this process?

A classroom lecture is in the synchronous modality, as is a lecture or seminar that is video-conferenced or telephone-mediated, as long as there is interactive communication. One-way lectures may in many cases instead be recorded and placed in the asynchronous modality. In the same modality can also be found the work with assignments, text readings, personal filling of knowledge gaps, forum discussions, and so forth. Planned or spontaneous group work among students can be imagined as a third, semi-synchronous domain (Power, 2008). The shifts between modalities are crucial so that students can get started with their work in time, acquire a learning flow and avoid procrastination. The teacher must be able to know that preparatory readings have been done, and the assignments completed, for the next meeting to be built on. An asynchronous forum discussion can take place after a synchronous event, reflecting on this event, and so forth. Central for these shifts are the synchronous meetings with teacher and peers and the positions in time when something must be delivered or performed for the process to continue. All of this is still possible to imagine without ICTs. In article 1, we propose the following five ways in which ICTs work within this model:

Support: Especially in the asynchronous domain, the teacher or course designer can support and help to structure the students' work better than before, usually through an LMS.

Migration: Activities can be moved between the modalities, which previously was not easy to do. A recorded lecture moves to the asynchronous modality and assignments can be moved to the synchronous modality.

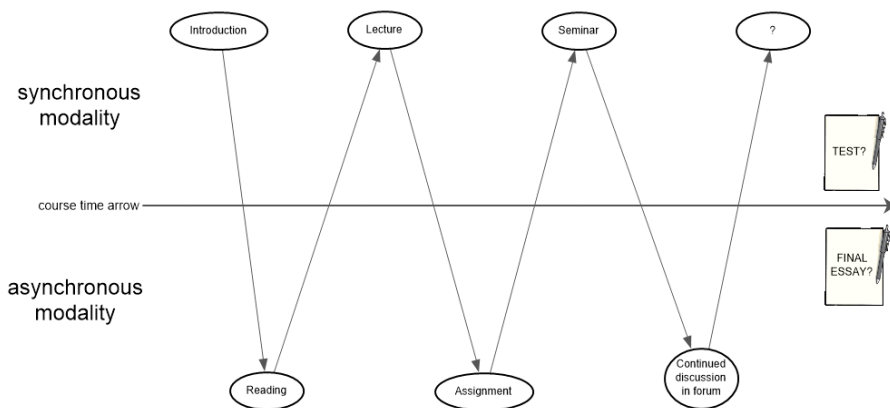


Figure 1. Simplified time-blended course design

Synchronous location: Synchronous co-located meetings can be replaced with technology-enabled synchronous meetings with interactivity if the co-location is not also needed.

Flow: ICTs can direct, control and stimulate workflow, by ensuring connections and progressions all the way through planned shifts in time modalities throughout the course.

Learner empowerment: Students can more easily take ownership of their study process if all course materials are accessible anytime and anywhere, and of the process is transparent. Learners can also address personal knowledge gaps.

This dissertation claims that education access through BL is better enabled through applying a time perspective. Places for education are now increasingly negotiable with the help of ICTs, as the DL, EL and OL traditions have shown. Articles 3 and 5 show alternative environments, such as a learning centre or a multi-institutional campus, which also constitute possible spacetimes for learning. A human always possesses a personal place, whether in prison, on Bouvet Island or in a well-connected and designed study environment. The crucial issue is to which degree it is possible, from this personal space, to communicate with others, access learning materials, focus on what needs to be done, create, reflect, and interact with teachers and peers. A campus is no longer a necessary condition, although, for many, it may be an ideal one.

Time is, at least on one level, not negotiable for education. If a person in a pressed life situation does not possess any time at all for studies, courses can hardly be attended or completed, be they ICT-enabled or not. To have or make some time available is a necessary condition for learning new things. Change and time presuppose one another, as previously discussed. If the student has some time available but is also working, taking care of family,

having long travels and so forth, there are openings for education access, but both the scheduling and the use of ICTs become more crucial. The time that is available does not need to be fully synchronised with scheduled lectures and seminars, but must be available. Some modules, moments or courses may still demand synchronicity and at times also co-location with teachers and peers, which makes access more complex. At the end of the day, it is easier to access a slot of time for learning, than to access a dedicated place for learning, which also routinely entails a time demand and travel time to a certain place *at* a certain time. Furthermore, accessing a place consumes time that could have been used for other purposes. Accessing time for learning is however only productive if the learner also can access a suitable place for the learning endeavour in question, as well as suitable media and communication.

When universities find that some of their online or distance courses have several campus students or students who live near campus and for whom such forms of education were not originally designed (Dziuban, Hartman, Juge, Moskal & Sorg, 2005), many explanations are possible. One of them is that the dimensions of time are more disrupting to access and attendance than the dimensions of place, or that students have a complex combination of time and place obstacles to their participation in standard face-to-face settings. Place and time in flexible and less flexible education solutions can be understood and described together, as in table 6.

Table 6. Conventional time-space course access designs¹⁷

	<i>Student place</i>					
<i>Student Time</i>	A. Living near campus	B. Commuting to campus	C. Can visit campus	D. Living in same geo-time zone	E. Living in other geo-time zones	F. Place not suited or no communication
1. All of day time	CF2F	(CF2F)	SYNC	SYNC	(SYNC)	NP
2. Some day time	(CF2F)	((CF2F))	SYNC	(SYNC)	((SYNC))	NP
3. No day time, but time	ASYNC	ASYNC	ASYNC	ASYNC	ASYNC (((SYNC)))	NP
4. No time	NP	NP	NP	NP	NP	NP

¹⁷ Course access designs: CF2F means on Campus Face-to-Face, SYNC means Synchronous course (but not co-located), ASYNC means Asynchronous course. (x) means x with difficulty, ((x)) means x with considerable difficulty, NP means Not Possible. The course designs (CF2F, SYNC, ASYNC) are one-way exclusive: a 1A student who can attend CF2F can alternatively use and attend both SYNC and ASYNC courses, a 1C student using the SYNC category can also use ASYNC, but not CF2F, and a student in category 3 who is participating in an ASYNC course cannot attend courses with any other access design without altering time and place conditions.

For full access to a campus face-to-face course (CF2F), the student must (A) live nearby and (1) have all day time available. If only some day time is available (2) and the student is commuting to campus (B), then CF2F courses are accessed only with some or considerable difficulty (B2). In comparison, a student with no day time available (3) and who lives close to campus (A), has the same situation as a student who lives outside of commuting distance (C, D, or E), in which case only an asynchronous course is possible. If no time to study is available at all (4), or the student only has an unconnected or unsuited place (F), no course participation appears possible.

However, with solutions aligned with the time-based BL model (Art. 1), where co-location (CF2F) constitutes one of the optional synchronous modalities, in addition to video conferencing, telepresence and so forth, it is possible to construct the access designs of table 7 instead.

Table 7. Time-blended course access designs

	<i>Student place access</i>					
<i>Student Time access</i>	A. Living near campus	B. Commuting to campus	C. Can visit campus	D. Living in same geo-time zone	E. Living in other geo-time zones	F. No study place/ no communication
1. All of day time	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	NP
2. Some day time	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	NP
3. No day time, but time	SYNC/ASYNC	SYNC/ASYNC	SYNC/ASYNC	ASYNC	ASYNC	NP
4. No time at all	NP	NP	NP	NP	NP	NP

I do not hereby claim to have solved any problem other than providing a perspective in which the classroom as a *default option* or template for understanding access in BL becomes unnecessary. There are courses in which co-location with peers and teachers is needed, somewhere, but this can be further scrutinised if, instead, synchronous communication can be used for the course process to continue. It may be the synchronous interaction, as an element in a synchronous-asynchronous shift process, that is needed or sufficient for teaching and learning, not the co-location. I also see no unsolvable problem with blending students in classrooms on campus with students at learning centres, workplaces and in homes, provided that there are good communication and interaction affordances. This entails a

design question, which is complex but not unsolvable. However, the first easy technology-driven solutions that come to mind may be too simple for a sustainable learning process. A web surveillance camera in the classroom to which remote students can log in, video transmission from the classroom to groups at learning centres or lecture-capture-enabled Hyflex models (Beatty, 2007) will probably not suffice. Students, irrespectively of place, must be part of the group of peers in an equal way: they must be represented and interactable.

8. Discussion

8.1 The Infosphere as critical environment

In this section, I use Floridi's Philosophy of Information to discuss both the elements that DL, EL and OL bring into BL and my time perspective on BL. This also widens the scope of ICTs in education. The discussion will end with an illustration and discussion of a future scenario with new blends, based on Floridi's *e-ducation* concept for the information society or *Infosphere*, also called the *Onlife*. The expression *Learning Onlife* is my experimental construction for learning in an ICT-integrated environment.

Floridi argues that human self-understanding of being in the world changes through history. For westerners, Galileo and Copernicus showed that Earth was not at the centre of the universe, Darwin established that humans are not separate from other biological life and Freud proposed that we may not have full control over ourselves. All of these changes also had contemporary philosophical consequences. Instead of only amending and adapting philosophy, it may be necessary to create new philosophy from scratch, as also Descartes realised in his time. Today, we as thinking humans live together with other entities that also process information, such as computer programs, algorithms and robots. We are not the only information processors in the world, and a smartphone now beats any grand master in chess but does not comfort the loser. For Floridi, this calls for a new philosophy to reposition human agency.

Philosophy of Information, or *Informational Structural Realism* (Floridi, 2008b, 2013a), is by Floridi seen as a philosophy "of our time, for our time" (Floridi, 2011b). Many countries live mainly from informational goods and a test of that is what a serious informational sabotage could entail for the national economy: "only those who live by the digit, may die by the digit" (Floridi, 2014a, p. 4). Other countries are coming a similar way, in stages, in a global world with pervasive ICTs. Humans have an increasingly *digital ontology* and experience the world as information, not merely as physical entities. The world consists increasingly, in human experience, of information. *What is real is what we can interact with* and modify, not what is stable and never changes as in earlier times (as for Plato). Floridi calls humans *inforgs*, in analogy with *cyborgs*. We live increasingly *onlife* (2014b), as the difference between being online and offline vanishes (2007, p. 61). Our world and the new environment that ICTs are prompting, but which we are constructing, is *the infosphere*, the world perceived as information, in analogy with *biosphere*. Information is not knowledge, but knowledge can be built on and of information by creating and constructing,

and humans are poietic (creating, building) entities (Floridi, 2011a). Humans handle information in a semantic way, with interpretation and construction as *semantic entities*. Computer programs, algorithms and robots are *syntactical entities*, which syntactically know the rules of the game, but do not interpret or understand it (2014a, p. 137; 2016b). They are specialised and very effective, and increasingly also communicate with one another. Floridi denounces strong artificial intelligence (AI), the Sci-Fi kind of strong super-human AI threatening to enslave humans (Boström, 2014; Harari, 2016). Strong AI is “logically possible”, as Floridi writes, but “utterly implausible” (2016b; see also: 2015b). Later he has called AI “almost an oxymoron” (2017, para. 60). It is the weak and specialised AI that we deal with and customise after human needs, and we must “make AI make us more human” (2016b). None of this is science fiction, “it is all happening in our kitchen” (2007, p. 61) claims Floridi, and exemplifies with robot vacuum cleaners and dishwashing machines. Floridi attributes this change in self-perception to Alan Turing (1912-1954), the first to clearly see machines as independent information processors besides the human mind (Floridi, 2012).

Floridi is not an educational researcher, but a system-building philosopher with an ongoing project that he develops through main works in 2012 and 2014 (with two volumes to come). The relevance of Floridi’s philosophy as a way by which to understand how to contextualise my work has become increasingly clearer to me. This is the kind of theory that I was missing and which can be useful in understanding and critiquing the concepts that I scrutinise in a new way. What I have been looking for may be a *post-Gutenberg* way of approaching education (Floridi, 2014b, p. 22). Or *e-education*, as Floridi calls it; education in an ICT-integrated environment (2013b, 2013c, 2016b).

8.2 Critique of the spatial component in BL

With his philosophy, Floridi provides new tools and theories with which to scrutinise contemporary concepts, beginning with an approach towards the *distance* component in DL. Floridi reconstructs or *re-ontologises* what *presence and telepresence* can mean in the infosphere¹⁸. In a world in which many people (especially in Europe and North America) do not make any distinction between online and offline (Floridi, 2007, p. 61), the *ontological*

¹⁸ Floridi argues that doing concept analysis is not enough, if the old concept just is taken apart and the fragments are left around in disorder. The ethical action of a responsible researcher is to make the concept work again in the changed context. The process is then called *Conceptual Reengineering* (Floridi 2011a) and is a part of construction of a good and common infosphere for future generations to live in.

friction for information has become very low, communication is easy, cost-effective and have good interfaces with human perception. According to Floridi (2005), we must rethink the concept of *presence*. This has implications for the concept of DL.

Presence, as a concept, has been frequently discussed in relation to ICTs. (Riva, Waterworth & Waterworth, 2004). A common definition which Floridi discusses, is presence as the feeling of *the unmediated being here/being there* (Floridi, 2005, p. 656). When technology-mediated telepresence works, it feels like presence: like *being there*. Floridi scrutinises the subjective feeling of the technology-mediated telepresence of an agent, and also the other agent's observation in the remote space of the person who is telepresent in the same space. He remarks that, even if a remote agent does not feel such a technology-forgetting presence, "presence as epistemic failure" (p. , that a person can still, via technology use, appear as being present for agents in the remote space. Presence or telepresence therefore cannot be defined by feelings. Floridi takes a different direction and claims that presence in a connected infosphere should be defined as *being interactable* in combination with *successful observation*. This forms a model of forward and backward presence in a local and remote space of observation (Floridi, 2005, p. 662). If we think of a large lecture room, we can have student A on the last row, facebooking and not being interested at all. He can be successfully observed (bodily) by others, but from the perspective¹⁹ of the teacher and the active students, student A is not interactable and thereby not present in that sense. Student B, who follows the lecture via ICTs (video conference, telephone or personal telepresence robotics), is far more present than student A, as student B is attentive and interactable. From another perspective, however (such as student C who has a crush on student A), student A is present, and his failing interactability and weak presence in the teacher's perspective is not an important observable.

Returning to DL, Floridi's re-ontologisation of presence appears to fit better the more that technology develops, communication works, and there is user accommodation to ICTs. A student's physical whereabouts will become increasingly less important in pace with how the means to be interactable in a teaching and learning process independent of place develops. However, the teacher's perspective will be different if there is a control issue that is important (assessment or use of dangerous equipment) or if the teaching and learning involves bodily interaction, and so forth.

As a consequence, Floridi writes that "There is no obviously privileged place to be defined as *local*. Call this an antilocalist thesis" (2015a, p. 49).

¹⁹ What here is called "perspective" is a simplification of Floridi's *Level of Abstraction*, his main method in PI. A Level of Abstraction is an intentional or professional perspective of an epistemic agent in studying a system (Floridi & Sanders, 2004; Floridi 2008). The system is never studied from any absolute point of view, trying to do that creates "a conceptual mess" (2008, p. 317).

Places are increasingly less crucial than synchronisation and interaction. Places, like classrooms, provide platforms for interaction, but other ICTs do that as well. Floridi predicts that the infosphere will become increasingly *delocalised* concerning *space*, *synchronised* relating to *time* and *correlated* regarding *interaction* (2007, p. 61). “The infosphere has many nodes, but no ultimate centre, so one can be only more or less provincial” (2014a, p. 80). Distance may not be an important issue for learning communication.

Hence, if from a teacher’s perspective, if it is better to have interactable and interacting students than uninterested ones, the physical whereabouts of a student becomes less important. Student interest, preparedness and will to interact re-appear as central issues, instead of if the communicating is mediated or not. It can also be argued that not even oral communication in a room is problem-free or non-mediated, although it can be more multi-channeled and thereby experienced as robust (Rubin & Rubin, 1985, p. 39). In the future, it may be better motivated to design courses differently for interacting versus non-interacting students, than for local and remote students, but for other reasons, this may not be a good idea.

8.3 Critique of the technology component in BL

E-learning began by using ICTs to deliver and structure learning materials and became increasingly interactive, with an emphasis on the technology aspect, the ICTs. Floridi points out that, transitioning from a situation of scarcity of learning resources into an abundance of resources in a short period of time, may have distorted our understanding (2015a, p. 2). The lack of accessible material for learning may only have concealed the real problem of learning (Floridi 2013b; 2013c). Floridi’s historical review of ICTs is relevant here, as is his categorisation of technologies, which reveals two ideas: 1) ICTs are not only digital and 2) the special affordances of digital ICTs to process information, are not yet much used in the education sector.

Pre-historical societies have no ICTs. There are still small pockets of such societies. History arrives with documentation and communication ICTs. Information has been cumulated, preserved and communicated. *Hyperhistorical societies* are characterised by the central position of *digital ICTs*. According to Floridi, the characteristic new affordance of these ICTs is the *processing of information*, not digital storage or communication. Humans currently have other information-processing entities by their side and with which to co-exist, namely digital ICTs, which also process information (such as computer programs and algorithms), although humans are the “only known semantic engines” (2013a, p. XIII). In reflecting on DL, EL and OL concepts, it becomes clear that they all use digital ICTs, but not yet to a significant extent the *information processing* characteristic of digital

ICTs. DL can be arranged with print and analogue electronic media and communication as well, and EL does not always necessitate advanced information processing. Processes have become faster, cheaper, more useful and more versatile, but does that make them a disruption of education? EL uses affordances of ICTs, but not yet many information-processing ICTs.

For Floridi, technologies are characterised by their *in-between-ness* (2014a, p. 25ff). *First order* technologies follow the pattern of *agent-technology-prompter*. The axe is a technology (T) between the human agent (A) and the prompter (P), for instance, a piece of wood, forming a simple A-T-P pattern. *Second order technologies* have a pattern with more steps, such as human-screwdriver-screw-piece of wood (agent-technology-technology-prompter, or A-T-T-P). Technologies as machines and transmissions for production in the industrial era often have many steps, such as A-T-T-T-T-T-P. *Third order technologies* are characterised by their connectedness to the information society or the infosphere. The human agent may not even be the agent in a technology loop, and the process progresses in many steps. Digital information-processing entities gather specialised information and act in their programmed ways, communicating with other informational entities, acting, evaluating, learning, and so forth. A version of Nike running shoes detect the runner's energy status, and evaluates it in relation to pre-set training objectives and actual pulse, and downloads the preferred music with the optimal rhythm, which it plays it in the runner's ears for the best possible training. The pattern becomes T-T-T-T-T-T-P. The human agent is not always *in the loop*, but must be *on the loop*, thereby controlling it (2014a, p. 30). Technology serves humans, in which the crucial elements are the interfaces between human and machine, and the ideal work distribution.

I propose that it is functionally motivated to view *the classroom* as a Floridian *first order technology*, enabling learning; a classic ICT for teaching and learning communication. A classroom is positioned between a user (teacher or student) and a prompter, the addressed students. A teacher uses the classroom in order to be heard and to focus the attention of the students, while the world outside should be locked out by the walls. The classroom is not necessarily the ideal metaphor for teaching and learning, if it limits how we can think of using other ICTs, be they digital or not.

8.4 Critique of the dualistic component in BL

The emphasis of our self-understandings as humans is on epistemology, or how we gather the information that is relevant to us and process this actively into knowledge. There is an observer-independent reality out there for Floridi, but for humans, the central issue is epistemology, which regards how information reaches us and how we process it into demonstratable

knowledge. We do not deal directly with the reality behind information and do not have to worry about it, but can rather propose that "reality appears to be informational with information the whole way up and the whole way down" (Dodig-Crnkovic, 2012, p. 12). Floridi writes that "The infosphere will not be a virtual environment supported by a genuinely 'material' world behind; rather, it will be the world itself that will be increasingly interpreted and understood informationally" (2015a, p. 10).

To conceptualise the infosphere as a virtual world, alongside our ordinary world, can easily foster a dualistic worldview, in which we log in and out, and shift or blend worlds or environments. According to Floridi, this is not a productive understanding (2007, p. 61). The infosphere is also not an informational layer on top of the conventional physical world, but rather *the world perceived informationally*. If this makes sense to us, it urges us to imagine the infosphere as an integrated world, *the Onlife*, which is made this way by our growing new self-understanding as inforgs. The so-called *virtual world* is not any imagined, private, anonymous, virtual, not fully real or other world. Instead, it integrates with²⁰ the one-and-only world that we have in common. The construction of this integrated onlife world is important, as Floridi describes:

We are constructing the new environment that will be inhabited by future generations. We should be working on an ecology of the infosphere, if we wish to avoid problems such as a tragedy of the digital commons. Unfortunately, I suspect it will take some time and a whole new kind of education and sensitivity to realise that the infosphere is a common space, which needs to be preserved to the advantage of all (Floridi, 2007, pp. 61-62).

"Average philosophy does not do well with nuances", Floridi argues (2015b, p. 8). It loves dualisms in order to spark debate and conflict. Good philosophy, however, often ends up in complex positions between extremes. The dualism that was recently created in several ways by the advent of the digital can be remediated and contextualised, especially by looking forward at what society we want to form for future generations. Tensions between *dualities* foster thinking, debate and development, but in the history of ideas, frozen dualisms seldom appear to lead to creative developments and Dunlop argues that dualisms should be handled with care in education (1999). In *A Cyborg Manifesto* (1991), Haraway envisioned technology integration as an

²⁰ Floridi's term for ICT integration is that digital ICTs (weak specialised AI:s) are *inscriptions into* (not descriptions of or prescriptions for) the world. There is nothing natural about them, but they inscribe themselves into our world and form thereby our environment, the infosphere (2014, pp. 142-143) where they, not we, are natives. It is our responsibility as semantic entities to interpret and direct this process so the infosphere becomes a good, democratic and environmentally friendly milieu.

opportunity for the liberation from dualisms, such as man and woman, animal and human, organism and machine, and physical and non-physical, which have important social consequences, and result in divisions and inequality (Haraway, 1991, p. 177).

8.5 Critique of the time-based model of BL

As is the case with DL, EL, OL and place-based BL, the time-based model of BL (Art. 1, 3, 4) focuses mostly on *documenting and communicating ICTs*, as enhanced versions of non-digital ICTs. The time perspective can shed new light on an ICT-enabled teaching-learning process, which, although it is known by every teacher, may have been temporarily distorted by ICTs as technical, communicating and access-providing technology. The time model does not have a clear place for *information-processing digital ICTs* and suffers from the additional duality between synchronous and asynchronous social modalities. However, it fits better into Floridi's way of looking at ICTs as technologies, without differentiating between analogue and digital media and communication, and thereby also reducing the feeling of disruption that is caused by the digital ICTs. The time-based model also relates well to teaching and learning as social information-processing activities. It reduces the feeling of dualism between the digital and the non-digital as separate environments, bringing them into a one-and-only world. From an infosphere perspective, the present use of ICTs in education, in all its forms, can show to be the transition of concepts and phenomena into a new educational environment.

Floridi's theory provides a concept of a new ICT-integrated human environment that is not separate from our lived experience, but rather an integral part of it. It makes increasingly less sense to say, "I learned it online", as if an information environment constituted another world, alongside our usual world. The ideas of the infosphere or the onlife suit the conceptualisation of "blended" that I reached by following the time and process perspective: an ICT-integrated world.

8.6 E-ducation and new blends onlife

Floridi proposes to imagine *e-ducation*, in which ICTs, both non-digital and digital, are increasingly integrated into a new normal world for us, *the infosphere*, which also applies to teaching and learning. However, Floridi does not hold the *How?* of e-ducation to be the most important issue. Instead, he concentrates on the *What?* and *What for?* of e-ducation, or what humans should learn at educational institutions and why? He does not

definitively answer the curricular question on what to learn, only mentions “the languages of information” (Floridi 2013b, 2013c), which comprise one’s own language, other languages, conceptual structures of knowledge areas and techniques for connecting and processing information. Floridi presents three ideas that can enrich our understanding of BL, or rather the integration of ICTs in e-ducation or Learning Onlife. Nr 2 and 3 can be seen as new kind of blends in education.

1. ICTs are re-ontologising education. When we realise that we are living as inforgs with digital ICTs around us, we must revise some of the older basic understandings of general concepts or we risk confusing old and new meanings, cannot think clearly and end up in unnecessary conflicts. Concepts such as *Presence* and *Privacy* are examples of this (Floridi, 2005). The method of *Levels of Abstraction* (Floridi & Sanders, 2004; Floridi, 2008a) is the advised method for critically unpacking and re-ontologising central concepts such as these. Re-ontologisation of education as a fundamental concept in society, in relation to other concepts changing along with it, benefits from questioning and discussion to enable changed practices.

