

The Development of Online and Blended Learning in Primary and Secondary Education in Iceland

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Abstract

In the early nineties, a grassroots movement of educators in rural districts initiated a nationwide network and connected most Icelandic schools to the Internet. The development of online and blended learning at the compulsory level involved: language-related projects; projects in rural schools; and efforts to increase course selection through collaboration between schools and access to upper secondary level courses. At the upper secondary level, in 1994 to 2005, pioneering distance programs started in a few schools. In the following years, blended and online learning developed to various extent in all schools with the aid of learning management systems (LMS's). Results from a 2010 evaluation study involving three main distance education providers are outlined and an overview of selected cases provided which shed light on recent development. It is concluded that there is a need for stronger policies and support from authorities regarding the development of distance, online learning and blended learning at the primary and secondary level in Iceland.

Introduction

Iceland is a volcanic island in the Northern Atlantic ocean and was first settled in the ninth century. It was under Norwegian and later Danish rule from 1262 to 1918, but became a republic in 1944. It is one of the Nordic countries and maintains close ties and cooperation with them; for example, at the government level through the Nordic Council. Iceland is not in the European Union but is in the European Economic Area (EEA). The country ranks high in economic, political and social stability and equality ("Iceland," 2017). Currently about one third of a million people live in Iceland, the majority in or close to the capital area of Reykjavík but others in small towns, villages or rural areas distributed around the country's 103,000 km² (ca. 40,000 sq. miles). The population density is only about 3.2/km² (8.3/sq. mi).

Iceland was isolated through the centuries with a homogeneous population due to its remote location, harsh climate, and lack of natural resources for boat building. The country was very poor with its economy based on farming but its affluence grew with the fishing industry during the last century as well as an economic boost during the second world war. In recent years, tourism has surpassed fisheries as the main source of income for the country and Iceland has become far more multi-cultural which has resulted in a varied language background of the population. The official language is Icelandic but from 1997 to 2016 the number of children having another mother tongue than Icelandic steadily rose from 377 (0.9%) to 4148 (9.3%) with more than 50 language backgrounds involved (Statistics Iceland, 2017a). The largest foreign language group has been Polish, with more than one third of the children in 2016 (1,467) of Polish origin.

In the following sections, we will provide a short introduction to Iceland's education system followed by a comprehensive overview of distance and blended learning in compulsory and upper secondary education in Iceland. At the compulsory level we describe distance learning projects related to language learning and rural school collaboration, as well as development in blended learning. At the upper secondary level, we describe the pioneering schools providing online and distance learning, look at the development of the use of LMS's in blended learning, and provide insights in the recent developments describing selected cases.

Overview of Iceland's Education System

In this section, we will give an overview of compulsory education in Iceland, which involves education at the primary and lower secondary level, and then we will describe education at the upper secondary level which is non-compulsory.

Iceland's Compulsory Education

Compulsory education in Iceland can be described as a single structure education with no transition between primary education and lower secondary education, and with general education provided in common for all pupils (Commission/EACEA/Eurydice, 2016a). These include grades 1 to 10 with children 6 to 16 year old (Commission/EACEA/Eurydice, 2016b).

The Icelandic Ministry of Education, Science, and Culture issues the main curricula of both compulsory schools and upper secondary schools and is responsible for the operation of the latter schools while education at the compulsory level is provided by the municipalities/local communities. In 2015, there were 168 compulsory

schools in Iceland (94% of them public) with ca. 44,000 learners (Statistics Iceland, 2017a). About 28,000 (i.e., 63%) of those lived in the capital area but the rest were spread sparsely throughout the country. The number of learners in each school ranged from 4 to 861 and the average number of learners per school was 260. During the past decades people have been moving from rural areas to the capital region where schools tend to be much larger, resulting in the closing down or merging of rural schools at the compulsory level.