2. ICTs are enveloping education. Within this context, an *envelope* is the term for the agency space that an industrial robot demands and within which it can be successful, and humans are wise not to interfere within this area. For long, we have attempted to optimise the conditions for our machines and informational entities. If we have a vacuum cleaner robot vacuuming our floors, the next time that we buy a new sofa, we will buy one with higher legs so that the robot can do its job there as well, so that we do not have to. This is an example of enveloping. In a teaching and learning process including ICTs, the basic questions are what they can do for us and what we want them to do. Of importance is also how the interfaces between informational entities and teaching humans are best designed. It must also be ensured that informational entities do not take over what humans need to know and do in order to function well. Floridi offers the metaphor of marriage (Floridi 2014a, p. 150), in which one partner is very effective, specialised, and has relentless energy and focus, while the other is lazy, creative, philosophical and social. How can this co-existence be a happy one? The answer is that the creative and lazy partner must be active in designing the co-existence, and the design must be tailored around what the effective partner can do (Floridi, 2014a, p. 150). ICT-enabled practices as *Learning Analytics* (Siemens & Long, 2011) and *Adaptive learning* (Dziuban, Moskal, Cassisi & Fawcett, 2016; Moskal, Carter & Johnson, 2017) are good examples of uses of ICTs as information processors in education, taking burdens off teachers and permitting teachers to do a more rewarding job. In the same

way, learners can use ICTs for concentrating on critical issues for learning, leaving more tedious tasks to ICTs.

An especially interesting example of enveloping is *Calibrated Peer Review*, (CPR)²¹. Coursera, the largest MOOC platform, integrates CPR into MOOC functionality in enhancing peer review between students in the assessment (Balfour, 2013, p. 43). It is a carefully-designed interaction between humans, teachers, students and computers. On the day of the test, within a given time period, an Internet-based test is accessible for students to take under secured conditions. It is an essay question with some instructions (500 words about problem x, remember to clarify a, b, c). The student completes this and clicks *submit*. Subsequently, two solution examples are shown, one of which is quite good and one of which has some flaws as a result of not following instructions, missing elements in other ways or being unclear or badly written. The student is asked to evaluate these examples and accesses a template for doing so. After the job is done and submitted, the student is calibrated by a computer programme as a peer reviewer, who determines if the student was categorical or nuanced, careful or inattentive, and so forth. Once all of the students have completed their tests and have been calibrated as reviewers, they receive from the CPR system two anonymous solutions by classmates and are asked to review them with the same template. When this is submitted, every student receives his/her essay again and has to review it in a coherent way. When all of this has been completed, the teacher receives an overview of evaluations from the system, makes a check of samples and checks essays there where the review results differ or behave irrationally. In this example of CPR, an informational entity (a computer program) performs the logistics, the protection of identities, some calibration and creates an overview of results for the teacher. Humans review, but the teacher only looks at some obvious discrepancies and some samples. Massachusetts Institute of Technology, a member of the EdX MOOC platform, has taken another route with more artificial intelligence, namely independent Automatic Essay Scoring (Balfour 2013, pp. 41-43). These two solutions *envelop* new technologies in education differently in work distribution between digital ICTs and humans.

3. ICTs are transdiegetic education. Floridi has not yet published on transdiegeticisation²², but lectured about it. Diegetic information is information which previously belonged to an environment, such as voices or

²¹ <http://cpr.molsci.ucla.edu/Home.aspx> , <https://library.educase.edu/resources/2013/10/7-things-you-should-know-about-calibrated-peer-review>.

²² “Transdiegetic Information – what it is and why it matters” is listed as a work-in-progress by Floridi: <http://www.philosophyofinformation.net/articles/>. In a personal email conversation with Floridi, on 2016-12-05-06, I received affirmative feedback on my example with transdiegeticisation and classrooms, which appears to be on track with the author’s intentions.

sounds from a scene in a film (which the actors can perceive in their environment). Non-diegetic information is other information, which does not belong or is accessible inside the environment, such as background music, a narrator's voice, and so forth. Floridi argues that *ICTs are transdiegeticising* the world (2014c), which means that information flows with *minimal ontological friction* over borders. It is not easily controlled by the walls of a room or anything similar. In the classroom or education situation, the ability to control and design what information flows within a learning environment has become almost impossible. With students using ICTs, they can access any information and focus on what they like, as long as they have ICT entities such as smartphones, tablets, laptops or Google glasses. They can also experience the right to do so, whereby ICTs become part of their identity. In education the question becomes how we can live with this blend and make it an asset instead of a potential continuous sabotage. It becomes increasingly clear that learning demands learner motivation and poietic agency. The teacher-made setup can no longer design or implement a learning situation that is built on information scarcity as a means of focusing students' attention. The learner is a motivated and social maker of knowledge, who does not learn in the same way by observing or by being informed (Floridi, 2016a).

Finally, Floridi provides a thought-provoking and refreshing reversed perspective on *e-education*. Instead of educators trying to spread as much information as possible within the limited place and time frames that are provided, the focus could instead be on *distributing ignorance* globally as evenly as possible, through social interactions between learners both locally and globally. What is it that we do not yet know and what can it be that we do not know that we do not know? (Floridi, 2013b). To share this kind of humble Socratic knowledge more also has global political and ethical dimensions for the global construction the infosphere.

8.7 To problematise Floridi

I have here used Floridi for discussion, but Floridi can of course also be discussed critically, and has been (Demir, 2012). First: he is not propagating for the infosphere as such, or for informational entities to take over human jobs. He is a messenger, analysing the world and presenting a scenario well worth to reflect on. He is asking us to localise and fully use our human agency in this changing world, as we are the only entities to interpret it and act ethically upon our understanding. It is therefore our responsibility as humans to form the infosphere into a common good, and Floridi is proposing ontology, epistemology, methods and ethics to enable the needed

human action. He is not alone in predicting that ICT-related changes will bring loss of many jobs. Frey and Osborne (2013) estimated that 47% of studied 702 professions in the US were at high risk of computerisation. Categories of teachers were commonly in the lower risk categories, with a spread of positions between 20 to 229 of 702 professions, (pp. 57-72). Floridi views "any job in which people serve as an interface" (Floridi, 2017, para. 5) to be at risk, and he is also worried. To reflect upon this, there is a need in education to think of what parts of the teacher's role to cherish, guard and develop, and for which other parts we can take increasing help of specialised information-processing ICTs. As examples, if correction of tests can be better done with an ICT, the teacher can save time and energy for personal and motivating feedback on student progress which is clearly a social and human teaching activity. However, these two processes must also communicate well through interfaces. The *Manifesto for teaching online* (2016), from Edinburgh university, provokes with "Automation need not impoverish education: we welcome our new robot colleagues". A crucial question, however, is if the gains made by ICT-enhancements can be kept within the education sector to improve it, or if the gains will end up as profits in investor's pockets. Floridi discusses a Robo-tax on AI applications (2017, para. 9). The cost for the human transformation into the infosphere should be borne by society, and the gains shared by all, argues Floridi (2016a). He writes further

All of these profound transformations oblige us to reflect seriously on who we are, could be, and would like to become. AI will challenge the exalted status we have conferred on our species. While I do not think that we are wrong to consider ourselves exceptional, I suspect that AI will help us identify the irreproducible, strictly human elements of our existence, and make us realize that we are exceptional only insofar as we are successfully dysfunctional. In the great software of the universe, we will remain a beautiful bug, and AI will increasingly become a normal feature. (2017, para. 13-14)

In *Education is not an app* (2017), Poritz and Rees argue that the use of ICTs in education must become connected, in future-oriented ways, to a broadened concept of academic freedom (p. 23, p. 53). They also formulate five laws to follow in all education, ICT-enabled or not, here are the first and the last: "1. Every real student deserves individual attention from, and interaction with, a real teacher." "5. It is the responsibility of the academic faculty to keep current on technological developments, no matter how far from their comfort zone they may be" (p. 117). Floridi would agree, although he might work with a re-ontologised meaning of "real" in the infosphere.

9. Concluding remarks

One interesting aspect of writing a dissertation by publication is that it enables the cooperation and interaction with senior researchers, in addition to that with supervisors. Receiving feedback after publication, both as citations and personal communication, also highly enriches and motivates further work. A less ideal aspect of writing by publication is that it can be complex to bring everything together under an understandable and coherent synthesis.

I view my attempts to answer my research questions, which will be commented below, as constructive and promising. It was helpful to consciously adopt a perspective that I carry from my professional experience in working for a community and in European Commission projects, rather than a university, toward making education accessible more broadly in a region outside of central university sites, and mainly for lifelong and second-chance learners.

I am glad that I had the impetus and possibility at the beginning of this dissertation project to work on a book chapter (Art. 2) concerning BL from a European perspective. This has provided a roadmap for definitional clarity and conceptual analysis, which were necessary for the subsequent work. It is interesting that few had ever posed this question about BL within practice and research in Europe in relation to North America. Article 2 has also been used in a Portuguese doctoral thesis on terminology and concept analysis around BL, within the linguistic terminology field (Fernandes, 2015).

My relation to theory in this work can be seen as unconventional, as I had not from the onset chosen a specific theory to accompany the work, and as no single BL definition or theory was fully adequate for my purposes of studying access in combination with BL. I am influenced by both constructivist learning theories and my critical approach in demanding increased access to higher education. Looking back, I think that I have questioned and studied concepts such as DL, EL, OL and BL from my experience as a philosophy teacher at upper secondary school, in which I always attempted to find new thought-provoking angles on concepts and practices, so they became more problematic and possible to discuss, deconstruct and reconstruct. I argue here for relevant new perspectives on the concept of BL in order to provoke discussion and interaction with existing literature and to thereby begin to unpack the concept and its implications for practice, and hence, to understand it better and develop it.

Finally, I believe I have found a suitable theory in Floridi's philosophy of information, on the track on which my conceptual analysis attempts led me, and which further provoked my conceptualisation. I also discovered Adam's social analysis of time late in this process, after many other theory readings on time. Floridi's philosophy is not actively used in articles, as I initially knew his theories insufficiently to realise their potential, given that they demand a theoretical deep-dive. His philosophy of information provides a relevant and thought-provoking set of theoretical ideas, methods and ethics, not only for philosophers but also for researchers in education who are interested in scrutinising understandings of ICTs in education from a contemporary and future perspective. Floridi's philosophy includes several dimensions of ICTs that other theories do not.

Concerning *my general aim*, namely to identify new constructive perspectives on ICTs for increased access to education for lifelong and second-chance learners, I am not disappointed, although the scope of possible research and development work constantly widens. I am interested in implementing new or altered designs, in studying them empirically, developing them further, reconceptualising more extensively and finding new perspectives. I hope that the presented perspectives will be useful and thought-provoking to others as well, or as idea seeds on which to reflect, build on and expand.

The first research question about BL and increased access proved to be complex, but not impossible to begin to unpack. The answer, which I worked out together with my co-authors, is that BL if reformulated into a question of ICT integration in learning, may not only be the DL, EL and OL practises that return to campus. Rather, it may also prove to be forming a new broad normality of practice which can contribute to solving issues of access. The education form for a close future may not be DL or OL for all, or a continued separation of campus-based and ICT-enabled education, but rather a combination of campus and remote students in one-and-the-same and more flexible ICT-enabled, blended, organisational setting. I acknowledge that some researchers and developers are working on a similar track, including Bower et al.'s (2013) *blended synchronous learning*, Power's *blended online learning* (2008), Irvine et al.'s *multi-access learning* (2013), and so forth. I am not alone in taking this direction.

For the second question on time compared to place as a constructive perspective to BL practices, my conclusion is that time is a very useful and constructive perspective on ICTs in education, both for analysis and design. Discovering this perspective was similar to a trivial déjà vu experience: the old pattern of iterated cycles with lessons and homework showed to have a

renewed actuality in studying and designing the integration of ICTs into mainstream education. In comparison with other perspectives, however, the usefulness of the time perspective also depends on the epistemic agent's perspective and role, which Floridi calls level of abstraction (2008a): What do we want to know about the studied system in interacting with it from our role and intentions? If we do not prioritise increased access, we can avoid it by emphasising that the perspective from the physical classroom as a necessary place is unalienable. ICTs can be used effectively both for decentralisation and centralisation.

Research in timescapes of ICT-integrated education appears to be a promising and vast field to further develop, also as a refurbished timespace of education, and in relation to education participation and access. The current research provides merely a beginning for further exploration. The communication between local learning environments, such as learning centres (Art. 3) or multi-institutional campuses (Art. 4) and larger environments appear possible, although this certainly requires much research and development.

The two design intervention articles 3 and 4 were stimulating to work with in order to tweak time and place conditions with the aid of ICTs. The design in article 3, in which MOOCs were used in study circles at local learning centres, proves to be a model of elegant simplicity and has been in continued use within this and similar projects. As expected, the interest from learning centres has been high, as the design provides a possible new instrument for local agency. Even more interesting for me to work in was the experimental approach in article 4, on time shifts and agile mechanisms, focusing on pacing and procrastination as time problems in flexible education. This is a far more complex field, which would be interesting to further develop and research.

Article 5 responds to the contextual issues around the research questions and connects to the background and to their spatial dimensions in defining the needs for regional development in the information society, also outside of university cities. Such environments, together with the learning centre environment in article 3, are important. People, excluding young people who move from their parental home, usually want to continue to live where they already do (Holm et al., 2013, p. 7; Lundholm, et al., 2004), but for subsistence and survival, higher education is increasingly needed and access to education becomes a crucial issue, both for individuals and communities.

ICTs have many affordances if used thoughtfully, and not only from centre-periphery-, learning quality- or cost-minimising perspectives. A wise use of ICTs in mainstream education can make it more inclusive, also for people who are currently held back by time and place obstacles. Such an increased

ICT-enabled opportunity for universities to provide education more widely has clear ethical and political consequences. Flexible and accessible education cannot remain as activities for recruiting missing students in a program, doing technical experiments or making policy-motivated outreach and generosity projects from universities. New groups of students can be provided with access to education within more flexible forms of mainstream education, as outlined in this dissertation and which seems to be already happening (Norberg, 2012). In order to also offer potential students with time and place obstacles the opportunity to develop their capabilities in an accessible education design must then increasingly become the norm, rather than something that is peripheral or beside the normal. Here, Daniel, Kanwar and Uvalic-Trumbic's Iron triangle model (2009) on the balancing of access with quality and cost is, of course, critical. As Meyer, one can ask, "If higher education is a right, and distance education is the answer – then who will pay?" (title of paper, 2008). The cost of making a mainstream campus course more accessible in a region with a time-blended design is however not as deterring as the costly design of asynchronous courses. We also have objectives about widening participation in higher education, which is an issue that is still not improving quickly (SCB, 2014, pp. 36-38). We can also want more even educational levels in regions of Sweden, which is not presently a national goal, but can possibly return in some form (SOU 2017:1).

Over the globe, higher education is growing fast in volume and becoming more accessible as a common good (Marginson, 2016, pp. 22-50).

Zgaga, Teichler, Schuetze and Wolter (2015, p. 20) write that "...access to higher education has been expanded remarkably over the last few decades, but inequality perpetuates and is taking on new and not always easily recognised forms". They mention this within the context of phenomena such as the student as a consumer, higher costs and fees, globalisation of education with MOOCs, global competition in international ranking lists, the tension between elite universities and mass education, new public management bureaucracy, quality assurance systems and so forth. Higher education reform is very complex and continues to be so.

Sheail (2015) discusses the "digital university" as being in a tension between the anytime-anywhere meme and the concrete spatial campus dimension. She proposes

...that the digital university, viewed as translocal and transtemporal, engaged with multiple timeframes and temporalities, is one idea that opens up possibilities for imagining the university beyond its traditional (actual or imagined) temporal and spatial boundaries. (2015, p. 18).

Barnett (2011) discusses multiple concepts of a university, with the aim of expanding the diversity of ideas about the university in society. He reviews past and present ideas as the *metaphysical* university, the *scientific*, the *entrepreneurial* and the *bureaucratic* university, but also presents more utopical ideas as the *therapeutic*, the *liquid*, the *authentic* and the *ecological* university. He argues that there is a lack of ideas about the university in the public domain, and some universities have "...closed in ideologically, spatially and ethically" (2013, p. 15) to prioritise the direct physical and economic interests as organisations, while treating ideas about the university as a public function in society as secondary. The idea which Barnett finds most interesting for the future is *the ecological university* in global interconnectedness and corresponding to the needs of the liquid or ecological learner who learns in multiple places, networks and time frames. He views the *entrepreneurial university* as too risky for a university to engage fully in; its identity and authenticity is at stake. This makes me reflect: If higher education is seen as a crucial vehicle for regional development, an obvious possible priority is the aggregation of a maximum number of young students around a physical campus environment in a vibrant city, in order to drive population growth and local knowledge-based development, envisioned to later grow regionally, nationally and globally. More or less all municipalities appear to have visions in this direction, at different scales. These visions cannot, as I propose, override goals of widening participation in higher education by making education offerings more accessible also to second-chance and lifelong learners, who wish to access higher education close to home.

Wedemeyer, one of the DL pioneers, writes in *Learning at the back door* (1981, p. 36) about an envisioned educational system for adult learners, stating that "instruction should be available any place where there are students – or even only one student – whether or not there are teachers at the same place or the same time". He recommends an optimal and simultaneously student-optional mix of teaching and learning media, and methods which are adapted to the student. He argues that education providers should not raise barriers concerning "the *place* where the students studies, nor the *rate* at which he studies, nor the *method* by which he studies or even the *sequence* in which he studies, but instead by evaluating as directly as possible the achievement of learning goals".

By integrating ICTs in mainstream education in wise ways and with the aid of well-enveloped digital ICTs as in learning analytics and adaptive learning, higher education may, hopefully, be slowly on the way.

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Attachments

1. Email expert survey, article 2

Dear European researcher,

...who has worked or done research on "blended learning", in one way or another (e.g., CSCL, TEL,...). You are one of about 60 people chosen from European countries.

Blended learning is a mix of ? Sure, easy...or not? Actually, what does "mixed" mean, in what ways/how? Have you ever asked yourself if there is any "unblended" learning?

For a research study we are looking for European perspectives on "blended learning". Is there anything like that? We also want to create a list with blended learning authors in order to make diverse approaches visible.

1. What is "blend" in "blended learning" for you? (e.g., components, type of blend, or just your definition) (1)
2. Could you possibly recommend a favourite paper on "blended learning", or an author, conference or other favourite resource? (2)
3. Do you have any feeling or hypothesis about differences between European and North American research on "blended learning"? (3)

We would be very happy if you could help us by answering the three questions, as a reply to this email, why not right away? :-)

It would be great when you could reply not later than June/14, 2012.

Thanks a lot,

Anders Norberg, Education Strategist, Campus Skellefteå.
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2. Letter to participants, article 3



2014-11-19

About interviews with course participants in connection to the Nordplus Horizontal project "Global Learning Services – Local Lifelong Learners"

My name is Anders Norberg, and I am a PhD student at Umeå University in Northern Sweden, doing my research at the Department for Applied Educational Sciences. I am also a strategist and developer for a small multi-institutional campus in Northern Sweden, Campus Skellefteå – and it is in connection to this job I do my research. I am looking for, investigating, modelling and developing new technology-enabled models for accessible and social lifelong learning.

In my interviews, which can be done face-to-face or via Skype and in English or Swedish/Scandinavian, I am interested in experiences and reflections, both positive and negative and more complex, concerning the global MOOC course you have attended, and also concerning the local arrangements where you studied – and the combination of these two and the experience as a whole. I will also ask about age, gender, occupation, earlier education, etc. You do not have to prepare in any way.

The participation is voluntary, and you can leave the interview at any moment, by any reason. (I hope that will not happen.) I am recording the interview for later transcription and study, and I hope that is OK with you. In other case, I will make notes. The research raw material is my own, which is not accessible for anyone outside our research group. When I write and publish about this project in some scientific journal, no real names or such details from the interview that can easily identify a person is used – so your participation is anonymous. If I make small quotations from an interview, which happens, it can be that somebody that knows you very well and also know you were interviewed can guess who said it –but that is seldom a problem. The paper is published for the global research community.

I am very happy if You can participate in my interview study. Normally, it will not take over 30 minutes.

If you have any questions, please contact me. Thanks!

A handwritten signature in black ink, appearing to read 'Anders Norberg'.

Anders Norberg, PhD student / Education Strategist, email anders.norberg@umu.se, cell phone +46703970738. My Skype id is andersnorbergumu

My supervisor is Professor Isa Jahnke, email isa.jahnke@umu.se, which can also be contacted

3. Interview guide, article 3

Interview guide Global Cloud Services – Local Lifelong Learners Arvidsjaur Lärocentrum

Basic	Gender, age? Living, pre-Arvidsjaur? Family situation? Educational background? Experience flexible education?
Participation	How come? Interest in design? Heard of MOOCs before?
Course	Opinion about the asynch web course itself? Content? Form? Difficulty? English? Cultural? Expectations met?
Technology	Worked? Own study environment? Assessment and grading?
Group	Importance overall? How? Example? Importance for motivation? Completion? Feelings before Monday meetings? Ever thought of quitting? What happened?
Forward	This kind of courses again? Could you make it without a group?
More comments?	

4. Information to participants, article 4



Information och förfrågan om medverkan i forskningsstudie

Den forskning inom ämnet Pedagogiskt arbete som sker vid avdelningen Interaktiva Medier och Lärande på Umeå Universitet, syftar bl a till ökad kunskap om hur undervisning kan läggas upp och stödjas med nya medier och ny teknikstödd kommunikation, även i kombination med traditionella medier och kommunikationssätt i undervisning. Denna kunskap kan användas för att stödja förbättringsarbete då det börjar bli en normalsituation att alla kurser har IT-stöd på ena eller andra sättet. En forskargrupp under ledning av professor Isa Jahnke heter "Digital Didaktik" och arbetar bl a med denna typ av frågor.

Du som deltar i pilotförsök med basårskurser på distans vid Luleå Tekniska Universitet under våren 2012 inbjuds att delta i en forskningsstudie, som både syftar till att bidra till ny kunskap och att förbättra kursen vid nästa genomförande. Deltagandet kommer att bestå i individuella intervjuer på 30-60 minuter eller ev intervjuer i grupp, s k. fokusgruppsintervjuer. Intervjuer spelas in och skrivs ut för analys men kopplas inte till person och personliga resultat. Det är upplevelser och synpunkter i sig som är intressanta, så personuppgifter som t ex namn och emailadress kommer bara att användas till att kalla till intervjutillfällen, de kommer inte att lagras tillsammans med materialet i övrigt, så inga personer kommer att kunna identifieras av utomstående. De som deltar i studien kommer att kunna ta del av resultatet.

Deltagandet i studien är frivilligt, och du kan närsomhelst avbryta utan att ange orsak. Ditt bidrag är viktigt och kan användas till att förbättra själva kursen och ge insikter om mekanismer i kurser som är helt eller delvis stödda av IT-teknik.

Jag som kommer att utföra studien heter Anders Norberg och är doktorand på Institutionen för Tillämpad Utbildningsvetenskap på Umeå Universitet, avdelning Interaktiva Medier och Lärande. Ansvarig handledare heter Isa Jahnke, mailadress isa.jahnke@edusci.umu.se. Vi kan båda lämna mera information om studien vid behov. Studien sker i samarbete och samförstånd med kursledning vid Luleå Tekniska Universitet.

Med vänliga hälsningar,

Anders Norberg, Doktorand, anders.norberg@edusci.umu.se, tel 070 3970738

5. Interview guide, article 4

Intervju pilotförsök basår

Vi startar nu, och kommer att hålla på max 60 minuter.

Jag är intresserad av din upplevelse och dina synpunkter och jag vill att du berättar så fritt som möjligt. Men jag kanske frågar upp på olika saker jag vill veta mer om. Jag kommer inte att kommentera vad du säger. Det beror inte på ointresse, utan på att jag inte vill styra för mycket. Du kan, som du vet, välja att inte svara på en fråga eller avbryta intervjun när du vill.

Om det kanske kommer upp saker under intervjuerna som jag glömt att fråga dig om, kan jag återkomma då?

Lite grundläggande uppgifter vill jag ha först:

- Ålder, kön?
- Bostadsort gymnasiet?
- Vilken utbildningsresa har du bakom dig?
- Framtidsplaner med att gå basåret?
- Vad gjorde att du anmälde dig till det här försöket med försöksperioder i Fysik på distans?

Kan du berätta för mig hur du jobbat en vanlig dag under försöksveckorna, eller berätta om ett par dagar?

Förändrades du i ditt sätt att jobba under tiden i försöksveckorna?

Du har ju också erfarenhet av basåret på konventionellt sätt ... upplever du skillnader mot de vanliga veckorna i basåret?

Interaktion med studiekamrater brukar anses viktigt i studier, problemlösning, diskussion, att hjälpa varann eller att dela att man inte förstår, etc. Sådant kan bli annorlunda i distansstudier. Kan du kommentera det?

Jag är också intresserad av vad du känner för olika delar i upplägget, "undervisningen"?

Multi-media-materialet i Fronter – filmer, bilder, animationer, texter, föreläsningar?

Har du själv letat sådant mtrl också för att förstå något bättre?

Uppgifterna?

Checklistorna?

Statusrapporter torsdagar?

Skill points?

Fredagsmötena?

Växlingen mellan självständigt arbete måndag till torsdag och sedan samtidighet och interaktion på fredagsmötena. Vad är din erfarenhet av det?

Sammanfattningsvis funderar jag också över

Vilken är din reflektion över upplägget i stort?

Mest positiva för dig i försöksveckorna?

Mest negativa eller problematiska?

Om du jämför, har det varit lättare eller svårare att lära för dig under försöksveckorna?

Om du jämför, uppfattade du studierna under försöksveckorna som mera flexibla eller mera styrda än de vanliga veckorna i basåret? (TID o PLATS)

Hur känner du: Var går gränsen för hur styrda studieuppläggen får vara? *Ovanligt strukturerade "distansstudier"*.

Många människor upplever sig ha problem med att man skjuter upp en knepig eller arbetsam uppgift om den är flexibel i tid. Hur upplever du sådant?

Det här försöket är ju ett beslutsunderlag för om man ska utveckla hela basåret åt det här hållet. Vad är din åsikt eller reflektion kring detta?

Är det något annat du vill tillägga eller kommentera?

List of included papers²³

Article 1:

Norberg, A., Dziuban, C. & Moskal P. (2011). A Time-Based Blended Learning Model. *On the Horizon*, 19(3), p. 207-216.

Article 2:

Norberg, A. & Jahnke, I. (2014) Are You Working in the Kitchen? – European Perspectives on Blended Learning. [Book Chapter] In A. G. Picciano, C. Dziuban, & C. R. Graham, (Eds.), *Blended Learning–Research Perspectives Volume 2*, New York: Routledge. pp. 251-267.

Article 3:

Norberg, A., Händel, Å. & Ödling, P. (2015). Using MOOCs at Learning Centers in Northern Sweden. *The International Review of Research in Open and Distributed Learning*. 16(6) p. 137-151.

Article 4:

Norberg, A., Stöckel, B. & Antti, M-L. (in review) Time Shifting and Agile Time Boxes in Course Design. *Paper under review*.

Article 5:

Kolehmainen, J., Irvine, J., Stewart, L. Karacsonyi, Z., Szabó, T., Alarinta, J. & Norberg, A. (2016) Quadruple Helix, Innovation and the Knowledge-Based Development: Lessons from Remote, Rural and Less-Favoured Regions. *Journal of the Knowledge Economy*, 7(1) pp. 23-42.

²³ Permission to publication in this printed dissertation has been granted from the publishers for all publications.

I

A time-based blended learning model

Anders Norberg, Charles D. Dziuban and Patsy D. Moskal

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Abstract

Purpose – *This paper seeks to outline a time-based strategy for blended learning that illustrates course design and delivery by framing students' learning opportunities in synchronous and asynchronous modalities.*

Design/methodology/approach – *This paper deconstructs the evolving components of blended learning in order to identify changes induced by digital technologies for enhancing teaching and learning environments.*

Findings – *This paper hypothesizes that blended learning may be traced back to early medieval times when printed material provided the first asynchronous learning opportunities. However, the digitalization of contemporary learning environments results in a de-emphasis on teaching and learning spaces. When time becomes the primary organizing construct for education in a technology-supported environment, blending possibilities emerge around five components: migration, support, location, learner empowerment, and flow.*

Research limitations/implications – *This study enables the readers to conceptualize blended learning as a combination of modern media, communication modes, times and places in a new kind of learning synthesis in place of traditional classrooms and technology with the teacher serving as a facilitator of a collective learning process.*

Practical implications – *The major implication of this paper is that modern learning technologies have freed students and educators from the lock in of classroom space as being the primary component of blended learning, thereby emphasizing learning rather than teaching in the planning process.*

Originality/value – *This paper proposes a new model of blended learning in which physical teaching environments give way to time. Time and synchronicity become the primary elements of the learning environments. In addition, the authors suggest that the time-based model as an educational "new normal" results in technologies as enablers rather than disruptors of learning continuity.*

Keywords *Blended learning, New normal, Time-based learning, Universities, Digital technology*

Paper type *Conceptual paper*

1. The new normal in education

Hinssen (2010) defines the concept "new normal" as a phase in the digitalisation of society, now about halfway complete, where technologies will not be framed as technology, but rather part of everyday life. In this emerging new conception, there is zero tolerance for failure but a simultaneous acceptance of what he cites as "good enough". According to Hinssen (2010), two examples are Skype and Gmail. Although he develops this notion in the context of information technology, the principle applies to the educational environment as well, where technology has a growing presence in online and blended learning.

The US Market for Self Paced Learning Products and Services predicts a five-year, compound, 22 percent per year decrease in the number of students attending traditional courses exclusively and an 11 percent increase in students taking an online or blended course (Ambient Insight, 2011). By these statistics, the number of students taking exclusively face-to-face courses will decline from 14.4 million in 2012 to 4.1 million in five

years. To channel Hinssen (2010), online and blended courses, programs and institutions will be the major drivers of this change. No longer will they be viewed as alternative activities but rather as the mainstream of higher education, and combined with emerging technologies will cause autocatalytic transformation.

2. Are online and blended learning the “new normal” in education?

The explosive development of online learning in higher education has been similar to the impact of most technological innovations. Online learning generates considerable optimism because it increases access for students to education, responding to their lifestyles through flexible learning opportunities. The result has been high satisfaction levels and a focus on the educational benefits that this technology provides. Online learning generates controversy as well (see the hype curve; e.g. Linden and Fenn, 2003). Questions arise about its quality when compared to face-to-face classes:

- the possibility of fostering academic dishonesty and student disengagement;
- instructors’ difficulty adjusting to their changed roles as facilitators rather than transmitters of information;
- faculty difficulty developing authentic student assessment protocols; and
- technology logistical problems and the non-responsiveness of learning management systems to the innovative aspirations of instructors (Morse, 2003).

A growing response to this educational ambivalence is the equally explosive growth of blended learning, which has generally been conceived as a combination of online and face-to-face instruction – providing the opportunity for the best of both of these worlds (Dziuban *et al.*, 2004). Blended learning’s rapid growth is evident in the growth of books and journal articles dedicated to the topic (e.g. Bonk and Graham, 2006; Garrison and Vaughan, 2008; Picciano and Dziuban, 2007). In addition, a number of conferences and grants have also been focused on blended learning. In 1994, The Sloan Consortium conducted an invited symposium on blended learning for 30 leaders. This has grown into an annual workshop of more than 300 international participants (The Sloan Consortium, 2011). EDUCAUSE, in cooperation with the Bill and Melinda Gates Foundation, announced in 2011 their Next Generation Learning Challenges (NGLC) grant program. One of the targeted funding tracks is blended learning (EDUCAUSE, n.d.). A Google N-gram shows an exponential use of the term “blended learning” in the professional literature over the past few years (Google, 2010). Many of these scientific meetings, professional activities and publications stress that blended learning has the potential to capitalize on the strength of both face-to-face and online learning, increasing the learning flexibility in a demand driven educational environment while maintaining the personal contact of the traditional classroom. Another argument for blended learning is that it offers greater potential for becoming a mainstream educational activity, more so than online learning in higher education because it maximizes the educational potential of a mix of both traditional academy and internet-based tools and services.

The notion of blended learning as some combination of face-to-face and online learning, with a focus on place and space, was the impetus for developing an effective mental model accommodating the logistical and pedagogical implications of this theory. The positive aspects included the empowering realization that blended learning viewed as this mix expanded the outreach capabilities of universities while greatly reducing the demand for new and expensive infrastructure that, continually, falls behind the demand curve (Dziuban *et al.*, 2005). Blending redirected the conversation on campus toward effective teaching and learning across many disciplines. Clearly, embracing the concept of blended learning changed role expectations for teachers and students. Instructors embraced new roles as educational facilitators. Students had access to a seemingly limitless source of informational assets through the internet. They could communicate flexibly with the instructor, each other, and others around the world, essentially vaporizing the boundaries of traditional classrooms. These developments severely altered the role of the instructor as merely a dispenser for

knowledge and information. At the same time, students experienced fundamental changes as well. Old habits of passively attending class became increasingly ineffective and those who persisted with those behaviors did not fare well in the blended environment. The new classes demanded the motivation for continuous and active engagement as students experienced critiques of their work from their peers on a regular basis, in addition to more consistent feedback from their instructors.

This initial development of blended learning led to deeper reflection regarding its pedagogical implication, spawned by its growing research canon. Research indicated that blended courses resulted in superior success and lower withdrawal rates when compared to face-to-face and online courses and that student satisfaction levels were highest for this format. Students most often chose blended sections when given the choice between enrolling in face-to-face or blended sections. Faculty members reported high levels of satisfaction with their blended teaching and that the amount and quality of their interaction with students surpassed what they experienced in their face-to-face courses (Dziuban *et al.*, 2006, 2011).

This ongoing research, combined with a growing awareness that a blended mental construct could be a catalyst for meaningful transformation in higher education, gave cause for the authors to search the internet and professional literature for evolving blended learning theories and models in education, industry and the military. Analysis of the 40+ models found identified three prototypes:

1. "Infrastructure" models involve components such as mixed modalities, development time, cost factors, combined programs, multiple locations, production issues, multiple institutions and landscape considerations.
2. "Learning environment" models are based on issues such as interaction, constructivism, communication, communities, learning management, learning effectiveness, cognition and performance support.
3. "Added value" models are driven by constructs such as synchronicity, enhancement, presence, access, reusability, transformation, replacement and process emphasis. Many blended learning models organize themselves with space as the basic frame for education, where technological assets augment or supplant place-bound education. In these models, blending becomes a mix of place versus non-place events.

3. Towards an evolving definition of blended learning

"Blended learning" has shown itself to be a problematic term. What is it that is blended? What kind of blend is it? Does blended learning seem ad-hoc, using a combination of traditional components as the blend? Would it be preferable for a blend to transcend the elements that formulated it?

The current emphasis on blended learning in teaching and learning evolved it into what Susan Leigh Star terms a "boundary object" (Bowker and Star, 1999). Those objects are ideas, things, theories or conceptions that resonate and hold together a large community of practice where each member has some intellectual or emotional investment in the idea. Interestingly, when members of this community assemble, however, the separate constituencies tend to differ the object's definition and application. Boundary objects are malleable enough to satisfy the needs of the individual constituencies, but cohesive enough to hold the larger community of practice together. They tend to support what Johnson (2010) terms "liquid networks". Therefore, boundary objects are generally constructed in the larger common community, but much more precisely developed by the individual constituencies. The advantage of boundary objects is their ability to maintain the interaction among several separate communities of practice. In many respects, blended learning is a prototype boundary object, pulling together faculty members, students, administrators, instructional designers, chief information officers, librarians, evaluators and journalists. Each one has a somewhat different definition and agenda for the concept but together they subscribe to the generalized notion of blended learning and participate in the continuing developmental conversation.

4. But is blended learning really about learning, and is it new and digital?

What is discussed as “blended learning” seldom reflects learning from the student’s perspective, but more precisely describes teaching and course organization (Oliver and Trigwell, 2005). In addition, it becomes conceptually difficult to understand what “unblended” learning might be. (Oliver and Trigwell, 2005). If blended learning can be plainly understood, is it still “new?”. Human learning comes from a combination of sensory experiences of different media and is always blended (Masie, 2002). Accordingly, there might be better candidates for the term “blended learning”. For example, ambitious and technology-savvy students often organize internet-based learning environments themselves in parallel to participation in a traditional lecture-based course (Kearns and Frey, 2010).

Most would agree that learning, not teaching, is the primary objective of education. Why, then, is “teaching” often called “learning” (as in “blended learning”), or why are “teaching and learning” metaphorically attached at the hip? There can be teaching without learning, and learning without teaching. The words are not semantically identical, nor are the processes they stand for always synchronous or co-located. However, at one time they once were more entangled conceptually: teaching and learning were basically thought to take place here (space) and now (time). Technology has more or less separated the processes in time and space in complicated ways. To find functional patterns for “teaching” and “learning” in “space” and “time” seems to be an important task. One important factor is that information access is no longer a problem. On the contrary, the abundance is itself both problem and possibility. This affects teaching and learning and their time and space conditions.

5. Teaching, space and time

The teaching space itself was once a technological innovation, known from Sumerian sources from 2000bc and the organized education of scribes (Kramer, 1949). Education had moved from apprenticeship or personal tutoring to a publicly organized rational form with one teacher who knew and mastered the art, and a number of learners (more learners than a master could have as apprentices at work) were provided a designed space and a devoted time to learn. Ideally, in this intersecting space and time there was isolation for teaching and student focus on learning. The teaching space has been an enduring and powerful concept, a metaphor for education.

Predominately, early medieval universities, course lectures comprised the aloud reading (*dictatio*) of Aristotle, Euclid and other authorities augmented with the lecturers’ comments. A course was identical to a book. In this environment, students had limited access to texts, and even note-taking was dependent on expensive materials. In other words, there was a lack of media for enabling personal, asynchronous learning. The teaching and learning processes had to be largely co-located in space and synchronous in time. However, with Gutenberg’s printing press and moveable type, texts became more accessible. This was attractive for universities that were collectors of those texts, and worrying for their faculty: in the future would people learn only from books? But a combination of teaching and books evolved into a kind of “blended learning 1.0” and few have since, before the internet age, questioned the value of books for asynchronous learning in courses. The printed material was not the primary content acquisition mechanism but rather a supplemental resource for the student’s asynchronous learning. Slowly, learning began to drift apart in space and time from the act of teaching, which decreased in time due to new technologies as obvious means of quality and effectiveness. This phenomenon resulted in expanded learner flexibility and more effective teaching (a book takes time to read aloud).

The teaching space is still a common perspective for understanding courses – a common perspective in that new technologies are not needed if enough students can attend the space. But if there is a shortage of students, spaces or teachers, new technologies can facilitate outreach or access of teaching. Often, this becomes a university management imperative, with lectures broadcast along with the standard book readings (that are no longer considered technology). As a result, questions arise as to how much and what parts

of the teaching must still be “here” (in the classroom) and how much of it can be experienced “anywhere”. Space and non-space events are blended, resulting in a kind of “half-distance” course, not so different from the blending when introducing print into education. In the blend, one-way lectures that once were old-fashioned can experience a renaissance because they can be broadcast or recorded. Interestingly, even very recent constructions tend to keep the classroom metaphor. “Virtual classrooms”, “Classroom 2.0”, Second Life classrooms and learning management systems often attempt to replicate the classroom structures.

When new technologies are considered natural and good enough, they are used in courses by teachers and students, primarily for quality and effectiveness enhancement. Eventually, then, the “here” versus “anywhere” distinction can give way to something else. Transportation of what is happening in the teaching space is no longer the ultimate goal and the sole use of new digital technologies. Therefore, the evolving imperative becomes synchronous communication, i.e. in the same time, rather than physical co-location (same space).

6. Learning, time and spaces

When a student acquires information or a concept, we know that it demanded time and that it was a process, but we cannot know much about spaces involved, other than the simple fact that there was a learning space. The expressions “distance education” and “online education” are interesting, because there is no doubt that learning takes place where the learner is. Tacitly, those terms imply that the learner has to relate to a geographical source or an originating delivery point for knowledge – a teaching space or in broader meaning a campus. However, those expressions say “you don’t have to be here (on campus) to learn any longer, as you did before” Time seems more fundamental than space for learning. The implication appears to be that newly built “learning spaces” on campuses become social with technology intended for collaborative learning, rather than enhancing teaching spaces.

The industrialization *époque* introduced clocks and schedules as necessities for rational activity, and university courses reflect that with the scheduling of spaces, teachers and students for scaffolding learning in a “one size fits all” manner. Earlier research on “instructional time” concentrated on how institutions might be more effective with teaching time and how it interacts with learning time. With current technology, however, this relationship is being reassessed because of increased IT communication and media, as well as diminished control over student learning options. Also, students learn in different ways and at different paces. Bloom (1968) argued that given enough time with quality instruction, almost all students will learn; this will not happen when time is a limited resource. Possibly as a result, learning space considerations might be de-emphasized and replaced with time-related distinctions, building on synchronicity and asynchronicity, and focusing on a learning process.

Michael Power has directed and researched a three-year project at Laval University in Canada, developing and testing “blended online learning”, a concept that, at first glance, can appear a paradox. How can a blended course be online? But in Power’s concept, video conferencing and synchronous desktop applications are used in place of the classroom. This project was intended as a way of improving distance courses and making education more accessible. Power developed a working template for course planning: the regular weekly shift between activities in synchronous mode, and individual or team assignments in an asynchronous mode (Power, 2008).

7. A time-based blended learning model

This distinction (synchronous/asynchronous) seems useful for categorization and understanding the time dimension of courses, technology-enabled or not. Here, blended learning combines various synchronous elements (face-to-face meeting, video conference meetings, chats, webinars) with various asynchronous elements (book readings,

assignments, recorded lectures, asynchronous research, discussion, and collaboration, for an optimal blend adapted to the course content, students' needs and teacher strengths. As this new environment develops, certain considerations come into play.

- Often, campus-based courses are called synchronous, but they contained many asynchronous activities long before the Internet age (book readings and assignments). Already, they are blended and can continue this development with the help of a synchronous/asynchronous approach instead of a here/anywhere distinction.
- Video-conference courses broadcasted to learning centers are almost identical, but the synchronous part is technology-enabled and the medium presents some challenges in terms of interaction.
- Asynchronous courses have no particular times or places, but rather general time frames. Correspondence courses, CD courses and asynchronous online courses are not blended in this sense. They are solely asynchronous and thus more flexible but lack synchronous learning interaction. Now, with help of communication technology, some of these are adding synchronicity and becoming more blended in this sense.
- Lecture capture courses are effective because they can offer students both a synchronous alternative (attend the lectures) and an asynchronous (watch recorded lectures later) or a combination (attend lecture and review later if needed). However, they tend to conserve a lecture-based knowledge transfer pattern that can become increasingly diminished when the internet, not the teacher, is seen as the source of knowledge by young people (Tapscott, 2008).

The blends can be traditional with conventional media and communication – or new and technology-supported with an increasing range of possibilities for blending. This indicates a shift toward anywhere *synchronous* learning, with fewer physical classrooms meetings, but more learning interaction.

Therefore, most courses are a blend of synchronous meetings and asynchronous activities, and both can be technology-enabled. Not new, but a perspective within which the following five features can be described when new media and communication integrates in mainstream courses.

7.1 Support

The students' asynchronous work can now be supported much more effectively with learning management systems, blogs, assignment drop boxes, forums, Twitter, and other tools. At times these assets function as the new core of the course with synchronous meetings serving a support function. Traditionally, the asynchronous work was minimally supported by the institution. It fell to the students to learn and manage their time. The examination would reveal the result. Now, there is much to gain by getting more out of asynchronous work and having synchronous support communication between meetings. A question for discussion can be how transparent the learner's habits should be. "Learning analytics" enables more detailed information about engagement than a glimpse of a student face in a lecture hall.

7.2 Migration

Traditional course elements can move between the synchronous and asynchronous domains. For example, a clear opportunity for resource saving is to deliver a one-way orientation lecture on the learning management system in a streaming video format, have the students view it, then assemble them in a synchronous meeting for discussion and application. New tools give birth to new practises and wiser use of times and places.

7.3 Synchronous location

Synchronous meetings are not always co-located. A face-to-face meeting is only one possible form for a synchronous event. Video and telephone conferences, online chats, e-meetings, and other formats are equally effective in many situations if it is pacing and support we want. If a teacher should wish to introduce something new and difficult in the

course, get deeper in the analysis of a concept, check all that has transpired thus far, or use the event as a milestone for turning in assignments, then synchronicity, without co-location, often suffices.

7.4 Flow

The connection and mutual support between activities in synchronous and asynchronous modes can more easily be optimized in a coherent course flow. The effectiveness of blending lies in the timely mix of modes, communication and media that transcends the blend. An interesting discussion may start synchronously in class and be developed in depth in an internet forum where all post contributions and the corresponding discussion continues at the next meeting, etc. Preparatory text reading can be facilitated by a community of practice among students before a synchronous meeting.

7.5 Learner empowerment

Learners can use their abilities and resources more effectively if they can access all course content anywhere, anytime. They can have rich social communication possibilities when studying, while still being helped and guided by synchronous meetings and learning interaction.

When courses are developed in this direction, a scalable and adaptable continuum emerges from a blended classroom course to a blended online course that is able to respond as the context changes. Conventional and technology-supported courses are not separate entities.

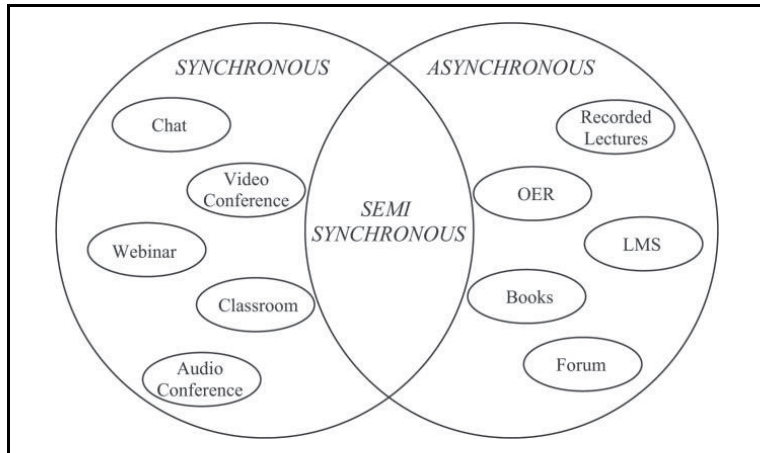
All courses contain both synchronous and asynchronous elements and can feature an intelligent shift pattern between them, able to accommodate multiple needs simultaneously. Groups and individuals at multiple locations with varying time conditions can interact while learning together in a blended format. As a result, universities might reduce the number of separate course formats to perhaps two (blended and asynchronous). Using a space perspective for courses complicates combined teaching groups and the associated planning. Seeing learning in a time and process perspective with space as an augmenting resource among many others for leading a group, new possibilities emerge for reframing the teaching and learning paradigm.

8. Conclusion

Often, it becomes easy to be caught up in dualism: campus or distance course? Blended or asynchronous? Both the place perspective on the blending of courses (here/anywhere) and the time perspective (synchronous/asynchronous) are dualistic as well. Technology integration in courses will not stop with scheduling and transportation issues and the question of location for teachers and students. Nor will it stop with increased alternatives for shifts of time modes in a course. In technology adoption we have a long history of accomplishing the traditional more effectively by perfecting technology for transferring knowledge in and from the classroom. When education abandons this practice, we enter a new normal period when we no longer think of digital tools as technology and when even blending becomes an irrelevant concept. Combining modern media, communication modes, and times/places will become more natural for both teachers and students in a new kind of learning synthesis in place of juxtaposed traditional classrooms and technology-enabled education concepts. A teacher as the facilitator and leader of a collective learning process seems as a more sustainable structure than both classrooms and courses. Figure 1 depicts some of those possibilities.

Time-based blended learning from a social systems perspective (Getzels *et al.*, 1968) suggests fundamental changes in the expectations for both teachers who move into a more facilitative role, and students who must become much more engaged with content, their peers and the instructor. As we interpret Shirky (2008), the boundaries of the "classroom" will disintegrate in a time-based blended model where it will no longer be possible to metaphorically close the door requiring that most of the information and knowledge in a

Figure 1 Some possibilities for time-based blending



course emanates from the instructor. In a real sense it becomes possible that a course has a specified beginning but no formal ending. This issue is continually raised by our students when they ask, "Why do we need semesters?". Fundamentally, this is an excellent question for which we have no good answer – especially when we de-emphasize space in the course equation. As matter of fact, this phenomenon appears to be eliminating boundaries among disciplines as well and in the possible future students might be asking, "why do we need separate disciplines?". Lanier (2010) suggests answers to both of these questions when he talks about software lock-ins and Web 2.0 stinkers. He points out that the brittle nature of computer programs can cause designs to become frozen in place because they continually build on old platforms. The metaphor for data storage is the individual "file", which may not be the best information solution as technology evolves. However, because of lock-in, files will probably be with us for the duration. Perhaps we are experiencing a bit of lock-in by assuming that the "course" is the best vehicle by which students might learn and forcing them to build on what has come before. If we continue to build learning technologies on top of old scaffolding, genuine transformation will be difficult.