Iceland's Upper Secondary Education

Education at the upper secondary level in Iceland is divided in general education for matriculation exam, vocational-industrial education, and professional education for master craftsmanship. The upper secondary schools may be divided in junior colleges (i.e., grammar schools) providing general education and comprehensive schools which offer both general and vocational programs. Traditionally, there were separate industrial-vocational schools but many of them are now merged in the comprehensive schools. In 2008, several industrial-vocational schools in the capital area, were merged to become The Technical College. In addition, there are many vocational schools with programs for specific trades and careers (they are not counted among the conventional upper secondary schools below). The length of the studies in vocational education varies from one to four-year study. The general upper secondary education is planned in continuation of the compulsory education (i.e., age 6–15) with pupils entering upper secondary schools at 16 years old. They used to be organized as four years of study for the matriculation exam, but that was recently changed to three years. Students in the vocational programs tend to be older than in the general programs (Statistics Iceland, 2017b).

There are currently 30 high schools/junior colleges in the country (i.e., not counting special schools at that school level, e.g. in arts or horticulture). The age of a “regular” student is 16-20. Approximately half of those schools offer vocational-industrial programs. Seventeen schools are in the countryside (i.e., 57%) and 13 in the capital area of Reykjavík (i.e., 43%).

Most of these upper secondary schools are public schools run by the state or in collaboration of the state and the municipalities. The Technical College in Reykjavík offering industrial-vocational education and different specialized programs is privately run by the employers' organizations SA – Business Iceland. Included there is The School of Master Craftsmanship for those who have completed a journeyman's examination in a certified trade and are generally working as trade craftsmen while finishing their studies. Many of the programs offered by The Technical College would qualify as tertiary education. Another, privately-run school is Keilir Academy,

founded in 2007. It offers vocational and academic programs, mostly at the tertiary level, many of which are organized as blended learning, or flipped learning, with considerable use of computer technology. Keilir also offers a program for preliminary university studies, which has been an important provider of online studies for finishing the equivalence of matriculation exams enabling older students to enter the university (Keilir, n.d.).

Most upper secondary schools in Iceland (~80%) organize their education in a unit credit system (i.e., module/course-based) where students follow courses prescribed in the relevant programs rather than following age-based cohorts. In the case students fail in a course, they need to repeat that course. The flexibility of the unit credit system makes it feasible for the schools to open access to their courses online and for credit recovery.

Distance and Blended Learning

With the advent of the Internet in the early nineties, online learning became a feasible formal education option for students in rural districts. Around 1990, a grassroots movement of small schools in sparsely populated districts had started to build up Internet connections which grew quickly. In 1992 it became a formalized nationwide network called Ísmennt or The Icelandic Educational Network (SKÝ - Skýrslutæknifélag Íslands, 2017; Wilde, 2011). The small countryside schools aimed to increase collaboration and enhance teachers' professional practice. By the spring of 1993, 80% of all schools in the country had been linked to the Internet through the network (Jónasson, 2001). Most of the network's staff members were teachers. The network became an important supporter as well as promoter of distance learning at all school levels in the country initiating or supporting pioneer projects in online education. The network was also an important supporter of Iceland University of Education, which started its distance education program for compulsory school teachers in 1993 to address a lack of certified teachers in rural schools (Jóhannsdóttir, 2010).

In this section we will describe how distance and blended learning developed both at the compulsory level and at the upper secondary level.

The Compulsory Level (i.e., Primary and Lower Secondary)

According to the Icelandic curriculum guide from 2011, the main objectives of distance and flexible education at compulsory school should be to provide pupils, no matter their location or educational achievement, the opportunity to take additional electives or advanced courses without extra fees (Icelandic Ministry of Education and Culture, 2014, p. 80). Given the background of Iceland as described above, the development of distance

education and blended learning at the compulsory level can mainly be divided in two: (1) Language related; and (2) efforts involving distance learning in small rural schools through online collaboration and/or video conferencing. In this section we will provide a description of two language-related cases and three cases involving rural schools. Additionally, there have been some efforts to offer other blended learning opportunities, for example in the Reykjavík municipality. Furthermore, students at the lower secondary level have been able to sign up for courses (i.e., advance placement) at the upper secondary level (Jakobsdóttir & Jóhannsdóttir, 2010), especially in Icelandic, English, Danish, or Mathematic