Finally, Meyer (2005) warns us to be very careful in the metaphors we choose to describe what we do. By modifying learning with "blended" we are tacitly implying that it is something fundamentally different from "regular learning". She poses simply dropping the "blended" and evolving into "plain old education" (p. 1263). She argues that this would create a new educational reality that education occurs through a multiplicity of sources, and is at all-times personal, technological, social, constructivist and pedagogical. Perhaps in the future we will be able to discontinue conversations about, space, blending and perhaps even time.

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“ARE YOU WORKING IN THE KITCHEN?”

European Perspectives on Blended Learning

Anders Norberg and Isa Jahnke

Introduction

A European researcher instantly hit the reply button when he received our e-mail survey about blended learning (BL) and wrote, “Blended? Are you working in the kitchen?”

Had we mailed a non-expert by mistake? No, it was the right person. We already knew that there were many competing definitions of BL, but this image of the inspired educator in the kitchen was a fresh vision. Is BL a design concept for master chefs or just another easy take-away solution? Do we prefer different blends or dialects of BL in different parts of the world, and, if so, why? In this chapter we use mixed methods to specify some European perspectives about blended learning from European researchers and teachers.

Methods

Our main purpose is to create an overview of different understandings of BL in Europe. We applied mixed methods that include a literature review, website research about how universities use the term blended learning and an e-mail/online survey.

In June 2012 we conducted an e-mail survey regarding conceptions of blended learning to acquire an overview of the European perspective and “clues” about the European understanding of BL. Is it possible to identify something special about European BL approaches, or at least something non-American? The question was not whether European universities use new media and ICT-like communication technology in their mainstream educational offerings; Collis and van der Wende had already observed ICT as a part of a

blend in higher education institutions in Europe in 2002 (Collis & van der Wende, 2002) and the hardware and Internet access is comparable to that of North America (OECD, 2010). However, how ICT is used in different countries, and with what results, is harder to measure. Our goal was to discover how European researchers approach the phenomenon of ICT integration.

We surveyed European researchers in the field of education: academic teachers, who published case studies about BL; and EU project managers with research and development (R&D) projects where BL was a key term. We chose experts from different European countries who had written about BL or technology in education because we knew them, had heard of them, or found them while doing Internet research. The questions also went to an International mailing list, JISCMail/SEDA (Staff & Educational Development Association) and the LinkedIn group “Higher Education Teaching and Learning, HETL.” Some replied to our questions, others discussed replies. We had no ambitions to make a representative poll, but we were searching for clues, input, opinions, examples, and comments by European researchers.

We created the following three survey questions:

1. “What is *blended* in blended learning for you (e.g., components, type of blend, or just your definition)?” This first question is about the *blended* terminology or discourse itself.
2. “Could you possibly recommend a favorite paper on blended learning, or an author, conference or other favorite resource?” The second question is about the *European contribution* to the research about BL.
3. “Do you have any feeling or hypothesis about the differences between European and North American research on blended learning?” The third question is about mapping out *other general differences* regarding BL.

We sent the survey to 67 experts from 10 European countries, to the SEDA mailing list, and to the LinkedIn group HETL. A total of 33 experts answered: 21 experts from 9 countries answered at least 1 of our questions and 12 answered all 3. Of the 21 experts, we classified 15 as researchers in educational science or computer-human interaction and 6 as other academics, teachers, and development officers; none of the EU project managers replied. The experts discussed each other’s answers, thus providing a total of 50 contributions.

With such a small set of voices, we did not create more statistics, but instead used the content as hints, citing part of the answers in our conclusions in the form of new questions.

When identifying a European perspective, we also were aware that Europe is a stretchable and diverse concept. The United Kingdom has much in common with the United States and Canada, and all are related by language and culture; German-speaking countries and Scandinavia have other traditions in common.

Furthermore, BL is not a concept with a clear main content with which to compare point by point. One expert commented: "Good luck with the can of worms that you are opening here."

Some Indicative Results

Use of The Blended Discourse

"What is Blended in Blended Learning for You?" (Q1 of the email/online survey)

From our survey, we collected a range of different answers with some typical replies, presented in Table 17.1.

The answers in Table 17.1 illustrate the discrepancies in "blended" terminology. While some refer to known definitions from North American authors, other regard "blended" discourse as confusing or useless, and researchers, teachers and education administrators use the term in different ways.

Sharpe, Benfield, Roberts, and Francis (2006) have found three ways in which the term BL was/is used in the UK:

1. BL describes a traditional course with supplementary resources in digital form—a common use of the term;
2. BL labels radical and innovative course designs, using digital media and communication; and
3. BL describes students with a holistic view of their learning, who use technology in new ways—a phenomenon that the authors say is both under reported and under researched.

TABLE 17.1 Quotes from Experts; "What is Blended in Blended Learning for You?"

-
- "Simply put, at the nine universities I have worked for, blended learning has meant that you have some face-to-face teaching and you have resources available online. Nothing more complex than that. Consequently, almost every programme in the UK is like that these days."
 - "In the strictest sense, blended learning is where an instructor combines two methods in the delivery of instruction."
 - "I never use the term—nor do I use the term e-learning any longer."
 - "... many European researchers did not understand blended learning like I do. They mix many kinds of things in blended learning."
 - "I find 'Blended learning' to be a completely useless term."
 - "... it . . . goes without saying that all learning is blended, but that does not get us anywhere."
 - "I always emphasize that blended learning is NOT a didactical concept."
-

We looked for the expression *blended learning* and its translations at the websites of the 20 highest ranked European universities in 2012 by Times World University to verify its daily use by European universities (www.timeshighereducation.co.uk/world-university-rankings/2012-13/world-ranking/region/europe). We also used Google site search, cleared the browser cache and checked results to ensure that counts from library catalogues were not included. Our results yielded an average of 208 instances per university website, varying from 0 to 1250, median 57. Three of these highly ranked university websites omitted BL.

We then searched the websites of randomly chosen universities or university colleges with the help of Wikipedia's country-wise listings, one from each of 47 countries, varying from 0 to 2490, resulting in an average of 186, median 11. Six university websites did not contain blended learning, 24 had 10 or more instances.

In general, higher counts come from classifying courses as blended learning. For a small comparison, a search at several US university web sites in 2012 gives us these counts for "blended learning": 807 (suny.edu); 649 (cuny.edu), 213 (ucf.edu) and 189 (byu.edu). We conclude, therefore, that the extent of blended learning courses seems to be comparable both at European and North American institutions albeit more diverse.

The different translations of BL in Table 17.2 reflect some national differences in interpretation.

European multi-national R&D projects and academic networks, mostly funded by the European Union, use BL discourse; e.g., COMBLE (www.comble.eu).

TABLE 17.2 Blended Learning in European Language

Learning as combined, mixed, blended, or integrated?

L'apprentissage

mixte (French)

Integriertes Lernen

(German)

Blandað nám (Icelandic)

Blandet læring (Norwegian)

Blandat lärande (Swedish)

Sulautuva oppiminen

(Finnish)

Aprenđizaje semipresencial

(Spanish)

Kombinované vzdelávanie

(Slovenian)

смешанное обучение

(Russian)



Apprendimento misto

(Italian)

Aprenđizagem combinada

(Portuguese)

Învățare mixtă (Romanian)

Vegyes képzési forma

(Hungarian)

Nauczanie mieszane (Polish)

Harmanlanmış öğrenme

(Turkish)

... but in most countries,
just say *blended learning*—
and you will be better
understood

comble-project.eu/), Blend-XL (www.blend-xl.eu/), BLearning4all (<http://b-learning4all.eu/>), Blinc (www.blinc-eu.org/), InnoEd (Page, Thorsteinnsson, & Niculescu, 2008), etc.

Research and development initiatives on BL are visible at a number of European universities; in the UK, the University of Hertfordshire and the University of Glamorgan have special initiatives in BL and a review of both literature and practice of "blended e-learning" was published in 2006 (Sharpe et al., 2006). In Finland, the Faculty of Social Sciences at the University of Helsinki has BL initiatives and a yearly conference with international speakers on BL and is cooperating with other higher education institutions in Finland (Joutsenvirta & Myyry, 2011).

We also have found some *blended* terms that we seldom find in American literature: "Blended e-learning" and "B-learning," probably from the e-learning-period prior to 2005. When e-learning, often designed as content provision for students or computer-based training, failed, any blend—classroom sessions or synchronous teacher presence, for example—was a welcome remediation. Driscoll (2002) describes BL as an introductory method to initiate more effective e-learning in organizations, by adding technology to traditional classrooms and moderating an asynchronous e-learning mix.

According to Sharpe et al. (2006), the often-criticized, unclear meaning of blended learning is really a success factor because it allows teachers to negotiate an appropriate meaning for the term (p. 4). Understood as a "boundary object" by Laumakis, Graham, and Dziuban (2009), blended learning unites people in imagining and developing the future, but not always in a coordinated way.

Blended Learning as a Research Term

"Could you Possibly Recommend a Favourite Paper on Blended Learning, or an Author, Conference or Other Favourite Resource?" (Q2, Online Survey, 2012)

The European experts provided many recommendations for reading about blended learning: many cited their own papers; three recommended American standard literature or books; and others recommended resources that described the concept without using the term. This material, though fragmentary, became a starting point.

We searched for books and published papers by European authors on blended learning, "hybrid delivery," "mixed-mode delivery," etc. We found a few European authors on a list of most cited papers and books on BL (Halverson, Graham, Spring, & Drysdale, 2012), some of whom published together with American researchers. The European authors, who are using the BL term, are often computer scientists or teachers in various subjects doing case-based research on results of implementing an IT tool or practice in their courses.

Computer scientists' relevant research fields include Technology-Enhanced Learning (TEL) or Computer-Supported Collaborative Learning (CSCL). TEL originates mainly from the educational sciences, while, according to Lonchamp (2010), CSCL is the combination of a CS segment (Computer Support or Computer Science) and a pedagogical or education element, CL (Collaborative Learning). CSCL focuses on collaborative learning and group cognition and includes different types of Computer Support, such as distance learning and collocated learning (face-to-face meetings using technology).

Moreover, we have found exclusively European expressions frequently used in research: "Blended learning arrangements," "blended learning scenarios," and "blended learning settings." This may reflect an attraction and a distance to the BL term at the same time.

Drysdale, Graham, Halverson, and Spring (2013) searched in the ProQuest Theses and Dissertation database for dissertations mentioning *blend*, *hybrid*, or *mixed mode* in the title or abstract (Drysdale et al., 2013) and found 205 American theses relevant for blended learning research registered until April 2012. The ProQuest database does not have the same coverage in Europe, but we found only three European dissertations during the same period when doing the same search, an indication that BL terminology is not central in European educational science-related teacher education, in which the terminology would be expected. European dissertations generally have titles and abstracts in English in parallel if they are not written in English.

According to a recent bibliographic study (Halverson et al., 2012), the most cited European paper on blended learning, number six globally, is "Can Blended Learning be Redeemed?" by Martin Oliver and Keith Trigwell (2005) with 287 citations to date, according to Google Scholar. The paper challenges conventional understandings of the BL term. The authors argue that the concept of a "blend" does not add anything meaningful or constructive when we think of blending environments, media, and pedagogies, etc. in education. Trigwell and Oliver (2005) argue that there is no general theory of blending in use, nor exists any defined example of unblended learning. Instead they ask: Isn't all learning a result of blends? Is "blending" the best word to use when describing technology implementation in teaching? Cannot pedagogical variation theory be more suitable (Runesson, 2005)? The variation theory states that what is being taught is not identical with what is learned by the students, but a learner needs a variation of teaching input to learn.

We also found a number of research papers that do not ignore blended learning, but propose new meanings and adapt the term to European educational research. We discuss six examples:

1. German researchers, Mandl and Kopp (2006) say that BL is an ambiguous term and propose ways to make the term more meaningful. The concept of BL needs to be considered in a broader didactical framework in which

the teacher has to prepare the different elements (methods, media) to improve the quality of the teaching–learning arrangements (Kerres & Jechle, 2002). The combination of presence and e-learning phases can be done in different ways and different conceptual models (Mandl & Winkler, 2004). They conclude that inconsistency of the term requires a stronger focus on the learner and the learning processes (Reinmann-Rothmeier & Mandl, 2001): Learning is an *active* process of construction (social construction of new knowledge); a *constructive* process (knowledge is constructed by integrating into the own existing knowledge); an *emotional* process (positive feelings instead of fear and negative feelings); a *self-controlled/-organized* process; a *social* process (learning takes place during interaction with others); and a *situational* process (learning is connected to a special context/situation). How should those six learning elements and BL be put together? They do not provide a solution, but, rather, create four aspects to formulate an appropriate frame for BL, an authentic context that allows/triggers multiple perspectives, has a social context, and needs instruction/support—very similar to Lave and Wenger’s (1991) “situated learning approach.”

2. The Norwegian researchers, Kudrik, Lahn, and Morch (2009), studied blended learning in a large, multinational company, also recognizing definition problems and lack of literature on BL, noting it as “practice oriented, but seldom informed by theory” (Kudrik et al., 2009, p. 2). They argue Vygotsky’s idea (1978) that there is a duality of learning, one socially oriented, the other individual; both interdependent. Based on this duality, we now have new means to enhance both collaborative and individual learning with a richer set of available technology and media that helps both modes of learning.
3. In their book, *Preparing for blended e-learning* (2007), Allison Littlejohn and Chris Pegler perceive the blending of activities and blending of media in teaching and learning as commonplace; the newer aspect of e-learning adds the blend of place and time dimension. Successful, fully online courses are still rare, yet blended e-learning offers a step-by-step model to increase the use of e-learning, hence the expression “blended e-learning.” Littlejohn and Pegler reflect on this from both teacher and student perspectives and present a planning tool, LD_lite (Learning Design_lite), a combination of three earlier existing frameworks that can be used separately, together, or in sequence for planning sustainable sequences of learning.
4. Aleksej Heinze and Chris Procter (2006) argue that four European earlier defined theories can contribute considerably to the concept of BL, although they do not use the term. They construct their BL model for use in a part-time Computer Science program solely from the combination of these four European theories:

- i. Vygotsky's *Zone of Proximal Development* (1986) addresses the difference or distance between what a student can learn individually and what s/he can learn under capable teacher guidance and social interaction with peers. The learning process should be focused on this zone.
 - ii. Lave and Wenger's *Community of Practice* (1998) builds on Vygotsky's (1962) emphasis on social interaction among peers for deep learning, but concentrates on learning as a function of a group of learners, communicating shared needs, interests, and problems, and not as a transfer of knowledge from the teacher to the group of learners.
 - iii. Laudrillard's *Conversational Framework* (2002) describes the communication between teacher and student as an iterative dialogue game in three cycles that support the student's on-going learning process. There is no one right media for this; the progress prioritized is the dialogue.
 - iv. Salmon's *E-moderating Model* (2000) builds on Maslow's hierarchy of human needs (1943) and describes five consecutive steps for introducing student to web-based course work.
5. Derntl and Motschnig-Pitrik (2005) argue that blended learning is very complex and in a case-based experimental phase, lacking theory support, structure, and models of social interaction to combine with e-learning content, etc. They propose a Blended Learning Systems Structure (BLESS) model that understands, organizes, and streamlines BL into something more useful. They tested the model in a computer-science course.
 6. Kerres and de Witt (2003) find that blended learning arrangements use both combinations of delivery media formats, didactical models and a constructive component. They present a framework to handle didactical design decisions, but conclude that it is difficult to find a single guiding didactical model.

These European researchers have a common interest for a blended learning discourse, but pursue an understanding to deepen and connect it to theory, existing didactical models, and pedagogical research. They are not only theorists, but also provide models and guidance for practice.

Are there General Differences Between Europe and North America Concerning Research on Blended Learning?

The last question was "Do you have any feeling or hypothesis about the differences between European and North American research on blended learning?" (Q3, online survey 2012). Table 17.3 demonstrates the range of answers to the question: Is there a European understanding of blended learning that differs from the North American?

TABLE 17.3 Quotes from Experts

-
- “A major obstacle in the German research is firstly the gap between pedagogues in schools and researchers from the field of E-learning/Blended learning and the lack of reference between Higher education didactics and the area of E-learning/Blended learning. This seems to be different in the USA.”
 - “The hypotheses on both sides of the Atlantic seem ill defined, and largely unhelpful in bringing about any meaningful change in education or learning. This could be because the area has become largely development-focused, lacking analytical rigour.”
 - “Since in Europe as well as in N. America people share the same technology to support the learning process, I suppose that there are no significant differences in this research.”
 - “No. I consider the diversity in blended learning is already very important among universities in the same country, and the main factor is the fact that blended learning is developed as a top-down learning methodology or as a complementary model that has developed after the f2f model in the organisation.”
 - “I have not looked specifically at differences between European and North American research on blended learning. However, everything comes to the same point: How do academics understand the term ‘Pedagogy?’”
 - “I guess it means the same” (in Europe and the US).
 - “No idea.”
-

Some respondents assert that the blended learning concept is global because of using the same global technologies. Others remark that differences within countries and between them can be as big as between continents, while other observe differing understandings of and approaches to pedagogy and education in Europe and North America. Additional factors can be a) the global dominance of North American books and other publications and b) the necessity to use current discourse to become understood and to become published in prestigious journals (Öhrn & Weiner, 2009).

In the next section, we examine these differences between Europe and North America by widening the context and formulate some questions, which are useful for reflection on the varying use of BL discourse in Europe and North America, rather than making clear propositions.

Implications—Widening the Context

Based on our experiences and studies, we derive implications by formulating some questions aiming for reflection on the use of blended learning in research.

a) Who are the Educational Researchers and do they Teach Themselves?

We have sorted globally relevant, blended-learning education researchers into four categories and as a framework to enhance understanding of European and North American writing on blended learning.

Researchers on education have “education” as a study object and experiment field; work on accepted scientific platforms; and study change in education. These researchers include sociologists, statisticians, psychologists, historians, philosophers, and computer scientists, and in North America, researchers in instructional technology and design. We do not find huge differences between European researchers and North Americans in this group, although European researchers discuss blended learning with some reservation, using expressions such as “blended learning arrangements” or “blended learning scenarios” instead of just BL.

Educational researchers work within a framework of “education” as an academic discipline in German-speaking countries and in Scandinavia (Biesta, 2011). Education is not only an object for study, but an academic subject in development. The basic direction is to develop theory to describe and enhance practice, often in connection to teacher education. The UK and the US do not have this framework.

Since IT integration in teaching and learning is not a very central theme or focus for European educational research, it is not surprising that blended learning is not either. A common criticism is that blended learning is not theory-based, not well defined, and is only a superficial and popular description of development.

Researchers on educational practices and change are teachers of any subject, who conduct personal research on teaching and learning practices they are involved in. The typical paper is the case study. Their direction is to improve education and perform interventions, experiments, and studies in the process. These researchers, common in many countries, are likely to use modern and not yet fully defined concepts such as blended learning that appear to be an attractive concept for ambitious teachers.

American books, research publications, conferences, and web sites also dominate Europe. Most European teachers have English as a well-developed second language, and relevant publications in their own language can be hard to find. If they find anything, however, it may be theoretical and not written primarily for them.

Education developers and educational technologists support active academic teachers in the change process. In the US, they are rooted in academic disciplines of their own instructional technology and design; in other countries, they are a small group randomly composed of technicians, former or active teachers, and pedagogical coaches, etc., and have a varied and unclear status, if the group exists at all (Hudson, 2009). They support change of practice and they have a good overview of what is current in their field. They often get the theory that they need from instructional technology and design from overseas, since European countries do not have this discipline, although some universities implement positions in research in higher education, Didaktik, and institutional research. Blended learning feels much more open to negotiate new

designs and teaching/learning concepts in educational development processes, than Didaktik does.

Furthermore, some new variables across these groups need to be considered. Interest for the blended learning discourse can be more likely if the researchers are themselves involved in teaching, supporting, or organizing undergraduate courses, and if the researchers work at an expanding university (widening of access, coping with upscaling of enrolment, struggling to establish their courses on new markets, etc.). In both cases, "BL" offers a framework for communication about change.

b) How much is a Course Seen as a Product on a Market, Needing Labels and Product Descriptions?

A course in higher education can be seen as either or both a "product" in an education market trying to attract students (it does not matter if the individual or a state pays the tuition) and/or a "public good" for the upbringing of well-educated democratic citizens. If we imagine a scale between these two, university marketing people would emphasize one and national politicians perhaps another. Recently, MOOC courses have caused a debate on "McDonaldization" of higher education (<http://chronicle.com/blogs/worldwise/moocs-mass-education-and-the-mcdonaldization-of-higher-education/30536>). Is a course in the US seen more as a product than a course in Europe, needing attractive product design, accurate labelling and definition? Is *blended* one such product label to be understood within a business context? Or do European researchers on the other hand care too little about higher education teaching and learning, its student-perceived quality, usefulness, and attractiveness?

c) Can Varying Pedagogic Traditions Play a Role in the Varying use of Blended Learning as a Research Term?

Instructional design and instructional technology are important backgrounds to e-learning and blended learning research in the US and Canada. Since technology is central in these science fields, the term *blended* is suitable for general descriptions of technology implementations in course design. These theories and models are not much known at European universities, but more so in company-based education sectors. In Europe, a background in Didaktik is more common, at least in German-speaking countries and in Scandinavia. However, in the UK, Didaktik can mean teaching methods in general. For Anglo-Americans, Didaktik sounds authoritarian, formal, and dull. But Didaktik is both old and young and must be understood from the academic ideal of "Bildung," which is difficult to translate into English; proposed translations include formation and erudition. The European approach to Didaktik

combines the development of teaching/learning with academic staff and curriculum development. “The art of teaching” is a simple definition. Didaktik deals with what to learn and why—corresponding somewhat to academic staff development and curriculum theory (Wildt & Jahnke, 2010). Didaktik, as the art of teaching, has traditionally not been much about the “how” of teaching and learning. Instead, the Humboldt concept of academic freedom (Humboldt, 1970) fits in the same tradition, giving the learner the freedom (Lernfreiheit) to learn from any teacher that suits him and according to his own liking, but with the knowledge of what he must learn to pass his exam. The free academic must both research and teach, but he can choose when, to whom, what, and how to teach (Lehrfreiheit).

At many European universities, the teachers today must develop the digital versions of their courses themselves in their preparation time, while teachers at American universities more frequently receive help from professional instructional, pedagogical, and graphic designers.

The Fachdidaktik (subject didactics) deals with the how of teaching related to the subject (e.g., Engineering, Education, Social Sciences) regarding the special properties of the subject. Here, the BL models can fit in more naturally, such as the TPACK model for understanding relationships between content, pedagogy, and technology (Koehler & Mishra, 2009). Hamilton argues that the European discourse of didactics is essentially identical to the Anglo-American “Pedagogics” (Hamilton, 1999): “Only their language divides them” (p. 135).

d) Are some Important Questions in Education Research Left Unattended if the Word “Blended” is not Used?

Do European educational researchers risk missing something important if the perspective that “blended” stands for is not used? We would answer, “Yes, maybe.”

The blended discourse seems, by its openness, to constitute a pragmatically *understandable concept* for teachers and policy-makers in the change process by functioning as a *negotiable third way* between the traditional education practices and something new, unknown, techno-driven, and extreme, and points at possible, gradual, generic change instead of disruptive change. The blended perspective further points at the *shifting* between place and time modalities inside the learning process as something important to study (Norberg, Dziuban, & Moskal, 2011).

e) Are Instructional Design and didactical Design coming closer and how do They Approach BL?

The integration of ICT in education can be developed and studied within frameworks of Instructional design or Didactical design. We think blended

learning by itself is not yet a sufficient didactical or instructional design approach, although BL has given rise to many good practices. We argue that the North American model of The Instructional Design (ID) and the European model of Didaktik (Didactical Design) are quite similar today; they have just been developed differently but can work together on technology integration in teaching and learning, with the help of BL and beyond.

The instructional design by Gagné, in *The conditions of learning and theory of instruction* (1965), uses the behaviorist learning approaches for understanding how learners learn, the basis for instructional design. Therefore, it is not a surprise when ID in its earlier understanding is seen as the practice of producing instructions for learners to allow them to create experiences that make the acquisition of knowledge and skill more efficient, effective, and appealing (Merrill, Drake, Lacy, & Pratt, 1996). An instructional design was seen as a classroom approach to create a "goal-mean relation" and to assist in the selection of methods to support teaching and learning (Winn & Snyder, 1996). To summarize, the instructional design was reduced to *methods* to support learning. Today, the understanding of instructional design is far broader; it includes the design of student-teacher interaction to support learning (IRMA, 2011) and combines educational and instructional experiences (see Zierer & Seel, 2012 for an overview).

The didactical design, Didaktik, started at a broader frame and focused on the relation between *student*, *teacher*, and *content*. This triangle is the main foundation for a didactical design. In addition, HochschulDidaktik (University-Didaktik) does not only focus on course development, but also on curriculum and academic development (Wildt & Jahnke, 2010). The term "didactical design" follows the German concept of Didaktik by Klafki (1963, 1997) and is inspired by Hudson (2008), by Fink's course design (2005), and Lund and Hauge (2011), who stress the differences of teaching concepts and learning activities and differentiate designs for teaching *and* designs for learning. Coming from this background, a didactical design includes teaching objectives, the *plan* of *how to* achieve those objectives in such a way that the learners are able to develop competencies and skills that the teachers have in mind, and different forms of feedback and assessment to assess the learning progress of the students (Biggs & Tang, 2007). The theoretical foundation of Didactics is based on two main concepts. First, the shift from a teacher-centered teaching to a learner-centered learning (Barr & Tagg, 1995) and second, the idea that learning does not follow a behaviorist concept, but is more a knowledge construction: a co-creation of new knowledge among a group of people that is "an active process of constructing rather than acquiring knowledge" (Duffy & Cunningham, 1996, p. 171).

The teaching objectives today are specified as *learning outcomes* and *competence development* that the students should develop over time. The didactical design asks how to make this possible, so that the learners are able to develop those

skills. The didactical design is the *enabler* so that learning can take place (Jahnke & Kumar, 2013). The idea of the design is first to name the competencies (teaching/learning goals) and then to design how the students could achieve and develop those skills. In Europe, there are often the four main levels of focus: professional knowledge competency, method competency, social competency, and personal competency.

Conclusion

Blended is an open term. When teachers saw that a) the understanding of e-learning as a total disruption in both teaching and learning was a mistake, and b) much of their earlier experience and knowledge of teaching is still valid, relevant, and useful in a world of new technology, then it is obvious why they like the word *blend*. What is more natural than to call the new IT integration a *blend* between old and new when communicating about it? The closer we come to an actual teaching situation description, the more natural the term seems to be for communication and educational development purposes. But is the *blend* metaphor really a suitable tool for a deeper analysis of what is happening when forming general theories? Do we have meanings that are defined well enough? Many European researchers seem to doubt that, and see the *blended* discourse as too superficial, in need of clarification and theory support. However, it seems that we are approaching a more global discussion on this when didactics, pedagogics, and instructional design, etc. converge.

At the end of the day, learning still takes time and effort, and teacher guidance in a community of reflecting peers takes us further than merely access to content--as before.

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Using MOOCs at Learning Centers in Northern Sweden

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Abstract

This paper describes the use of globally accessible Massive Open Online Courses, MOOCs, for addressing the needs of learners at community learning centers in Northern Sweden. The Scandinavian “study circle” concept is used to facilitate the studying of MOOCs, thereby forming “blended” or “glonacal” courses. Although the technical possibilities for Swedish universities to offer accessible education are steadily increasing, most universities do not, at present, prioritize courses for off-campus students. The available web courses in asynchronous formats are also difficult to master for untraditional learners and leaves the local learning centers with limited possibilities. Therefore a Nordplus Horizontal project 2014-2016, with partners in three Nordic countries, is developing models for the use of MOOCs in learning centers and organizations. A small pilot course case at the learning center in Arvidsjaur and its outcome is presented, including the interactions with Lund University which has an ongoing piloting project on use and examination of MOOCs. This concept development is discussed as a blended learning design and as a “glonacal” phenomenon with Marginson and Rhoades’ “glonacal agency heuristics”. Possible future scenarios are outlined.

Keywords: Open Education; MOOC; Wrapped MOOC; Glocalization; Glonacal Agency Heuristics; Blended Learning; Study Circle; Learning Center; Akademi Norr; Lund University.

Introduction

Disposition of the Paper

First a background is given on education access in sparsely populated parts of Northern Sweden, the present state of stakeholders, and the involved project initiatives. Then a small pilot case from the learning center in Arvidsjaur is presented. Finally, this idea is analyzed as a variety of blended learning and with an actor analysis on the background of Marginson and Rhoades' glonacal heuristics (2002).

The questions in focus for this paper are:

- a) How can Swedish local learning centers offer, adapt, and use MOOCs instead of vanishing national courses?
- b) How can a new learning opportunity, combined by using global and local solutions as well as asynchronous and synchronous modes, be understood, and what are the possible future implications?

Diminishing Access to Education

With its 450 000 km², Sweden is the fifth largest country in size in the European Union but has a total population of only 9,6 million and an average density of 23 inhabitants per km². In contrast, the European Union has 112 inhabitants per km² (SCB, 2013). The population density in southern and mid-Sweden is much greater than in the north: about 8 million people live in the southern third of the country. For the two northernmost regions, Norrbotten and Västerbotten, the population density is 2,5 and 4,7 inhabitants per km² respectively. The vast majority live along the coast of the Gulf of Bothnia in the cities of Umeå, Skellefteå and Luleå. The sparsely populated inland areas have suffered from serious depopulation from the 1950's and onwards. Many of the traditional jobs in forestry and agriculture have disappeared, and new jobs in the service and knowledge sectors are limited. These areas are nationally strategic as they are rich in mineral resources, forests, hydro- and wind power, and popular for tourism. The new jobs that emerge, often require skills that the local educational systems have difficulties to match. One example is the important high-tech winter car testing industry (Nybacka, Larsson & Ericsson, 2007). Higher education is accessible along the coast in the university cities of Umeå and Luleå. For the inland communities, this means a brain-drain because they see young people leaving but not returning. For lifelong learners (students over the age of 25), the coastal campuses are beyond daily commuting distance, and the average education level inland is - as one can expect - low in national comparison. At the same time, these inland municipalities are often the initial placement for asylum-seekers mainly from the Middle East and Africa. Many of these get no access to higher education, both for formal and geospatial reasons.

In 2010, the increase of “distance education” in Sweden was expected to continue (Amneus 2010), but by 2014 the number of courses and programs offered had instead decreased (UHÄ, 2014). Universities now seem to be concentrating on campus-based programs of education.

Learning Centers and Local Development

Because of the long distances to a university campus, rural communities try to be proactive. Some representation of higher education in the local community, big or small, is seen as a necessity for local development (Danielson, Grepperud & Roos, 2015). The political motivations vary but concerns are about regional development in a knowledge society, and the learning centers, are often connected to business development. A 2005 European Commission assigned study found local learning centers existed in varying forms all over Europe (Buiskool, Grijpstra, van Kan, van Lakerveld & den Oudendammer, 2005). Grepperud and Thomssen (2001) categorizes the functions of Norwegian and Swedish learning centers as three “M”-s, “Motor, Mötessplats, Mäklare” (“engine” for development, “meeting place” for students, “broker” of education). Learning centers also offer career counseling and exam proctoring services (Glesbygdverket 2003). For the past two decades, a central technology of the learning centers has been the video conference studio bringing students together for online seminars and lectures. Today, technological development allows video to be streamed to personal computers in homes and mobile devices as well. The idea and work mode of learning centers is therefore meeting challenges and evolving (Grepperud, Danielsen & Roos 2015). The learning centers want to support a social dimension of learning, which also makes learning more visible in the local community (Lögdlund 2008). MOOCs will bring new possibilities and challenges to the learning center (Danielson, Roos, & Grepperud, 2015).

The Swedish Study Circle Tradition

The classic Swedish “study circle” concept has been and still is important in Sweden: it is the regular local gathering of learners for studying together. This goes back to Oscar Olsson, teacher and parliament member and active in the temperance movement at the beginning of the 20th century (Larsson & Nordvall, 2010). From teaching groups in the temperance movement, in 1902 he formed a model of studying together that was more flexible and resource-efficient. The study circle allowed for and encouraged questions and discussions between individual learner’s to aid and improve learning. It was not led by a teacher, but by a host, a “circle leader.” It has since been an important tool for political and religious movements, temperance organizations, trade unions, sports movements, and NGOs. Some approved study material or study plan is used. This model can also integrate new technology. When the Swedish national radio broadcasting service, Radiotjänst, in late 1920’s, began broadcasting series of lectures in different subjects, “radio circles” emerged. The new technology was combined with the collaborative learning format of the study circle. People gathered to listen to lectures in front of a radio set, afterward discussing its message. There was even a national conference for radio circle leaders (Radiotjänst, 1933).

The Perspective of the Universities in the Region

For the universities in Northern Sweden, the extension of access to education has been an important task since their foundation in the 60s and 70s. Early distance education often built on a model with concentrated face to face periods on campus or other meeting venues and self-directed asynchronous studies at home. As educational technologies have developed, they have been incorporated by universities to increase educational access: video tapes, video conferences, CD-ROMs, e-mail and LMS's. The institutions had a spectrum of objectives such as reaching more students; testing new technology; showing political policy awareness; and cooperating with local communities. A considerable era of expansion occurred in the late 90s when EC structural funds ESF 3.5 were used by communities to involve universities in development projects for increased educational access. This kind of funding is no longer available. Flexible educational offerings by universities directed to address local needs have become fewer. One reason for this is changes to the funding system. Sweden has no tuition fees for education for its own or other EU citizens. Instead, universities are compensated by the state first for the registration of a student on a course and additionally for a student's completion of a course. Because of an adjustment in the compensation model, the completion of courses is favored over registration. This has caused a capacity transfer where universities shift from offering shorter courses to instead focusing on attracting students for program enrollment on main campuses. Concerning offering MOOCs, the Swedish universities have no regular funding, and they seem to be hesitant, although some of the top ranking institutions, like Karolinska Institutet and Lunds University, are now running MOOCs.

Are MOOCs a Part of a Solution?

MOOCs are categorized mainly as cMOOCs and xMOOCs. The former is modeled after the original MOOC course from the University of Manitoba in 2008, with George Siemens and Stephen Downes as initiators. cMOOCs focus on knowledge creation and participation in connection with connectivist theory (Siemens, 2013). An xMOOC is an online scalable course typically from a world-class university, with lectures, assignments, and quizzes. Pedagogically, it resembles traditional setups and focuses on knowledge acquisition. Both kinds have some characteristics in common. They are: tuition-free for the most part; non-selective in enrolment - which is unlike Swedish education but welcomed by the untraditional learner; unclear concerning formal credit value; offered in English - which for Swedish students is often acceptable although support can be needed. The following refers mainly to xMOOCs.

A Design for Use of MOOCs at Learning Centers

There is a customized design concept under implementation including MOOCs in the project “Global Cloud Services – Local Lifelong Learners”. The setup is as follows:

- a) Learning center staff identifies learning needs in the regional development context.
- b) If a university in the region cannot supply an appropriate solution to the learning need, available MOOC alternatives are examined.
- c) A suitable MOOC course is found and marketed locally as a study circle function with weekly or bi-weekly study meetings at the learning center.
- d) Students register for the MOOC and meet local peers to organize. The group can be quite small; from 3 or 4 participants.
- e) A study circle leader is appointed among the learners to function as a host for meetings.
- f) The course can be augmented by adding local content, e.g. visits to workplaces relevant for the course or an expert visiting the group for discussions in person.
- g) A course certificate can be obtained from the MOOC platform, alternatively national recognition by cooperation with a Swedish university arranging a local examination is an option.

This concept gives the learning center a new tool for addressing local learning needs. It gives the asynchronous course a social face-to-face support environment that will be helpful for course completion and enhance learning. It liberates the learning center from being dependent on regional or national universities’ education offerings. It also offers a more complex social network. For example, students have two layers of peers – internationally through the MOOC course forum and locally in the study circle.

The Nordplus Horizontal project “Global Cloud Services – Local Lifelong Learners” is funded by the Nordic Council of Ministers, an intergovernmental body. Partners are Akademi Norr, an association of 13 northern Sweden communities with learning centers (Roos, Grepperud & Danielsen 2015); the city of Skellefteå with a multi-institutional campus; Lederne, a Danish association of managers; and Fjarkennsla, an Icelandic e-learning firm. The main objective is to try out models for contextualizing MOOCs in collective local settings. Within this project, MOOC courses are combined with study circles, the results researched, and the design enhanced continuously.

Parallel to the “Global Cloud Services” project, Akademi Norr has cooperation with Lund University about providing an examination for students taking MOOCs, awarding course certificates from Lund University. The cooperation is primarily directed towards groups that have

difficulties entering the job market such as unemployed youth, newly arrived immigrants, and the disabled. This cooperation is coordinated with the project.

The first MOOC course in the project started in October 2014 with a local group in Arvidsjaur, Sweden, which took the course “Intro to the Design of Everyday Things” at Udacity.

Setting. Arvidsjaur is a traditional place for the Sami people, and is also renowned for its winter car testing activities and its tourism. Around 6500 people live in the municipality. The learning center is co-located with the municipal labor market development unit, office for refugees and EU project activities. Arvidsjaur is with its learning center a member of the association Akademi Norr, mentioned above.

Participants. Two men and three women aged 17-31, all of different nationalities, were recruited for their interest in the MOOC way of studying by the learning center manager, who also participated as a sixth learner. The learners were recruited by networking in and around the learning center. Of the participants, three had a university education, one had a vocational education and two were still attending upper secondary school.

The course “Intro to the Design of Everyday Things” was chosen for good reviews online and for being of general interest. The course was “self-paced”, meaning that it could start any time. It comprised multiple short lectures in combination with design assignments and quizzes. In addition to videos discussing problem solutions, there was an active forum online for communication among learners. The final assignment was to design a user interface for a time-bank app for a mobile device.

Method. Data collection was done by semi-structured interviews: four persons were interviewed in the learning center and one via Skype. The interviews were of piloting character and were aimed at describing student experiences of to the online course itself, then of the study circle, and finally how this formed a combined experience. Content analysis was used for the transcribed interviews. As more courses are completed, the method will be adjusted. The interviews available to this date do not provide a saturated understanding, but prepares for further study in a following Design-Based Educational Research project, enhancing the design and evaluating results in cycles (See Design-Based Research Collective, 2003).

Results. Only one person said she would have chosen to take this course by herself. One respondent says, “*we did not have a common interest to join the course...it was rather like that we would like to have a new experience*”. None had participated in any online or distance course earlier, but two had heard about MOOCs. The learners were satisfied with the course, and with their participation. The English language offered a challenge as some were more skilled than others. What was difficult was mostly the special discourse of design concepts. Two mentions the term “*affordances*,” which seem to have no clear translation in some other languages. A Swedish

male who declared that he had his language skills thanks to video-gaming said that he could have given up the course at this stage: “...to afford something is kind of to have money enough...it complicated it a lot, and I would soon have lost interest if I had done this all alone...but when we could discuss it in the group, it became different.” The other male mentioning “affordances” said: “This with affordance. The first time I heard...affordance then what’s this... but then I (came to) see everything as affordances or signifiers.” There were some smaller cultural issues. A young girl, who recently had arrived from a non-European country, said about the final assignment task to design a time-bank exchange app for a smartphone: “In Europe time is like gold...if we look at Africa and Asia time is not that necessary you know.” (Interpreted meaning: not looked upon as a value in the same way).

During the six-week course, there had been synchronous meetings every Monday evening at 7, lasting for one hour. Not all could participate every time. The study center manager led the meetings to start with, but this task was on a few occasions managed by another participant. The intended examiner, a professor from Lund University, called in a few minutes to some meetings to reduce any tension among the students about the upcoming examination. In the group, the videos and assignments for the previous week were discussed, and also the agenda for the coming week. All of the participants emphasized that the group had been important for pacing the studies and for getting things done and for finishing the course. However, the younger participants still in high school did not have much time to study as they were ambitious in school as well, and they were often supported by the older participants. This was accepted in the experiment. One girl says: “I and the other girl here, we were talking it through, but the others were really young, we were a support for them” and two participants meant that it was better if all in a study group were on similar level. The group meetings were important as they; a) formed a work schedule, helpful to get things done: “you feel you have the responsibility to watch it (the videos) and share the opinions”; b) enabled reflection and discussion: “when we met on Monday I asked if I did not understand and we could talk about it.” Two students also reported lively group discussions where all had differing interpretations of an assignment concerning design elements of a rolling staircase. The course forum was not used (only one person reports trying), which was due to the existence of the local group. Four of the participants said that they could have studied the course by themselves, if motivated by the subject. The two youngest just said they must prioritize school instead, but that they had much valued the help of others.

Examination of learning. After course completion, a professor from Lund University visited Arvidsjaur and performed a verbal course examination of five of the participants (not the learning center manager). The examining interviews were done individually and lasted up to an hour covering both the theoretical concepts introduced during the course and the practical assignments. The grading was only “pass” or “fail.” They all passed and were given a certificate from Lund University of the same kind as if they had taken part in a contracted course. A more complex grading has been discussed for future examinations. In particular there have been discussions on how to handle weak students with low self-esteem that have put considerable

effort into studying the course but have not reached all of the course goals. A “fail” on a course would risk further lowering their will to take on new challenges and set goals for their lives.

Two Theoretical Lenses

Theoretical Lens I: Blending Spaces or Time Modalities?

When considering the discourses of technology and education, a clear consciousness of “place” and “transport” is shown (Meyer, 2005). “Distance learning,” “education distribution,” “remote student” – all point at a place as the radiation source of teaching or even learning. Still, much “distance teaching” has a classroom idea in the conceptual background; lectures are recorded or synchronously broadcasted, and LMS’s replicate classroom functions. “Blended learning” is often understood as the use of an online environment in combination with classrooms; it all becomes a “blend of places.” If a course is seen in this way, it seems to promote content distribution logistics as the central educational function. The metaphor of transportation of fresh goods to far-off places also brings in value propositions about transportation damages of goods, creation and consumption, and the normal and the exception.

There are alternative perspectives that can be of help, freeing up our thought from the place perspective. If “blended learning,” which is a very problematic but commonly used term (Oliver & Trigwell, 2005), is applied to the distinction synchronous /asynchronous instead of classroom /online, another perspective of how to use ICT tools in education appears. We have an increasing number of new digital synchronous and asynchronous tools, but we also have older ones in the mix; for example, the classroom as a synchronous tool and the book as an asynchronous one. Therefore, a current education design dilemma is how to combine carefully chosen tools in a course process involving students at one or several places and during varying time access conditions. These kinds of blended models have been described in Power’s “Blended online learning” (2008), in Norberg, Dziuban and Moskal’s time-based blended learning model (2011), and recently as “blended MOOCs” or “distributed flips” (Sandeen, 2013). A human is bound to be somewhere, more or less social and beneficial, when learning. The learner is not in the cloud. A co-located place for synchronous peer interaction, such as a learning center, can be of good use.

Recently, the concept of a “wrapped MOOC”, a course with ordinary students as the asynchronous part of the course in combination with face-to-face lessons with the teacher, has been tested and discussed. An example is when Stanford’s AI course on Coursera was used at Vanderbilt University (Bruff, Fisher, McEwen & Smith, 2013). Stephen Downes remarks that whatever a “wrapped MOOC” is, it is not a MOOC because it is not open any longer (Downes, 2013). The study circle model presented here is different, as it does not have a teacher, but it is essentially a get-together of students of the same course, and not closed. It does not have the problems with syncing campus schedules with MOOC schedules that were both detected by Caulfield when doing “distributed flips” with MOOC content (2013).

Theoretical Lens II: Glonacal Agency Heuristics

Which words and concepts can be useful for imagining the global in relation to the local in a case such as with MOOCs at a learning center? "Glocalization" addresses how the global must be adapted to the local, but misses the national level. In the present time, the national level may not seem so actively involved in MOOCs, but is important in the context as funder and founder of universities for national purposes. "Marketization" mainly relates to the tension between national state control and market control of higher education. Is "globalization" the word we are seeking? Held, McGrew, Goldblatt and Perraton (1999) defines it as "the widening, deepening and speeding up of worldwide interconnectedness," but it may make us think of the global, national, and local as a hierarchy or as Russian dolls of decreasing size placed one inside the other. This may not be helpful in itself as there are reciprocal links, interactions, flows, and relations between the global, the national and the local in all directions. Marginson and Rhoades (2002) capture this with their "glonacal agency heuristics" model. "Glonacal" means global + national + local. For imagining the glonacal they construct a non-hierarchical hexagon with agencies (organizations) and human agency (people who have agency) at the three glonacal levels forming six interdependent nodes, and it then describes relations between them as non-hierarchical and reciprocal; the flows go in all directions. Below we provide an attempt to use the glonacal model for capturing the presented design of MOOC courses. For this, we could also map out a regional level such as the EU European Higher Education Area, EHEA, between the global and the national. Below we discuss the actors and stakeholders on these three levels (global-national-local) and two kinds of agencies: agencies of organizations; and human individual or collective agencies. What can these agencies and agents see as possibilities or threats in a MOOC case like ours?

Agent Analysis on Glonacal Basis

The MOOC provider, usually a highly ranked university, is typically a *local or national agency*. The political and strategic motives for MOOC providers vary. Fiona Hollands finds, in 83 interviews with university leaders, the following: extending reach and access, building and maintaining brand, improving economics by reducing costs or increasing revenues, improving educational outcomes, innovation in teaching and learning, and conducting research on teaching and learning (Hollands, 2014). The MOOC providers must balance traditional factors as tuition fees, campus environments, and national regulatory frameworks while trying out something new. They believe that some parts of their teaching, usually a part connected to research priorities, are of global relevance and quality. A MOOC can thereby become a preliminary claim in a future global education provision. Research and education now go hand in hand from the local to the national and on to the global level. The MOOC providers may look upon their attracted MOOC students as their experimental global cloud students, and probably do not mind that some of them are working in supported groups in Northern Sweden. Inside the university, the engagement in MOOCs is often a result of human agency – people with ideas, enthusiasm, and influence.

The MOOC platforms can be seen as *global agencies*. These are exemplified by the “for-profit” platforms like Coursera or Udacity, or by the “not-for-profit” like EdX or Future-learn, which are ventures in cooperation between universities. They bring MOOC courses to students by providing their advanced LMS platform solutions and course marketing to the well-chosen MOOC providers, for a fee or cost. These platforms have made an important innovation – the scalability of the functions of a course, thereby solving a lot of organizational problems which the local university still has on campus. The visions of radical change are more often found on the global platform level than on the MOOC provider level where there are more traditional interests to balance and satisfy as well. It is interesting to note that Coursera is looking for test centers and meeting places, and some MOOCs offer automatic meeting suggestions with nearby students at cafeterias for example – acknowledging social needs to meet and interact with peers.

A Swedish university is a *local or national agency*. Here “local” should not be understood as value-laden. Today this local agency normally prioritizes international research excellence measured in publishing, citations, and rankings, counting on that this will also automatically mean education excellence status and attractiveness for students as well. In the best case, it will attract competitive high-performing students that almost teach themselves. Recruitment of untraditional students to distance education customized to fit local needs is usually not an attractive area for expansion. The connection between research and education seems strong here, but the coin has a flip side. The more specialized the research becomes in the hunt for global excellence, the weaker the capacity to satisfy a broad spectrum of education needs around the university site becomes. Here a discrepancy appears. The local region around any university is asking for both education and research services in an increasing number of knowledge disciplines. Their university, often thought of as a full-service provider, has become more of a global specialized institution. This development further decreases the likelihood of rural areas being serviced with higher education.

A local university can start a MOOC itself. In Sweden, the universities have asked the national agency of higher education for financing of MOOCs, as education for Swedish and EU citizens is tuition-free and state funded. This has not been granted. Universities can also “wrap” MOOCs as earlier described, but no such experiments are known to have been carried out in Sweden below Ph.D. studies.

We also have *local human agency*, playing into the local and national agencies’ policy discussions. One example comes from a professor in telecommunications at Lund University, Per Ödling. He has described a risk scenario for Swedish universities that do not refresh their policies and practices and adapt to youth culture and technology (Ödling, 2013). He has proposed a “University of Sweden” (Ödling, Källström & Lagergren, 2013) to make globally available for education the best of Swedish research-based knowledge. The “University of Sweden” would focus on quality control and examination of students who learn in net-based courses, such as MOOCs,

independent of the provider. That is also what Lund University has prototyped in Arvidsjaur, and more is to be expected.

Northern Sweden's local learning centers and their associations are also *local agencies*, in the glonacal model. They work in their communities with higher education offerings as a tool for development of their traditional economy into a knowledge economy. It is a question of community survival in a time of depopulation and brain-drain and the forming of modern local knowledge economies. Although the learning center is sometimes seen as a university's remote node in a hierarchical model, a local learning center is not owned by the university, but by the local community. It can thereby alter its ontology and try to become more of a *global* learning center instead, and try to connect to other education providers on MOOC platforms. The potential students are not only the traditional ones; consequently, they may need support and feedback that an asynchronous web course seldom provides to learners outside a higher education culture. The use of study circle methodology can provide a solution.

What remains of the glonacal model in this Swedish case is the *national agency*. A national study on possibilities and risks with both use and provision of MOOCs has been started at the Swedish Higher Education Authority by government decision in March 2015.