The Language Centre

In 1971 opportunities to study Norwegian or Swedish instead of Danish were provided due to many returning expatriates who had worked or studied in those countries and were returning back to Iceland with children wanting to continue with those languages rather than to study Danish. These children were relatively few and distributed around the country so it was hard, especially for small rural schools to provide that instruction. To address this issue, in 2001, Reykjavík Education authorities decided to found The Language Centre which started operating in 2002 (Tungumálaverið, 2013). It currently provides advice and assistance to schools and districts throughout the country; in-school classes (i.e., web-facilitated) in Norwegian, Polish, and Swedish to students in Reykjavík; and on-line classes in Norwegian, Polish, and Swedish for students within and outside the metropolitan area for students in grades 9 and 10. In 2015-2016 there were 182 children from the countryside and 210 from Reykjavík. The students access the online class during the time in their own school, when their classmates are studying Danish, or from home. Students communicate with their teachers online, do projects and take tests online. Parts of projects involving oral practice of the language can be completed via phone or online conversations.

Learner autonomy has been encouraged from the start of the school (Ragnarsdóttir, 1999; Ragnarsdóttir, 2002) but other emphasis include a communicative approach, project and theme-based learning, personalized learning, and portfolio assessment. Teachers and students in The Language Centre have participated in collaborative projects with other teacher and student groups across the Nordic countries, for example via Norden Online. The learning environment and tools of The Language Centre have changed through the years and in 2016 it included, for example, *Moodle*, *Quia*, *Google*, *ScreenCast-o-matic*, *Facebook*, *iMovie*, *pbwiki*, *MS Powerpoint*, and *SoundCloud* (Ragnarsdóttir, 2016).

IceKids (Íslenskuskólinn á Netinu)

The aim of IceKids was to create a web-based platform and a school community for young expatriate Icelanders to keep up their mother tongue through courses, games, and community in a safe online environment (Macdonald, 2008). It was initiated by the University of Iceland and used Netskólinn (i.e., The Net school) as the LMS. The IceKids project was one of a number of Icelandic cases studied in an OECD/OERI project in 2008 involving the development of digital resources in the Nordic countries. All activities and content (games, newsletters for parents, courses, tests, discussions) using the LMS were developed by the teacher working closely with a programmer – a former teacher – who was paid a small amount to turn the ideas into working reality (Macdonald, 2008, p. 20). The innovation was essentially a grassroots effort. Other stakeholders were the ministry of education, Icelandic families living abroad and a number of sponsors. There was an absence of engagement and therefore ownership from schools, companies and the foreign ministry, not having been involved from the outset when the project was ministry of education funded. Eventually funding issues closed the project (Macdonald, 2008).

Strandir

In the school year 1999 to 2000 a project was started to connect a small school in a remote rural area in the Westfjords of Iceland (i.e., Broddanes School) to a larger school (in Hólmavík) 37km away. This development project was inspired by two early projects in other countries with distance education at the primary/lower secondary level: The Finnish Kilpisjärvi project and the Alaskan project On the Wings of Tomorrow. For several years there had been fewer than 10 students at the Broddanes School and the aim of the project was to explore whether distance learning through video conferencing (i.e., connected classrooms) could improve work and study in such a small school at the compulsory level by increasing learning opportunities and variety. The aim was also to strengthen students' social position and facilitate their interaction with peers in neighbor schools and reduce teachers' isolation and improve their work conditions with better opportunities for interaction with colleagues. The school administrators and teachers at the school collected data during the project and did action research (Sigþórsson, 2000, 2003). The University of Akureyri Research Centre evaluated the project (Sigþórsson, 2000) collecting data from administrators and teachers (i.e., meetings via video conferencing and on site), from students in grades 4, 5/6, and 9 (i.e., interviews and surveys), and parents (i.e., surveys). There were 5 students in these grades who participated in Broddanes and 44 in Hólmavík. The main conclusions of the evaluation study indicated that distance education of this sort was technically and pedagogically viable and in

various ways could strengthen work and study in small schools and include social benefits. This appeared more true for students in the older grades and for students that were more independent and self-confident. Students and parents tended to be happy with the experience but there were some technical difficulties and it proved hard for the teachers to divide their attention between their class in Hólmavík and the distance student(s) at Broddanes. The experiment did not save any money for the schools involved but they continued to collaborate via distance to some extent after the project for a few years without outside support but then discontinued, and Broddanes school later closed.