Two Possible Future Development Scenarios

We have here formulated the problem of education access in remote communities in Sweden and suggested as well as implemented a design for addressing this problem. From the point of view developed from the learning center perspective, two interesting future scenarios arise.

An xMOOC-Kind of Future Scenario:

Asynchronous scalable global courses and programs from universities specialized in specific knowledge areas are accessible worldwide. These are customized and combined to provide each student a unique education. Big campuses, smaller branch campuses, and learning centers all become multi-institutional learning environments with different offerings of labs, mentoring, and functions. Exams are run by local bodies – universities or third-party assessors, by the MOOC provider or by a combination of both. Universities provide their own MOOCs for global students in their research specialties.

An Alternative cMOOC-Kind of Scenario:

Universities can proactively try to become more consciously glonacal; as such, they still compete in a global arena both with their research and with their associated specialized and globally accessible courses. At the same time, they work locally with communities to find ways to integrate campus education and what is now decentralized and distance education into new education logistics. Students on campus study together with other students in learning centers, in

workplaces, and with students dispersed around the world. They have varying learning environments but construct their learning together under teacher inspiration and guidance. When needed, MOOC courses from other universities are used, but the university in the region works to create relevant courses and to support student learning in a constructive mode.

Conclusion

Our experiment was small but results encourage further actions. The understanding of this design has increased, and the learning center in Arvidsjaur has a new tool. The learning centers are often looked upon as an improvised construction in a context of depopulation, brain drain, general crisis, and long distance to the nearest campus. However, they may turn out to be a model for a future environment of education: a learning space serving local students but connected to many universities around the world. The learning centers can work actively at the intersection of the global, the national and the local. They can emerge as Foucauldian heterotopias (Foucault, 1984), connecting many places into one.

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IV

Time shifting and agile time boxes in course design

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Keywords: Blended learning, online learning, ICTs and learning, agile frameworks, procrastination, pacing, time shifting, education logistics

Abstract: The ongoing integration of Information and Communication Technologies, (ICTs), into higher education courses is often called *blended learning* although it often relates to course design. It is usually understood in place categories, as a combination of traditional classroom-based sessions and Internet-enabled distance or online learning practices. One alternative understanding of ICT integration can be constructed of time categories, with an understanding of ICTs more as process- and project- related. Two such design frameworks are conceptually presented and then used together in a small case study in a pilot experiment in physics at the preparatory level for entering engineering programs at a university in Northern Sweden, where a need was to counteract procrastination in studies which can be a problem in flexible courses when students and teachers are separated. These are a) time shift mechanisms between synchronous and asynchronous learning modes in the course process and b) agile frameworks mechanisms adapted from work process developments in the software industry. Data were collected in student interviews and analysed with qualitative content analysis. Results show student satisfaction with the work rhythm and that a feeling of presence, which enables easy interaction, can be facilitated by synchronicity.

1. Introduction

A *course* is an artefact in formal education, a defined content in combination with learning objectives and normally a set time for completion. The course is seldom questioned as such in higher education, although it has some serious drawbacks in relation to student learning strategies, habits, and pace. It can be seen as an element in an industrial system. If a student cannot complete in the set time, the student fails. This can be a failure of the system if the student can learn under different conditions. ICTs are often recognised for increasing learner flexibility in the modification of time and place conditions, but can also thereby increase problems, such as procrastination.

A course can if we want, when operationalized, be understood as a project; for teachers, students and administrators although in different ways; it has a start and a

stop and objectives to fulfil in between. Learning to understand content x, master a procedure y or demonstrating a skill z, on the other hand, may be better understood as ongoing processes, within, between and outside courses.

The integration of Information and Communication Technologies (ICTs) in various fields of activity in society has largely dealt with making projects and processes more effective and raising quality, and in the longer perspective also meant a redesign of core activities. An interesting thing with the advent of ICTs in the area of higher education is, we argue that it resulted in spatial conceptualizations of ICTs and the roles they can play in teaching and learning, in four ways:

- **Transport:** To use ICTs as transport metaphors to make *distance learning* possible, transferring campus education from a normal place at campus out to reach new groups, by sending, recording content or recreating classroom events. Synchronous video-conferencing from studio to studio is one example. Just trying to imagine the literal implications of the term *distance learning* shows some of its center-periphery spatial thinking.
- **Other-worldliness:** To adapt and run the course, in another world, the *online* or *virtual* world, including teachers, learners and material. One such example is the use of a Learning Management System (LMS), sometimes called the *virtual campus*. Still, the learner does not live in any cloud, and the necessary physical whereabouts of the learner can be more for less beneficial for learning.
- **Blendedness:** To use the face-to-face classroom in parallel to an online environment, as an LMS, in an attempt to combine the best from two worlds. ICTs are here connected to the campus environment more closely again, but teachers and students tend to become focused on the distribution of learning content in physical or virtual spaces, alternating between these places by log-in-log-out procedures.

In this paper, we depart from the commonly used spatial theorisations of ICTs in university education as the primary focus. Instead, we propose a time perspective as an alternative dimension to further our understanding of ICT integration into university teaching and learning processes.

We present as an illustration a case from Luleå University of Technology, LTU, (www.ltu.se) in Northern Sweden where we designed and tested time tools in course module in Physics at preparatory level¹.

Our general research question is to evaluate how useful time-related categories, terminology and understandings are in course design with ICT integration. For this presentation, we concentrate on the students' experiences and views of this model.

How useful are time-related perspectives such as time shifting and agile mechanism as design principles for an ICT-enabled course module at preparatory level?

¹ A preparatory course is aimed at upper secondary school graduates who need additional tuition and credentials before entering a specific university level program.

Before proceeding with presenting our research study, we provide a brief clarification and background of the concepts we use. Some of these concepts are widely used in literature (like *blended learning*), while others are less familiar or emerge from our past research and different research fields (for instance *agile project frameworks*).

1.1 Blended Learning

The term *blended learning* (BL) will probably never get a standard definition, but is commonly understood as the combination of something traditional and something new and digital in courses (places, course material types, communication tools, pedagogies). BL is a problematic term but frequently used in higher education, albeit slightly different in North America and Europe in the research domain (Norberg & Jahnke, 2014). BL tends to be mainly concerned with the organisation of teaching. How students use old and new technologies to learn often falls outside the area of BL (Sharpe, Benfield & Francis, 2006, p. 26, 54). Oliver and Trigwell remark that the word *learning* should be returned to its rightful owners, the students (2005, p. 24). They do not think that the metaphor of a *blend* is helpful. Sharpe et al. (2006, p. 4) on the other hand, warmly recommend the use of the term BL, just because it lacks an agreed-upon definition. Thereby it allows teachers to experiment and negotiate its meaning themselves. Seen from another angle, the research fields of BL, and for example Technology Enhanced Learning (TEL), and Computer Supported Collaborative Learning (CSCL) can all be seen as studying and conceptualising the *long-term integration* of ICT tools into new normalities of learning processes in higher education, rather than studying *blending*. We do not talk then about ICTs causing sudden disruption as about more sustainable long-term changes of operational modes in higher education. ICTs become more of augmentation to human ability than imagined as alternative technology-supported places for activities. These new human abilities to communicate, teach and learn can compress, modify and unbundle time and place obstacles in a one and only world of human interaction. “We are probably the last generation to experience any difference between offline and online”, writes the information theorist Luciano Floridi (2007, p. 61) thereby leading out of a divided ontology with the traditional physical-social world and the new digital one side by side, which humans traverse by log-in and log-out procedures.

1.2 Time and blending

One idea about acquiring a more sustainable perspective is to leave place-and-education focus behind and try to give time-and-education focus priority instead. One such time-related attempt is represented by Power (2008) with his *blended online learning* and Norberg, Dziuban and Moskal (2011) with a *time-based blended learning model*. These studies suggest an alternative conceptual model of ICT integration in mainstream courses. It is not primarily about classroom and online, here

and there, real and virtual but about shifting synchronous and asynchronous modes of communication and work during a course period. This is in a way old and trivial: to gather students for a day at school and give assignments for homework follows this pattern – as well as the modern flipping of the classroom; typically to listen to lectures at home and practice, discuss and study in school. Some tools and media, old or new, are synchronous, like classrooms, video conferences, webinar, telepresence and chat, other for asynchronous use; like print, recorded lectures and discussion forums. A design task is to choose tools for the synchronous and asynchronous modes while also thinking of the shift between them, so work in one mode points forward to the next coming. Norberg et al. (2011, pp. 212-213) show some characteristic kinds of change with ICT integration: *Asynchronous support, synchronous location, migration, flow and empowerment*. We use this below for orientation in the ICT-integrated course design landscape.

1.3 Procrastination and asynchronicity

Some problems are more easily understood with a time-related model as background; one we will focus on here is the pacing of student work in relation to course design. Online courses and blended courses with much asynchronous content can become a culture shock for many students when it comes to personal time management (Leeds 2014). It seems that the more asynchronous, and thereby flexible a course is, the bigger the risk for procrastination; flexible work tasks are postponed. The situation at the end of the course becomes unbearable, and even unhealthy – and students may not succeed in completing their course (Elvers, Polzella & Graetz, 2003). A covariance can be demonstrated between procrastination and non-engagement in forums in courses (Michinov, Brunot, Bohec, Juhel & Delaval, 2011). Many know the mechanisms of procrastination, and some have learnt to somewhat control and use it for productivity, becoming addicted to deadlines for getting anything done. Modern strategies for addressing procrastination in ICT-supported team processes are available.

1.4 Agile project frameworks

We discovered that big projects in the computer programming sector have for some years worked rather successfully with addressing procrastination in the workflow. Development of software can cover long periods, up to a couple of years. Earlier the dominating work project model was strictly sequential and not easy to pause or rewind. From the customer-negotiated detailed specifications, a strict work plan was laid out with the production stages all in high detail up front, often represented by a Gantt chart. This is commonly called a *waterfall model*. The work phases, dates, dependencies and expertise needed were mapped up. The distribution of work was between expert teams; software architects, business analysts, code developers,

interface designers, subject matter experts, testing teams, and so forth. It looks very good and well organised, but it often happened that projects became very critically late near deadline of delivery where enough time and resources were not available. The needed time had been available, though, in the first part of the project period, but the project staff had not been able to work effectively since work conditions still were very flexible and much still undecided. It was often discovered near the final deadline that there were many programming bugs not earlier detected and often parallel but slightly different work had been done on similar functions by different teams. The isolation of the project as a whole while the world went on the outside could result in dissatisfied customers. Although specifications had been met, the product had become irrelevant.

Some innovative strategies to address these problems have been developed, interestingly enough partly in parallel practice. These strategies are incremental; step-by-step, instead of purely sequential; they are cross-functional instead of highly specialised, and they build on self-organizing teams and are in communication with other developments in business and society, which also are allowed to affect the project. Below, we describe *Scrum*, the most known agile framework from the regularly updated Scrum guide (Sutherland & Schwaber, 2016).

Scrum has *three roles*; Product owner, Team member and Scrum master, *three artefacts*; Product backlog, Sprint backlog and Product increment and also *ceremonies*: Sprint planning, Daily scrum and Sprint review/retrospective. The coordinator of the project as a whole, the *product owner*, has a list of ranked and prioritised *backlog items* for the final product, work tasks that must be done within the total project frame to produce functions in the software that the final user should expect. These are expressed in *user stories* (“As a <type of user>, I want <goal> so that <reason>”). This stack of backlog items can be adjusted and reprioritized due to new experience and communication in-and-outside the project, and there can be emergent and disappearing items. Teams led by a scrum master accept to work on one or a number of items received from the product owner for a short, self-contained project period, typically 1-4 weeks, which is called a *sprint* or *time box*.

The team leader, the *scrum master*, coordinates the team to do a careful day-by-day planning by breaking down the backlog item into time-estimated work tasks, forming a *sprint backlog*. These tasks are prioritised and agreed upon by the team members. The scrum master protects the team from outside disturbance while working, watches what still is left to do and removes obstacles and also is a team member. Daily status of the team members work is reported in a short morning meeting, the *daily stand-up* which the scrum master leads. It lasts for a maximum of 15 minutes, and consists of all members answering three questions: What did I do yesterday? What am I going to do today? Are there any problems? Problems are listed by the scrum master on an *impediment list* and should normally be resolved before next stand-up, or the sprint planning must be altered, but objectives not decreased. A *Kanban board* with post-it notes in columns (*To Do, Doing, Done*), on a white board or online, shows daily progress and enables transparency. The result of the sprint is a potentially shippable

product increment, which is demonstrated and discussed with stakeholders (*sprint review*) and the work process evaluated in the team (*sprint retrospective*).

Thus, in a big total project frame where flexibility remains on the project level, team members always have concrete work to do, test and deliver within a time box. The team should have a stimulating, but not critically stressful, situation of work and they should feel satisfaction when a work task is *done*. The most frequently discussed question in agile projects seems to be about *the definition of done*, on which team members must agree. Not that what is done must be perfect and final, but that it works is potentially shippable for the time being, and permits people to concentrate on new tasks. The work pace should be sustainable, and it should be fun to work, people also then do better work. (Sutherland and Schwaber, 2016). The incremental approach is illustrated by jokes as “How do you eat an elephant? One piece at a time.”

1.5 Agile frameworks and education

We find that there are both similarities and differences between courses in education and projects. School can remind us of a waterfall project; not detecting or ignoring problems that should have been resolved for keeping up the planned pace instead; placing possible application values with education very far ahead, being subject-based and specialised and ending up in not-so-updated learning outcomes. If a student falls behind, he or she often stays behind, partly due to the organisation of the system and not necessarily because of inability to learn. A recurring problem is procrastination, which increases with flexibility. There are also important differences: When student fulfils a course objective, it can hardly be seen as a deliverable product, although it is believed to be testable, and teamwork in programming and learning in social context works somewhat different. In a course it is not enough if only one student works with a specific course objective, all should reach it, and so on. Software development is a business activity.

Different agile strategies show considerable similarity; Scrum, XP, Lean and Atern. Representatives for different agile methods met 2001 and formulated the short *Agile Manifesto*² with four altered priorities. Traditional items at the right are declared as still valued, but items on the left are in agile thinking valued even more:

Individuals and interactions	<i>over</i>	processes and tools,
Working software	<i>over</i>	comprehensive documentation,
Customer collaboration	<i>over</i>	contract negotiation,
Responding to change	<i>over</i>	following a plan.

The four basic altered priorities above from the agile manifesto can be adapted to thinking of education; here is D’Souza and Rodrigues’s version as an example (2014) where they value items in the left column higher than those on the right:

² <http://www.agilemanifesto.org>

Students and teachers and their interactions	<i>over</i>	administrative processes,
Working knowledge	<i>over</i>	grades,
Collaboration with students	<i>over</i>	fixed syllabi,
Responding to change	<i>over</i>	following a plan.

Agile pedagogy is an expression that shows up increasingly often, with varying idea content for education reform. No coherent theoretical framework has knowingly been formulated, but some researchers see development possibilities in this direction (Stewart, DeCusatis, Kidder, Massi, & Kirk, 2009; D’Souza & Rodriguez, 2014; Royle & Nikolic 2016; Foster & Ruiz, 2010). Courses on agile thinking and project strategies are created and tested in computer science at some institutions (Soundararajan, Chigani, & Arthur 2012). Teachers use Scrum for running software development courses in more realistic and team-based modes instead of as a solitary student activity (Slaten, Droujkova, Berenson, Williams, & Layman, 2005; Perera, 2009). Agile strategies are also utilised for development and management of e-learning- or blended systems (Tesar & Sieber, 2010; Doherty 2010). The classic waterfall process in North American instructional design, ADDIE, is increasingly being altered into agile ways of working instead (Groves, Rickelman, Casarino & Hall, 2012).

What we are trying here is different. We develop new strategies, inspired by agile frameworks, to directly address procrastination in courses with a high ratio of asynchronous modalities. We have a suitable time-shifting map over the ICT-integrated course, with the synchronous - asynchronous time shift pattern, to be able to do it.

2. A case study; design of modules in Physics

2.1 Context of the case

At LTU, the preparatory year for entering technical university programs (*Tekniskt basår*) existed only in a campus version, but a more flexible accessible solution was planned in 2013, first called the *distance* version. If Swedish students do not have the required grades in STEM subjects (science, technology, engineering, and mathematics) from upper secondary school for entering STEM university programs, the preparatory year is a common solution. The content is at the pre-university level, but the courses are provided by universities. It is known to be very intense and demanding. The focus is on qualifying for admission the following year. It is considered as a hard case for distance and online education designs, and low success rates are common. Some Swedish universities have closed down the preparatory year distance offerings because of this and because the national financing system now rewards the institutions mainly for students that finalise their studies.

The long-term aim of the planned project was to supply the engineering educations with more students by providing a modern and well-designed distance education built on pre-recorded lectures and demos and a creative use of Open Educational Resources

(OER), in a Learning Management System. For this, a pilot project was set up. Some demanding modules in the course Physics B: Waves, Light, Induction and Electro-Magnetic radiation, were to be developed by an instructional designer together with teachers and students and then tested for acquiring experiences for the further development of a distance version of the whole preparatory year.

In the planning phase of this distance experiment, the attention turned from the place thinking (distance) to time-, project- and project-process perspectives for enabling inclusion of students with varying place and time conditions. A thought was also to use the developed material for campus students and for an existing open entrance solution (*Öppen ingång*) to engineering programs. The *distance* was not the problem for the nine students of totally over 100 in the campus-based version that chose to become involved in the pilot project. They attended other courses on campus simultaneously, but in the pilot project on Physics B they were physically separated from teachers and peers – although not barred from attending lectures, they didn't.

2.2 Two time-design components for the pilot course

The design was informed by the constructivist Community of Inquiry (CoI) model (Garrison & Vaughan, 2008). CoI is frequently used for blended learning design and emphasises the balance and intersection between three forms of presence; social, teaching and cognitive presence. On this theoretical basis, two design elements were integrated:

Design Component 1: The synchronous-asynchronous time shift

Students work with the asynchronous material, Open Educational Resources, (OERs), and related assignments during *Mondays to Thursdays*, with a detailed plan, a *paceing guide*, for what to do each day. It was possible to have some flexibility between days at the beginning of the week. Thursdays were for synthesising learning, reporting status and questions to be resolved in a *mandatory synchronous meeting* via Adobe Connect with the teacher on *Fridays*, to check up progress, discuss questions sent in beforehand and give support on difficult sections. The ambition is that *time and process* can keep the course together and constitute the base for peer and teacher interaction (social and teaching presence).

Design Component 2: Agile-inspired mechanisms for pacing

We defined and implemented three mechanisms from agile frameworks:

A) **Time boxes.** The week constituted an agile *time box* or *sprint*, designed as a self-contained project unit with a deliverable demonstrating mastery at the end of the week when the sprint was *done* and the week's learning content could be left, for the time being, concentrating on what was next. For emphasising this, we promised that weekends would be free if the plan was followed.

B) **Time box planning.** We saw the course learning objectives as product backlog items, and broke them down into a week planning; a sprint backlog, so there should be no hesitation on where to start and what to do and how to go on. This was called the *pacing guide* and was reinforced by a customised *checklist* for each day to fill in, and a status report to be sent to the teacher on Thursdays.

C) **Transparency** possibilities between students in parallel work during the time box were important to implement for creating a team feeling, but we did not know exactly how to create this. We were expecting that the LMS discussion forum would show to have a new relevance when students knew that they probably were working on the same thing the same day, and left it with that.

2.3 Method

Participants: There were 9 participants in the pilot course, of which 8 were interviewed; 4 men and 4 women. One participant had accepted but postponed interview meetings until too late. The interviewed participants were of ages 19-34, with a median age of 23 years, and had attended upper secondary schools in Southern Sweden (n=2), the Stockholm area in Mid Sweden (n=2) and Northern Sweden (N=4). Upper secondary education was the only education background for 4 students, 2 had started but not finished higher vocational educations, 1 had military university college studies and 1 had studied university courses, also distance courses. They were all focusing on qualifying for technical and engineering university programs after the base year, in all from computer game programming to architecture. They had chosen this pilot course of one or two reasons; for increased flexibility as they had to travel to campus (n=2), had small children (n=1), part-time work as a skiing instructor (n=1), wanted to work on their own instead of attending lectures (n=3), wanted more material to work with than in ordinary campus setting (n=2), and wanted more varied asynchronous and multimedia material to work with due to dyslexia (n=1). In the results, the men have the nicknames Karl, Tomas, Erik and Olle and the women Anna, Siri, Julia and Maja.

Data collection and analysis: First an agreement was made with the department, teachers and course management staff. A guide for semi-structured interviews with open-ended questions was prepared and refined in discussion between authors. The focus of the interviews was to acquire data about the students' experiences of the pilot course in general, and especially the time and pacing design elements in the learning process and the experiences of social, cognitive and teaching presence. The participants were informed beforehand about the general aim of the study, their voluntary participation, their right to refuse to answer or leave during the interview and the use and safe storage of the anonymized interview data. After the course modules had been completed, the first author conducted and recorded the eight interviews, which lasted between 23 and 35 minutes. The interviews were transcribed

and read through several times for acquiring a broad first understanding. The text was then processed and meaning-bearing units in the transcripts identified and discussed. Subsequently, the meaning units were abstracted, coded and sorted into groups with related meanings and abstracted into five subcategories and two main categories, using Mayring's qualitative content analysis (2014). Subcategories and main categories are presented in Table 1.

Table 1. Subcategories and categories in the analysis of the learners' experiences of their learning in the pilot course

Subcategories	Categories
Overview of work Work flexibility Taking learning control	Personal control
Peers on demand Teacher synchronisation	Social tuning

2.4 Results

All 8 participants reported an overall positive experience of the pilot course. This satisfaction varied in strength and underlying reasons.

First, our data shows that a part of the satisfaction relied on the provision and design of asynchronous learning materials on the learning platform, which we not had set out to study per se, but showed to be important for the cognitive presence of the CoI model (Garrison & Vaughan, 2008). Students were satisfied with the short lectures and tutorial-type YouTube films, the direct connection between instruction and application problems to work with, and the customization of the material directly connected to the course objectives, which was reported to be a difference in comparison with the campus setting:

The [video] clips are short... but if I'm sitting in the lecture hall where we're over a hundred, it's not possible to raise your hand and say, "Excuse me, can you slow down a little so I can take notes, and [if] you want to listen while taking notes it becomes chaos and you don't see what notes you've made. (Maja)

The students also commented spontaneously on the physical separation from the teacher and fellow students. Two students were clearly ambivalent, although they were satisfied with the work mode during the period. Anna said *I really miss campus a lot* and tried to organise face-to-face study meetings as a complement but gave up since there was little interest. Siri both meant that *"it is harder to focus on campus"* but still also thought: *"...but being on campus is a lot more fun"*.

Personal control, our first main category, comprises meaning-bearing units related to the individual experience of increasingly taking more personal control over the learning process. The students seem to be used to the situation of not knowing how much work there is, or is left to do, and also that not previously announced work can suddenly show up in a course, even late. Also, the uniform pace of lectures and the time-and place demands around them are contrasted to experiences of working with content in the pilot course.

Overview of work (subcategory) was reported as being different in the pilot course compared to campus studies; students experienced better control over their own study work situation just by overviewing it better and being able to plan it better. What Siri and Julia say about starting difficulties due to limited overview is interesting.

It was really easy to understand and very comprehensive. If I have a clear picture of how much it is, then it is easier to take oneself through it as well. It's a big step to start if you don't know how much there is. (Siri)

The difference is probably that I feel freer to work on my own and can work when I feel like it. I don't feel that I must wait for the next lecture and don't know what I have to do any longer. Or feeling it's too much or not knowing what it is I need to do. (Julia)

Concerning the subcategory **work flexibility**, students reported having been able to work when they had time, or could save time, and also appreciated the weekly repetitive rhythm as a support structure. They did not seem to think the quite detailed daily and weekly design had limited the flexibility so much, but rather helped them along.

If I had been able to do the whole year at home, I would have saved two hours a day. More time. One more hour to sleep and one hour more studying. (Karl)

If it all were like this, I would have been able to work too if I wanted. These studies cost me a lot of money, study loans and all that, and I have not been able to work that much. (Tomas)

When I had time, I could sit down and study...exactly (emphasised) when I had time for it. (Olle)

It's good to be more in control of what to do and when. It has been chaotic to come back to campus. Just having [assignment] submissions every Thursday, it's good having it [routines] like that. (Anna)

During the period, students developed their work habits during this period; they were in some respects gradually **taking learning control** (subcategory). One student,

however, procrastinated more and more, but said he wanted to do it, he did not do anything special on weekends anyway, and he had still the control he wanted (Karl). For the other, the course design seems to have been of some help not to procrastinate, but it took time to detect the personal affordances within the general design of the course.

At first, I didn't work as flexibly as it essentially was [set up to be], I just worked through everything in one sitting, as much as I could. Then I discovered what I had problems with, and focused more on that. (Olle)

The checklist had been a good help for some of the students; other did not use it:

...great reward system...it has been the biggest carrot to want to do it during the right day, and check of those [boxes]. Which I miss now when I'm back in the traditional [class], it is hard to know what to do this day, then one has to plan something oneself...but when I know I have until next week, it becomes a little like, well...but now it really was Yes! Now I do this today! I wanted to check the boxes, and it felt really good (laughter). (Maja)

Three students reported the course as being likely a start of studying in a slightly different way in campus courses as well, while other found it hard to transfer their experiences to campus studies. Two students proposed a campus version of this kind of setup as in the pilot course, to have alternatives in learning.

After this [experience], I actually skipped some lectures and relied on YouTube instead. Mostly, this [skipping strategy] works really well. Not only in Physics, but also in Math and Chemistry... Chemistry especially since it's hard to understand the lecturer. (Anna)

After this was over, it was hard to bring this way of thinking when I only went to lectures. (Maja)

Social tuning is our second main category constructed by the categorisation of meaning-bearing units (see table 1). With this is meant both the establishment of peer learning between students when studying which we as subcategories called **Peers on demand** and **Teacher synchronisation**, relating to the weekly meeting on Fridays in an Adobe Connect meeting when the week was concluded. Technology-enabled courses are often regarded as lonely learning processes, but our students seem to frequently have used some of the tools provided for interaction when they needed help from peers.

The **Peers-on-demand** experience was facilitated by knowing that other students were studying the same content at the same time. It seemed easier to ask for help under such circumstances; it felt more like teamwork even if the students were not

sitting together. A mutual feeling of *presence* seems to be supplied by the synchronisation of work, which enabled peer interaction.

If you're on campus [in the ordinary course], it's easy to get lost in day-dreams, and those who know more help only themselves and I myself feel a little inferior then, and then I don't dare ask for help. Although here [in the pilot course] ...I only had to write [on the forum] and so it became more anonymous, but we knew who we were ...and those who had time replied...[in this situation] you don't feel so much like you're a burden (Maja)

One week the 9 students wrote 129 comments to one another in the forum, and it was continued in Skype and on cell phones, but not in the reserved rooms on Adobe Connect. Olle describes his experience:

I wrote in the forum if anyone understands this and I got back that I need to look at it [the problem] this way instead...

Other students thought it was easier to get help on campus, especially just short explanations:

...when I have a problem I do not need to solve at once, but if it is something I haven't understood and the day after or similar when I am in school I can talk with my friends there and learn from them....that is a thing I miss a little with this distance version. (Karl)

Teacher synchronisation as a subcategory relates to the synchronous meeting with the teacher in Adobe Connect on Fridays and was also meant to provide a clear rhythm in the studies. Students had on Thursday turned in assignments for the week, written a short status report how they had managed the studies and sent in questions or request for help on something difficult or unclear. The students seem to have appreciated this synchronous design feature, they were *seen* by the teacher, but also somewhat confirmed as members in the course by other students. It also worked well as a closure mechanism; it was *done* in the agile meaning.

We felt that the teacher knew we were there, asking how things are going and such...that feels good (Olle)

It was not perhaps anything special I was thinking of before the Friday meeting, but when I came there....exactly, precisely, yes boy this....this is good. We must have that. (Julia)

We got kind of a closure of the study week and could get to know if others than I thought it was difficult – that it probably wasn't fun for them either. (Anna)

I wanted to be done and say that I have done this (emphasis), so I could be free during the weekend. (Julia)

3. Discussion

This was a small design experiment. The participating students had chosen to participate as an alternative to another way of studying, and they had each their good reasons to do so. On the other hand, they had something as a reference; their parallel campus-based studies. The students on the preparatory year are in general quite focused; their studies do not have much of meaning if they cannot finalise them and be admitted to an engineering or natural science program. They can be expected to concentrate on exactly what to learn for passing the test because these studies are mainly instrumental in getting them where they want. Not all courses can be designed as concretely as this kind of courses, and planned day by day, week by week, in high detail by teachers and instructional designers.

The students seemed to have acquired good control over the increased flexibility with the time-related project tools and structures we provided, and not reacted in too negative ways against the detailed day-to-day design. We do not, however, know anything about how this could have developed in the long run, for broader groups and as a mandatory structure.

Both the Social and Teaching presence in the CoI model (Garrison & Vaughan, 2008) seem both to be reinforced by the synchronous design in the meaning that the students worked side by side, physically separated but in interaction, and by the regularity of synchronous sessions with the teacher, which also marked phases in the study work. For enabling the cognitive presence in the CoI model, the use of well-structured OER seems to have been important. The balance between the three types of CoI presence seems to have worked out.

The pilot course was considered promising but did not lead directly to a development of an extended flexible version of the preparatory year and did thus not enable direct iteration for further design-based research. The involved department at the LTU continues to look at course design from a time perspective, with shifts between synchronous and asynchronous modes. The time boxes are kept in the learning platform. Most appreciated by the students was the detailed study plan, the *pacing guide*, so that was introduced to ordinary campus courses, as a way to help students avoid procrastination. The students also appreciated that the material was so well organised and easy to find, with all different parts being segmented into short, discrete sections. This can also serve to increase the critical through flow in the basic courses in mathematics and physics, and plans are to introduce the concept gradually in these courses where many students experience problems. The final goal is to have the concept introduced into a majority of basic courses in STEM subjects. For more advanced courses the agile framework can still be used, but the students should be more involved in the sprint planning where the backlog items are determined. The

continuation of the project also involves educating the teachers in the way of working with agile course design, and that task should not be underestimated.

A Swedish university can today have offerings of the same course in several distribution forms: traditional campus form, decentralised but in classrooms, synchronous videoconference and asynchronous online, and many combinations thereof. This demands different teachers, varying student recruitment strategies and varying technology. We can imagine a reduction to only two basic forms of course offerings that are a) time-blended and b) asynchronous, so the number of forms is reduced. The blended form can then fill many of the distance needs of today, just by being able to include both full-time campus students and students with different limitations concerning time and place in one and the same form. This could be a basis of a new education logistics for widening participation.

4. Conclusions

To work with time perspectives in the design of a course is both old and new. Every teacher knows critical issues connected to the time available in the planning of a course. However, ICTs have so far been understood more as place-modifying and transporting technologies in education. From this experiment, we conclude that a time and process perspective is useful for the improvement of courses in different respects, and these courses can, at the same time, be designed to include students with time- and place obstacles to face-to-face participation in classrooms.

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V

Quadruple Helix, Innovation and the Knowledge-Based Development: Lessons from Remote, Rural and Less-Favoured Regions

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Abstract This paper addresses the dynamics of knowledge-based development of remote, rural and less-favoured regions. Many of the regional strategies and policies aimed at developing innovation emanate from policymakers in centrally located urban conurbations and are assumed to be universally applicable. An example is the classical “triple helix” model and its successors for economic development based around the idea of universities, business and public sector organisations all coming together to foster innovation and economic prosperity. In many remote, rural and less-favoured localities, there may not be a university or other knowledge-intensive institution present which makes a difference from the point of view of local development agendas. In many regions, also the business community may be scattered and insufficiently developed in terms of innovation. And furthermore, this kind of region may also have a weak public sector to enhance innovativeness. In such regions, social and community groups may often play the dominant entrepreneurial role. The community may also play a significant role in remote, rural and less-favoured regions where the basic elements of “triple helix” model are present. In this respect the concept of a “quadruple helix” is highly beneficial. This is the case, because innovation processes are becoming increasingly open to different stakeholders. In this paper, four illustrative cases of knowledge-based development processes and policies in remote, rural and less-favoured regions are analysed by using a “double-coin model of knowledge-based regional

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development” which places the quadruple helix model at the very heart of knowledge-based regional development.

Keywords Knowledge-based · Regional development · Higher education institutions · Triple helix · Quadruple helix · Double-coin model

Introduction

The role of higher education institutions (HEIs) in regional development processes is somewhat paradoxical: on the one hand, the role of HEIs may be emphasised supporting the improvement of regional competitiveness, economic growth and the creation of valuable knowledge-based economies, which are sustained by accessible, efficient and high value education and research. On the other hand, there are universities and other HEIs that are purely aiming at international or even global approaches to research and education, resulting in neglecting their own home base, namely the city or the region in which they are located. The regional and global views are not necessarily mutually exclusive, but even globally oriented universities and HEIs can have a huge impact on economic development and business innovation locally and regionally (see, e.g. Goddard and Vallance 2013).

EU, national and regional strategies and policies on innovation have been prioritised and innovation is now core to most EU economic and regional development funding programmes. The EU-wide and EU-led smart specialisation agenda is a good example of that trend. However, many of the strategies aimed at developing innovation emanate from policymakers in centrally located urban conurbations, based on specific policy models which are in many case assumed to be universally applicable. There are several earlier studies on knowledge-based development, innovation systems and innovation policies in rural and peripheral regions (e.g. Alarinta 1998; Wiig and Isaksen 1998; Doloreux 2003; Sotarauta and Kosonen 2004; Doloreux and Dionne 2008; Karlsen et al. 2011; Suutari and Rantanen 2011; Pelkonen and Nieminen 2015). It can be stated that all of these studies examine certain aspects of the specific nature of innovation and innovation policy in the context of rural, peripheral and less-favoured regions. However, it quickly becomes obvious that all regions are not alike in terms of innovation and innovation policy.

This paper aims to contribute to the academic debate on the knowledge-based development of rural, peripheral and less-favoured regions by introducing the “double-coin model of knowledge-based regional development” which places the quadruple helix model at the very heart of that process. The key question of this paper is, how can businesses, higher education institutions, governmental organisations and different community groups contribute to the economic growth and social development in regions with underperforming economies, turning peripheral or otherwise less-developed regions onto the path of sustainable knowledge-based development? Having feasible answers to that question and understanding the dynamics of knowledge-based regional development is increasingly important in Europe and beyond. From the European point of view, the “double-coin model of knowledge-based regional development” is related to the key ideas of the smart specialisation agenda mentioned above (see, e.g. McCann and Ortega-Argilés 2013; Foray 2015). For example, our

point of departure is that the knowledge-based regional development should not be seen as a set of traditional top-down policies, but as a complex, place-based, multi-actor discovery process.

The approach of the paper is practical and policy-oriented, as it is based on case studies from Finland, Hungary, Scotland and Sweden. The above-mentioned conceptual framework has been sketched, and empirical case studies have been mainly conducted within the UNICREDS project (UNICREDS 2010), which was an EU INTERREG IVC funded project made up of partners from remote, rural and less-favoured regions from across the EU including the UK, Nordic countries and central Europe. UNICREDS included various assessments, a survey and reviews of best practice. All of these measures produced a large number of case studies and a wealth of insightful data on how knowledge-based development and innovation take place in the case regions.

The paper is organised as follows: first, the concepts of triple helix and quadruple helix are introduced briefly and the “double-coin model of knowledge-based regional development” is established to set the scene for the case studies. Shared conceptual framework is illustrated by case studies from different angles. Respectively, they illustrate the key points of this article from different angles. The first, Finnish case is a summary of how a rural region has waded its way to the “knowledge economy” by adding new, knowledge-based layers to its natural strengths. The second, Swedish case deals with multi-institutional learning environments and suggests them to be a future solution that can also be applied beyond remote and sparsely populated communities. The third, Hungarian case illustrates the ways in which a research-intensive university has intensified its regional engagement in terms of innovation by involving civil society actors and potential innovation users in various ways. And finally, the fourth, Scottish case describes how one of Europe’s most peripheral regions has achieved excellence in healthcare provision by intense collaboration among triple helix actors and by involving new actors in the development of health service provision.

Setting the Scene: Knowledge-Based Regional Development

From Triple Helix to Quadruple Helix

The knowledge-based or innovation-driven regional development calls for certain kinds of activity, actors and their collaborative practices. In this respect, the concept of triple helix is relevant and beneficial (see, e.g. Etzkowitz and Leydesdorff 1995, 2000; Etzkowitz 1998, 2002; Gunasekara 2006). The basic idea of this concept is to deepen the understanding concerning universities’ and HEIs’ role in innovation. It is based around the idea of universities, business and public sector organisations all coming together to foster innovation and economic prosperity (Etzkowitz and Leydesdorff 1995). The key is to widen the dyadic and often unidirectional university–industry collaboration by including governmental organisations.

Leydesdorff (2012) wrote about a possible “N-tuple of helices” meaning that additional helices can be necessary for understanding and analysing innovation but reminds us of the parsimony principle—the addition of factors should be motivated by explanatory needs. After this, the “N-tuple of Helices” have even been called a

“paradigm” for the development of increasingly better models (Park 2014). Business life and innovation are in a constant flux, and the changes are reflected in new and emerging characteristics.

During recent years, there has been a vivid discussion on open and user-driven innovation (see, e.g. Chesbrough 2003a, b; Huizingh 2011; von Hippel 2005; Gassmann 2006). The grand idea behind these concepts is that the contact surface of innovation needs to be widened. The concept of open innovation was introduced as far back as 2003 (Chesbrough 2003a, b), although similar principles have been applied in firms earlier. The core of the concept is twofold: on the one hand, firms are searching and utilising knowledge, technologies and other competences across the firm boundaries. On the other hand, the firms are willing to commercialise and allow technologies and ideas to be utilised outside the firm itself (e.g. by licencing). So, efficient innovation does not mean only efficient internal R&D, but capabilities to form networks with innovative actors outside the company (Diener and Piller 2010, 14).

Furthermore, open innovation is more than interaction between organisations, as individuals and communities formed by individuals enter the innovation scene. In this respect, the concept of crowdsourcing is very relevant (e.g. Brabham 2008). Crowdsourcing is a way for firms to harness the ideas and abilities of large, even unlimited groups of people. Although open innovation and crowdsourcing are not usually that unlimited, there is a new debate emerging around “targeted open innovation” (e.g. Hossain and Islam 2015). This concept refers to an open innovation model in which the openness of innovation is combined with a very strategic view on communities’ role in the whole business model. Consequently, targeted open innovation is also a tool for building long-lasting and loyal relationships with customers and other relevant stakeholder communities. Customers of a company and users of a certain product or service are quite obvious examples of open innovation communities, but the role of individuals and communities in innovation can be understood even in wider sense.

In this respect, the concept of quadruple helix seems to be relevant. This concept adds to the triple helix one more actor group, namely the wider community. The quadruple helix can be seen as an action model of four kinds of stakeholders, which aims at generating innovations. (see, e.g. Armkil et al. 2010). It is notable that this action model or principle can be applied in different scales to different innovations ranging from minor, incremental (product) innovations to fundamental, social innovations.

Carayannis and Campbell (2009, 2010) have named the fourth helix as “media-based and culture-based public” and “civil society.” This emphasises democratic values as a part of the innovation process, which is not naturally inherent in the triple helix model. The addition of a fifth helix, the awareness of environment and social ecology, forms a quintuple helix model with an ecological dimension (Carayannis and Campbell 2010). The nature or formulation of the fourth and later fifth helix varies depending on the explanatory needs. Correspondingly, European Commission yearbook on open innovation 2.0 labels the fourth helix as “users”, “citizens” or “civic society” (Open Innovation 2013). These formulations also point out that a triple helix may be possible without democracy while a quadruple helix is not. Including the fourth helix is part of the development required on the way to a knowledge-based and innovation-based driven democracy, a “creativity society” where creativity is developing not only within specific creative workplaces, professions or classes but also across the whole economy (Dubina et al. 2012).

Double-Coin Model of Knowledge-Based Regional Development

The purpose of this section is to set the scene for the case studies. The point of the departure is the basic logic of regional development. It is all about making changes that will turn the current direction of the region into a desirable future. It sounds easy, but that is not the case. Usually, the temporal journey between these two status quos is not straightforward and easy at all. In fact, the actual processes and dynamics of regional development have remained surprisingly veiled. So, it can be called the “black box” of regional development (see Fig. 1).

This above-mentioned “black box” needs to be unpacked. In most cases, the desirable future will not become true without deliberate actions. So, regional development calls for actors and activity. In this respect, the concept of “regional development network” is beneficial (e.g. Linnamaa 2004). It refers to a regional policy or governance network consisting of public, semi-public, private and third sector organisations which aim to contribute to the development of the region in question. The governance and policy networks have gained more and more influence, as increasing numbers of the societal and regional problems and challenges have become “wicked” in the sense that they cannot be solved by just one authority or by straightforward measures. “Wicked problems” need to be tackled by many actors simultaneously or sequentially. Regional development processes are in many cases alike: the contribution of many actors is needed in order to set off positive processes of change.

The regional development networks are usually informal and loosely coupled, and actors belonging to it may not even recognise their own role in the network. The intensity and internal cohesion of this kind of policy networks typically vary (cf. Kickert et al. 1997). In addition, they are not coordinated from one point, but the

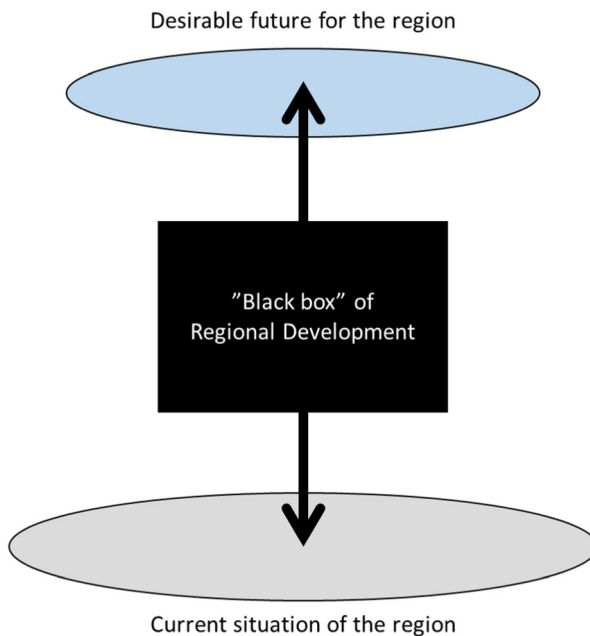


Fig. 1 The “black box” of regional development

coordination and leadership of these networks is shared in nature. Following this point, there is usually not that much formal regulation, but the coordination of the regional development network is more likely to be based on social coordination mechanisms, openness and reciprocity.

The typical triple helix actors usually belong to the regional development network. In addition, triple helix collaboration is multilateral in nature and also the innovation policies are formed by all the parties, not solely by government. The triple helix also encases the idea of the three institutional spheres adopting and performing the roles of the other spheres in addition to their own. This non-traditional approach to institutional roles is viewed as a potential source of innovation. However, it can be argued that in many European regions and localities this model may not be that relevant in its purest sense. In some remote, rural and less-favoured localities, there may not even be a university or other knowledge-intensive institution present. Also, the business community may be scattered and insufficiently developed in terms of innovation. And furthermore, these kinds of regions may also have a weak public sector struggling with the supervision of the basic public services. Consequently, in such areas, social and community groups may often play the dominant entrepreneurial role. The community may also play a significant part in those rural and remote regions where the basic elements of “triple helix” model are present, but potentially weak or insufficient: in this kind of region, all the actors and their capabilities should be included in order to make good use of its potential and to bring the region forward.

In this paper, the fourth helix of the quadruple helix is named as “community” referring to the actors of the local and regional civil society. Ultimately, the community consists of “ordinary people” and their joint, coordinated activities which can be organised either on temporary basis (e.g. joint projects and endeavours) or in more permanent manner (e.g. NGOs and associations). From the quadruple helix point of view, the “community” is assimilated to some extent with other helices. For example, in small, rural communities, the local government is very closely intertwined with both other community activities and local business life. Still, the local and regional government structures are separate from the community or communities, because they are part of larger governmental structures, such as nation state or EU. In any case, the concept of a “quadruple helix” is highly beneficial in the context of rural, peripheral and less-favoured regions. Furthermore, these regions could even be forerunners in inclusive economic development and innovation, which is of course a great challenge.

In sum, quadruple helix collaboration is seen as a specific, more intensive field of collaboration within the regional development network focusing on knowledge-intensive development. It aims directly or indirectly at positive changes of the region. It is worth noticing that quadruple helix collaboration is not usually bound to a certain region, but it is seen as a more general process in which academia, industry, government and wider communities are engaged in order to create new knowledge, technology and innovation meeting both economic and societal needs. However, in this paper, the quadruple helix collaboration refers to the same kind of collaborative processes, but in the regional context (see Fig. 2).

Knowledge-based development of remote, rural and less-favoured regions is very challenging, as the preconditions are not naturally inclined into that line of development. Achieving genuine and sustainable competitiveness calls for visionary, insightful and targeted strategic thinking. This is especially the case, as the competitiveness of a

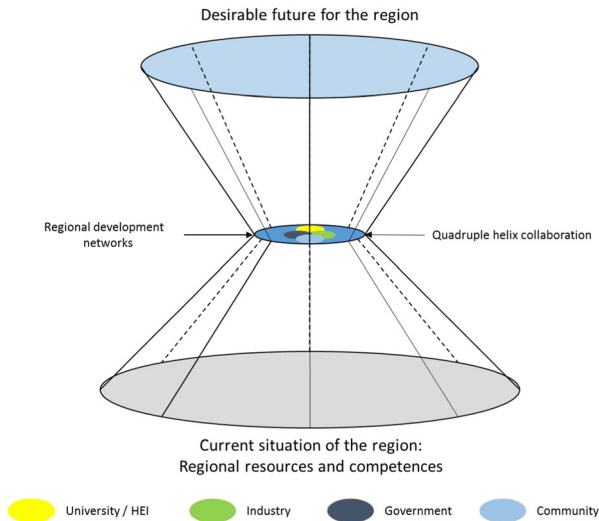


Fig. 2 Filling the “black box”

peripheral or disadvantageous region can be seen as a paradox. Namely, the seeds of the regional competitiveness may lie in the specific, or even disadvantageous characteristics of the regions (rurality, remoteness, harsh climate, sparse population etc). Rurality, for example, is the very basis for the competitiveness of smart food system development in South Ostrobothnia, Finland. Correspondingly, in the Highlands and Islands (Scotland), for example, versatile means of distance learning and other ICT-related solutions have been developed and utilised in order to overcome the long distances. This can be seen for example, as a basis for developing the excellence in digital healthcare. A harsh climate can in itself be a resource for development, for example, the winter-testing of vehicle components in Northern Sweden (Nybacka et al. 2007).

Thus, turning disadvantageous characteristics of a region into competitive assets requires good strategic thinking and actions, but also usually genuinely mutual interests, commitment to the collaboration and excellent quality in the collaborative processes of all the quadruple helix actors. It is also self-evident that all the quadruple helix actors need to pay attention to the quality of their own activities. Some deficiencies of an organisation can be compensated by collaborating with other organisations. Still, when aiming at sustainable and progressive knowledge-based regional development, quadruple helix collaboration needs to be based on complementary and value adding resources and competences of each quadruple helix partner. Thus, the collaboration should be seen as a motivational factor for the development of resources, competences and processes of every actor group.

Furthermore, there need to be prospects for further development concerning the collaboration itself and the actual substance of the collaboration. In the context of regional development and quadruple helix collaboration, these future prospects can be categorised as visions for the region. Each actor of the regional development network and each quadruple helix actor has their own visions concerning their own future and the whole region. Consequently, these actors are also executing their own strategies in order to attain their own visions. In this respect, it is not worth finding only one vision

concerning the desirable future of the region. Instead, it is worth having joint processes for finding and forming shared visions concerning the region. This requires actors—organisations or individuals—who are capable of “visioning between visions” (Sotarauta et al. 2007). Emphasising the role of individuals is important, as it is extremely difficult to achieve shared vision without personal level interaction in addition to the structural level connectivity of the organisations.

When dealing with regional knowledge-based development, these shared visions are usually related to regional research and innovation capacity. Collective “visioning between visions” and putting the shared visions into practice is not easy, and to do it collectively calls for regional leadership, which can be characterised as “relay in time and space” (see, e.g. Sotarauta 2014a, b).

All the actors of the regional development network have a kind of double role. On the one hand, the regional resources and competences related to innovation consist of the quadruple helices acting within the region. On the other hand, these organisations and communities create and utilise the other regional resources and competences by concrete measures and actions, e.g. by investing in some organisations, by funding research or by commercialising research results of a university. So, it is important to understand that each quadruple helix organisation or community is responsible for both utilising and creating regional resources and competences. When talking about knowledge-based regional development, these utilisation and creation processes are related mainly to regional knowledge resources and competences. Furthermore, it is worth noticing that the shared regional visions mentioned above will turn into reality only by these concrete measures and actions.

In sum, knowledge-based regional development culminates in the characteristics and activities of the regional quadruple helix actors. They need to be able to make a future together by having processes in which the joint and shared visions are shaped. They also need to undertake concrete actions to utilise and to create regional knowledge resources and competences. All of these processes call for joint, collective and collaborative activities among quadruple helix actors. All of these elements together constitute the framework for knowledge-based regional development (see Fig. 3). This heuristic framework is used—*mutatis mutandis*—in the following case studies.

Case Studies

South Ostrobothnia, Finland: From Fields to Food Systems

South Ostrobothnia is an inland region located in the western part of Finland. The population is about 194,000, and the population density is lower than the national average. South Ostrobothnia is a rural region and one of the key regions in terms of agriculture in Finland. So, large, open fields characterise the region. Seinäjoki is the central city of South Ostrobothnia having about 61,000 inhabitants. After year 2000, it has been one of the most attractive cities in terms of migration in Finland (Aro and Laiho 2013, 24; Sotarauta 2014b).

The economic structure of South Ostrobothnia is a traditional one. On the other hand, an exceptionally high number of firms characterises the economic landscape of

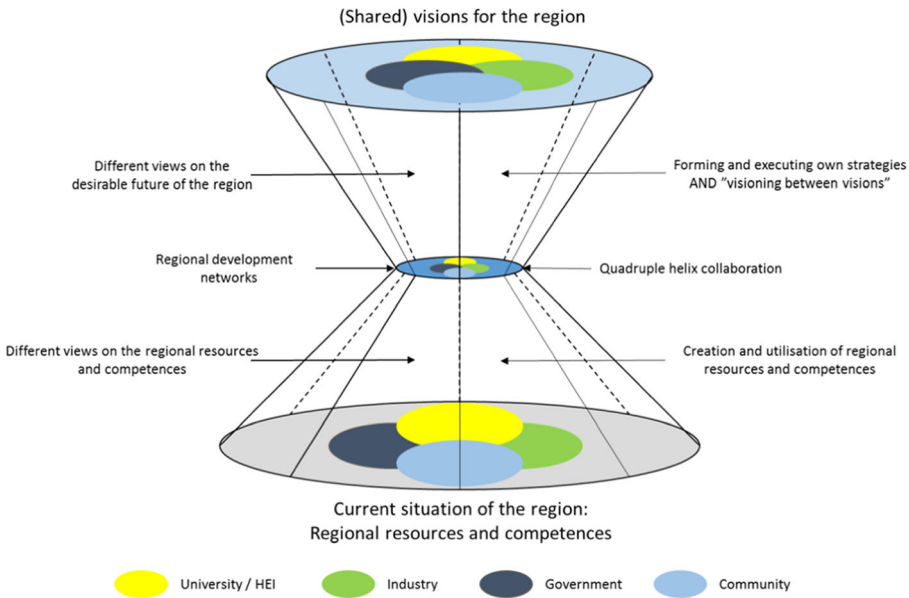


Fig. 3 Framework for the knowledge-based regional development

the region. The relative number of enterprises is one of the highest in Finland; 8.2 per 100 inhabitants while the national average is 5.9. Consequently, the great majority of the firms are very small, and a noticeable degree of them are specialised in traditional branches of business processing food, metal or wood. In addition, the SMEs are not usually internationally oriented and they are not that active in (formal) innovation activities. So, the R&D spending figures of South Ostrobothnia are quite low as a share of GDP; the figure in South Ostrobothnia is 0.8 % and the national figure is 3.7 %.

The level of education in this region, known for entrepreneurial spirit, has traditionally been one of the lowest in whole Finland. There has been very pragmatic orientation to the work in South Ostrobothnia: hardworking attitude and handicraft skills have been greatly admired. Despite this tradition, the region has been active in developing services of higher education. Local municipalities, by activation of individuals with educational pursuits, founded the regional university association in 1960. The association offered summer university courses and created a forum where active municipalities and individuals could interact and enhance academic services. Summer university experienced growth, and after 10 years, it was found out that a more permanent academic organisation was needed (Eilola 2010, 62).

After stubborn efforts, explicit progress was gained first in 1981 when University of Tampere founded the unit of Institute of continuing education in Seinäjoki. Seven years later, the Institute for rural research and training at University of Helsinki started its work in Seinäjoki. The University of Helsinki represented the most important academic organisation in agricultural and forestry education and research. The Institute, itself, was an organisational innovation in relation to the traditional agricultural, food and forestry sciences. The Institute took the mission to carry out research and educate people in order to discover new sources of livelihood and to develop services of the rural areas. All this was done in a multidisciplinary and collaborative way. From the

regional point of view, the institute created the targeted link between academic research and economic characteristics of the region.

In the early 1990s, Finland faced economic recession and South Ostrobothnia was one of the regions that suffered serious outmigration flow and decrease in population rate. Young people moved out, many of them to get a university degree. At that time, many of them did not have the opportunity to return, as the academic labour market was very weak. That was the case even after the recession, when new sectors of the Finnish economy (e.g. ICT and biotechnology) boomed at the end of 1990s.

The regional economy of South Ostrobothnia was poorly able to utilise and position itself in innovation- and technology-oriented development. This was seen to imply a serious danger that South Ostrobothnia would end up being some kind of “peripheral pocket” in national knowledge economy (Sotarauta and Kosonen 2004). In this situation, a few active individual people in academic organisations and public administration, called for a giant leap towards the knowledge economy instead of continuing development work with small concrete steps. This leap should bring the regional research, innovation and education activities to a totally new level.

So, this “visioning between visions” created a strong common ground among key regional players consisting of typical triple-helix parties: something has to be done, and it should be done by our own hands and with intensive organisational co-operation. Local media and active individuals, including some at private organisations—the regional community—largely supported this idea. Consequently, South Ostrobothnia decided in programme-agreement of 2001 to make considerable investments in research (Research and Innovation Programme 2000–2006). Those investments were targeted to new professorships on new and future-oriented fields of research that are tightly linked to the economic and otherwise profiling strengths of the region. Funding of the most important academic positions, like professors, is gathered from both public and private sources. Also local SMEs funded the professorships, which was an institutional breakthrough.

This fresh and collaborative approach aroused enthusiasm in South Ostrobothnia, and new research groups have been established during the years—currently there are 22 of them. In addition to the strengthened presence of universities in South Ostrobothnia, its own vocationally-oriented HEI—Seinäjoki University of Applied Sciences—has developed its activities significantly during the past 15 years. Also other significant investments in the knowledge-based development have occurred (see Kolehmainen and Alarinta 2009).

In sum, South Ostrobothnia and Seinäjoki as its central city have been committed to investing in building the regional innovation infrastructure and capacity. The region has benefitted from this knowledge-based development approach. However, as a recent analysis shows, there are still many challenges and obstacle to be overcome, such as the low level of internationalisation (Pelkonen and Nieminen 2015). It is obvious that building the overall innovation capacity is a long process, and it is clearly not enough on its own. In the beginning of 2010s, it became clear that the region called for more coherent joint strategy. Thus, several joint strategy processes were set to identify few common focal areas. “Sustainable food systems” was identified to be one of those and it is also the backbone of the region’s smart specialisation strategy. Sustainable food system has unique characteristics: the role of individual consumers is important and the number of small independent firms is high. This called for new ways to conduct

innovation activities, and consequently, new innovation platforms, like living-labs, have been established for the agro-food machinery, for example. These collaborative and open, yet targeted innovation platforms have increased the number of firms attending the development work.

South Ostrobothnia and Seinäjoki were recognised also on the national level in 2013 when the Finnish innovative city-regions were elected as organisation of national innovation policy. The region received nation-wide mission to enhance innovativeness in the food systems of the bio-economy.

Västerbotten, Sweden: Multi-Institutional Learning Environments

The county of Västerbotten in Northern Sweden covers 13 % of Sweden's area, about the size of Denmark, but only 2.8 % of Sweden's population lives here, 4.3 persons per km² compared to 23.4/km² for Sweden and 120/km² for the European Union as a whole. The population is unevenly distributed—most live along the coast with its cities of Umeå and Skellefteå, and the inland and mountain area is even more sparsely populated, for some inland communities below 1 person/km². In the southeast of Västerbotten, the University of Umeå is situated, with about 35,000 students, Sweden's fifth in size. Students from the community of Skellefteå with 72,000 inhabitants have about 2 h commuting time south to Umeå University campus and as long north to Luleå University of Technology.

For most inland communities, the university campuses are clearly outside of daily commuting distance. This has not been a problem for young traditional student groups as they move to education, but for lifelong learners, re-learners and non-traditional students, the university infrastructure becomes a big problem—for distant communities that want to have a competitive work force for proceeding in smart specialisation. This centralisation has proceeded since about 2010, and distributed learning alternatives have diminished (UKÄ 2014), partly because of changed state financing, but also in part because of ambitions such as of the city of Umeå, with the university, to become a hotspot of development by centralisation of people and resources.

This situation is a seedbed for creative open innovation, as a more active and concrete university presence seems required. The span between the actual state and the desired state of the region is not closing. The recommended black box of a centralised innovation function has low credibility to remote stakeholders. New universities or new university-driven branch campuses seem to be out of question. How can these communities then proceed?

Since the late 1980s, when videoconferencing came into use, communities without universities started learning centres with a video studio, counselling, meeting rooms, computer and broadband access, testing facilities, etc. This was not arranged by universities, but by the local communities that felt they must do something—and they negotiated with universities about education provision and helped recruit students to what was needed: education of teachers, nurses and other health workers, engineers, etc. Around these centres often grew development projects, new citizen services and co-operation with other communities in similar situation, such as “Akademi Norr” (www.akademinorr.se), an association with 13 communities with learning centres..

Bigger communities, like the city of Skellefteå which already had some technical education belonging to Luleå University of Technology, invested in the 1990s in

building a community-owned multi-institutional campus, Campus Skellefteå, a kind of a learning centre XL, including also full-time programmes on site, with today about 2000 students belonging to Luleå University of Technology, Umeå University, higher vocational education, adult education and online and blended courses. There are learner services in place, a university library, student sports facilities, restaurants and cafeterias and a national research institute. The recipe is to concentrate all there is of higher and adult education and research, make it visible, and develop it as a functional symbol of the knowledge society with the help of education and research partners with mobile services. Politicians in Skellefteå, together with local businesses and other organisations, have made this huge investment in building, owning and running a campus of their own as an almost conflict-free joint venture, and without regrets. The development was targeted—the lack of higher education visibility and access was critical, but can now be dealt with, even if it is not easy.

New community-supported environments like these are now emerging in many parts of the world. In Northern Europe, the UNICREDS project included three such campus environments; Campus Skellefteå in Northern Sweden, Campus Seinäjoki in Finland and Tremough Campus in Falmouth, Cornwall, UK (University Partnerships for Prosperity 2010). These North-European campuses all provide citizens with learning environments composed of services from different universities, with community invitation and support. In addition to these examples, it is worth noticing that multi-institutional learning institutions are becoming a global phenomenon: in the Middle East, “Education hubs” (Knight 2011) as Qatar Education City and Dubai International Academic City (Lane 2010) contain a mix of local, European and US universities and other education on locally built and owned platforms. In China, “university cities” (University city/ 学城 n.d.), as in Huangzho, Schenzen or Songjiang, are a national instrument for scaling up education by combining high-quality services from already existing universities, but in new local blends. In the US, the “university centres” often have background in the co-operation between communities far from a campus and a state-wide university system. One example of many is the University Center of Lake County outside Chicago, with today 19 universities represented at the same, small campus (Lee 2007). The initiative to these environments is community-based, increasing education access, differentiating and upscaling education provision.

North Great Plain Region, Hungary: Pharmapolis Innovative Food Cluster

The city of Debrecen is the centre of the North Great Plain region in Hungary. As part of the North-eastern area of Hungary, the North Great Plain region (17.729 km²) with its 1.48 million inhabitants (2014¹) is among the least developed regions both in the country and in the EU—the regional GDP lags both the national and EU averages. The region basically has a rural character with several urbanised centres and can be described as an area with low economic activity rate (58.1 % in 2014²) and relatively high unemployment rate (11.5 % in 2014³). Compared to past years, the number of

¹ <http://ec.europa.eu/eurostat>

² <http://ec.europa.eu/eurostat>

³ <http://ec.europa.eu/eurostat>

registered enterprises, the performance value of investments as well as the volume of industrial production have increased.

Despite the fact that the North Great Plain region can be characterised as less-favoured the University of Debrecen is one of the most significant scientific bases of Hungary and it has been classified as “University of National Excellence”. The University of Debrecen is committed to act in a more beneficial way for the economic growth of its region by utilising internationally recognised research and development potential. The city of Debrecen and the university have a long-term relationship; strengthened by the region’s business and industry actors, an important innovation basis supports to find and create competitive advantages in the region, develop a new culture of collaboration and stimulate investments. In a recent collaboration agreement (2014), the University of Debrecen and the regional Chamber of Commerce and Industry joined forces to establish a new innovation agency aiming to enhance open innovation, coordinating and mediating market demands of regional business actors.

In addition to its traditional education and knowledge generating function, understanding the significance of universities as incubators for start-ups, the University of Debrecen performs new upcoming roles required for co-creation and made the first steps towards open innovation. This process is strongly supported by the recently established Technology and Knowledge Transfer Center of the university that is aimed to significantly improve knowledge transfer and consolidate the provision of innovation services.

In the North Great Plain Region clusters consisting of all the triple helix actor groups constitute the determinant form of partnerships in the region. They can be characterised as knowledge-based, specialised innovation systems in which the University of Debrecen acts actively as knowledge generator and knowledge diffuser. Debrecen-based Pharmapolis Innovative Food Cluster focuses on the production of healthy functional food products in which the recent scientific findings are used. The cluster is rooted in former research and development co-operations and partnerships in agro-biotechnology, involving different actors including universities, knowledge and research centres, administrative bodies, chambers as well as private members, companies and SMEs. The cluster sets together development ideas of both large and small companies and research experiences of the University of Debrecen.

Bringing closer good ideas, different initiatives and particularly commercialising those, a new form of marketing research results and products has been introduced at the University of Debrecen when the Innovation Shop (I-Shop, <http://www.i-bolt.hu/>) opened in 2010. Applying the latest research results, but keeping the local traditions at the same time, the I-Shop offers functional food products developed by the University of Debrecen and its cluster partners and provides the floor for potential customers to test these newly created products and to assess their potential success and value on market. In the first months, particularly the employees and students of the university visited the I-shop and tested the innovative products, but for now there is a wide range of customers seeking for healthy products. Daily contact with food producers and idea owners makes it possible to speed up the marketing of fresh ideas, first results and products.

Stepping over the frames of triple helix, the management of the cluster added a fourth group of innovation actors and involved the general public and local community members. Widening the scope of I-Shop and trying to engage further stakeholders, I-

Club was opened in the university in 2012 providing side events with topic-related presentations and discussions at a regular basis where participants can share ideas on potential future needs and have their comments on tested products.

These events ensure that the members of the local community, citizens and small groups focusing on different healthy food issues have the opportunity to meet, provide feedback and generate future research and development ideas. It is especially important for all parties taking part in the innovation process, as the cluster is planned to have an important future role in food, health and wellness sector studies and developments concerning the development of related instruments and diagnostics.

Highlands and Islands, Scotland, UK: the Centre for Health Science

The Highlands and Islands region of Scotland is broadly the Scottish Highlands plus Orkney, Shetland and the Western Isles and has a population of ~450,000 and a population density of 9.1 persons per km² (compared to the Scottish figure of 67.5 persons per km²). The major industrial and economic activities include, e.g. renewable energy, life sciences, tourism, food and drink and creative industries. Approximately 99 % of the Scottish business population are small- and medium-sized Enterprises (SMEs), of these more than 80 % are microbusinesses.

The University of the Highlands and Islands (UHI) achieved full university title only in 2011—prior to that, there was no higher education institution based in the region, resulting in young people leaving the region to access higher education and limited support for SMEs and R&D. UHI is a partnership of 13 independent colleges and research institutions (~7000 students) and is the R&D and educational stronghold of the region. The presence of the university in the region has been calculated to have added 3813 new jobs to the region and £246 million to the local economy.

UHI's role in the Centre for Health Sciences (CHS) is an excellent example of a knowledge-based regional development that reflects the predominantly remote, rural and isolated nature of the region. The aim of the Centre is to become the innovation hub in the Highlands and Islands region for the health sector. The hub unites the quadruple helix of public, private, academic and community sectors and is focused on excellence in health science and biotechnology, bringing together research, education, training, patient care and business development.

The main remit of the hub is to stimulate innovation and creativity and encourage collaboration across the Highlands and Islands, building upon the health science research, education and training activity in the region, which is encouraged through collaboration, knowledge transfer, improved clinical outcomes, publications and commercialisation.

The Centre has been hugely important to the region, creating jobs, generating income and offering exciting new opportunities for training and research and has a GVA of ~£6.2 million per annum.

Although located in Inverness, the Centre aims to impact across the entire region through a hub and spokes mechanism, with outreach projects and activities. An example of how this operates can be seen from a specific project titled “O4O” (older people for older people) which was carried out by CHS's Centre for Rural Health as part of an EU Northern Periphery Programme Project. This example illustrates the potential role of Higher Education Institutions in using project-based activities to connect helix partners

together and bring entrepreneurial and innovative processes to the community—the fourth strand of the quadruple helix. It also illustrates a means of widening the innovation “contact surface” through targeted, user-driven open innovation to develop local healthcare solutions for remote, isolated and rural communities.

The O4O project was designed in response to findings that there was a greater proportion of older people in the population in remote, rural and isolated areas compared with central urban regions. It was becoming increasingly difficult to provide services to sparsely populated rural areas due to high costs and difficulties of recruiting and retaining staff. If people in the more remote, rural and isolated communities could do more to help themselves, in partnership with public sector local councils or municipalities, this would increase provision and limit the costs and problems for the public sector of trying to find ways to provide services to rural areas.

O4O sought to share knowledge internationally on how older people can contribute to sustainable, vibrant communities and how to maintain people living independently in their own communities for as long as possible. The project set out to involve older people in the design and development of service provision for other older people.

To better understand user needs, the O4O project engaged with many local communities in the more remote, rural and isolated parts of the Highlands and Islands. As a result of the knowledge gained, new processes and new mechanisms were developed that allowed people in rural communities to take more responsibility for service provision (e.g. transport, care, domestic tasks for each other, etc). One means of achieving this was through setting up new social enterprise companies. This approach combined business and commercial ideas and techniques (business development training, market research, business planning) for the first time with the social desires of rural community members. In many cases, viable new services have subsequently been developed, which have brought people together to generate new ideas and opportunities—as well as social benefits. The project demonstrated that older people themselves are central in developing solutions to the challenges they face. A toolkit was also produced that enables O4O type services to be set up in communities throughout Europe.

The project was also recognised by winning an EU Regiostars 2012 award for projects “addressing the challenge of demographic change and supporting active ageing”.

Discussion and Policy Recommendations

This paper deals with the knowledge-based development on remote, rural and less-favoured regions: How can this kind of region be propelled into the path of sustainable knowledge-based development? The sketched “double-coin model of knowledge-based regional development” suggests that quadruple helix actors have pivotal role in this process. All four illustrative case studies showed that the quadruple helix approach can and has been applied to support the knowledge-based development and innovativeness of remote, rural and less-favoured regions. Even more importantly, positive developments will not take place without deliberative and decisive actions: regional development calls for actors and activity. In addition, the cases pointed out further questions and notions concerning the quadruple helix and regional development.

The *South Ostrobothnia (Finland)* case revealed that reaching a solid, shared vision for the region in question is a long-lasting process in which encouraging milestones are important. The central question is how to organise, maintain and occasionally intensify the development process which may be very complex and lengthy. It could be argued that this is a matter of leadership which calls for personal level enthusiasm and the ability to motivate and energise representatives of different quadruple helix actor groups. At different stages of the development process, different people or actor groups may be in charge of the process.

In any case, there need to be regional forums and arenas in which shared visions can be discussed and shaped among different quadruple helix actor groups. Consequently, in rural circumstances, it is very important to support and offer mental “space” for the activity of local people. That has been the case in South Ostrobothnia. Organisational support for organisational innovations is needed to facilitate and boost local and regional development processes. In creating shared vision and planning, and especially carrying out concrete common measures, people that have a connecting role in local and regional networks have an important role. They should act as the brokers in interweaving the networks and explaining objectives for different stakeholders. Formal, common, and also written, contracts with common goals are also needed when resources are allocated over several financial years.

The *Västerbotten (Sweden)* case showed that developing multi-institutional learning environments is a solution for a remote and peripheral region to respond to the educational needs and to open up new avenues for the development. The internationally increasing number of this kind of arrangements implies that they are an applicable tool for the knowledge-based development. So, these multi-institutional learning environments initiated by the communities are, we argue, an important innovation with a future. As university research priorities are increasingly globalised and specialised, the education will presumably follow the same path. MOOC courses can be one of the first signs of this. However, learners are not placeless, but they live and work in communities which are trying to find their role in (global) smart specialisation. At the same time as the specialisation and globalisation of universities is progressing, regions around universities are in need of versatile higher education. In this respect, it is an interesting thought that higher education learning environments, although not education and research in themselves, can become a community responsibility. University and campus first unbundle, but then re-bundle, creating new possibilities for further development and smart specialisation. As a policy implication, this all demands “glonacal strategies” (see Marginson and Rhoades 2002). One such strategy is to recognise and support multi-institutional campuses and learning centres, as community-based service and innovation platforms, which enables local access to globalised research and education in the spirit of open innovation.

The *North Great Plain Region (Hungary)* case illustrated the ways how a research-intensive university can vitalise and strengthen its regional ties. Triple-helix collaboration is very important in this respect, but the University of Debrecen has also discovered the value of the fourth helix. For example, the Innovation Shop is a serious attempt to involve customers’ views and expertise in innovation processes. But the fourth helix can gain even stronger foothold in the future.

Based on the recent process of formulating a solid, regular and co-operative communication and discussion between the regional/local triple helix actors, the

development of the innovation potential of the North Great Plain Region's economy clearly demands the coordinated co-operation and co-working of the active local communities and civil society even beyond the city borders. It is especially needed for the targeted cluster policy of the North Great Plain Region of Hungary. The strengthening university activity and engagement towards the real involvement of rural communities in the region strongly promotes the definition of sector-specific needs of these communities. At the same time, the vibrant and inspirational members of the civil society, associations and other local communities of these rural areas can significantly contribute to the success of innovative solutions/regional innovation through the appropriate combination of local knowledge, expertise and regionally available professional university, government and/or business expertise. This process is essentially important in the dynamics of the regional innovation system. So, the policy recommendation would be that universities can and should be active in involving different user and civil society communities in the knowledge-based regional development processes.

The *Highlands and Islands (Scotland)* case showed that a very peripheral region can achieve excellence in a certain field. This calls for intense local and regional collaboration among triple-helix actors. In addition, the national support (e.g. National Health Service) and EU funding have played a major role in this development. However, it has been very important to involve new actors in the development of health service provision. In this respect, an important lesson learned from the CHS O4O project is the importance of gaining local community input into local issues, rather than assuming a top-down, one-size-fits-all approach. Searching for and adopting relevant ideas and knowledge wherever they can be found, and maintaining a strategic view of the community's needs, can help policymakers design strategic programmes that better fit local, regional and national needs. Thus, the policy implication from the CHS example is that a hub and spoke mechanism can provide research and innovation benefits across a region—as long as you ensure that the strategy includes outreach projects and activities, such as the O4O project, that spread the impacts and benefits of research and innovation activity to the entire region and not just the urban centres. So, both the “hub” and “spokes” need to be active and willing to collaborate to make regional difference.

In sum, different kinds of communities seem to have an increasing role in innovation activities and thus also in knowledge-based regional development. In this scene, the triple helix configuration has traditionally been in the dominant position. In this respect, the key question is, how can the actors of the traditional triple helix support the empowerment of the local and regional communities? What kind of inclusive practices do they have? If they have an introverted attitude, organisational policies and priorities in formal procedures of business, research and administration, then there is only limited room for community interaction and personal level co-operation.

This notion brings us to the second key point. The individuals—people acting in regions—are fundamentally important from the point of view of regional development dynamics. This notion is highlighted when the role of regional and local communities is discussed. However, it is important to notice that civil servants, researchers and entrepreneurs are also members of these communities. If there exist decentralised competences to active behaviour and network-building, then the regional or local system can possess structural dynamics. If the right conditions for envisaged

development are missing, some stakeholder or responsible actor will have to take the innovative initiative towards shared action—otherwise nothing will happen. It can be argued that especially in rural, peripheral and otherwise less-favoured regions the questions of regional development come closer to people’s personal lives than in bigger cities. Some individuals in these communities can be acting in more than one role in a quadruple helix model, or shift between them. These people usually make a difference.

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**Eol uostbvi boerinhbs i Peebhohitl ubscetue
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