VestBarð

In 2003 to 2006, a similar project was started with collaboration of schools in a different area of the Westfjords of Iceland (Thorsteinsson, Ingason, & Þórsteinsdóttir, 2006). There were difficulties for the schools involved to attract licensed teachers and travel in winter on mountainous roads was difficult. Two schools participated in the project, one with 100 students (at Patreksfjord) but the other with about 90 students distributed in three locations (i.e., about 50 in Tálknafjord, 20 in Bildudalur, and 20 in Birkimelur). Students' social connections increased and they felt they were a part of a larger whole with less conflict between areas. The participation appeared to increase learners' independence in their studies. Teaching methods became more varied, and there was more communication between teachers who were also gaining skills in computer use and the use of software which could be of use in teaching. Learning performance appeared similar to performance in traditional learning and it was thought that students would be better prepared to utilize distance learning opportunities at the upper secondary school level in the future. There were opportunities to take advantage of teachers' special expertise across schools without travel cost. While technical difficulties came up, they were managed effectively, and overall the experiment was thought to have gone rather well and as a result a new project - SnæVest - started with the same schools in the Westfjords that were to collaborate with schools in towns and villages in the Snæfellsnes peninsula.

SnæVest

The main aim of the SnæVest project was to strengthen the countryside schools involved with blended learning (Jóhannsdóttir & Jakobsdóttir, 2011). In the beginning of the project there was the same need as in the VestBarð project, that is a lack of teachers. However, in 2008, an economic crisis rocked Iceland and had a large effect on the project. Prices for new video conference equipment and laptop computers for students in the participating schools skyrocketed. It became easier during the project period to get qualified teachers in the rural schools, so

the need to get teachers all but vanished. Technical problems also came up when trying to connect more than two schools via video conferencing. However the subjects Danish and Physics were taught from the Patreksfjord school to schools in Tálknafjord and in Snæfellsnes and administrators and teachers thought that had gone well. Students had been pleased and the projects online learning materials developed had been useful. However, it appeared difficult for other schools to access and/or reuse the materials from the LMS, Netskólinn. The extensive collaboration between the schools to develop varied teaching methods and blended learning had not gone as planned although there was interest for a continuation of the project. The evaluation revealed the vulnerability of a project of this kind to outside effects including technology pricing and teacher availability. It was suggested that a nationwide collaboration with an online school might be a way to go, open to any school at the compulsory level in need of teaching or interested in collaborative projects with their student groups. Also it was suggested to look at open source solutions in relation to learning materials and LMS's.

Blended learning – Reykjavík schools

An experiment was done in 2002 to 2004 using WebCT (Jónsdóttir, 2003) where three and later four Reykjavík schools collaborated providing students in grades 8 to 10 access to online courses (i.e., electives) across the schools, for example in mathematics and creative writing. In 2006, Reykjavík City provided access to Blackboard for all schools at the compulsory level in the city. The use was very limited (Thorkelsdóttir, 2015) but in 2011 it was decided to switch to Moodle and later it was decided to open access to the web for all schools in Iceland. Teachers and schools have been able to set up courses and also to share learning materials in a special open educational resource category.

Examples of schools and teachers developing blended and online learning in recent years include Hólabrekku School where learning materials in Danish have been developed and students in grades 8 to 10 work more independently on projects and exercises in Moodle during the school time at home or outside the classroom (Thorkelsdóttir, 2015). Also learning materials on ICT in teaching and learning for teachers have been available for self-study and professional development. One development project involved an action research study by a teacher in Reykjavík teaching social science at the lower secondary level using blended learning in Moodle for his students in Voga School but later he provided online access to those materials and taught students in a rural school using the same materials (Tómasson, 2015) at a distance. His conclusions were that Moodle was very applicable for both blended learning and distance learning at this school level.

Pupils at the compulsory level taking courses at the upper secondary level

In an evaluation study of distance education at the upper secondary level in 2010 it was revealed that many students at the compulsory level were taking distance education courses (Jakobsdóttir & Jóhannsdóttir, 2010). About 8% of the 3228 distance education students registered with the three largest distance education providers were 15 or younger (i.e., from the lower secondary level). About 70% of those reported in a survey that the main reason they registered for a distance education course at the upper secondary level was to get ahead in their studies. The schools tended to be pleased with these students because they had low dropout rate compared, for example, with students self-blending courses in the 16-20 year age group.

Upper Secondary Schools/Junior Colleges

In this section an overview will be provided of online and blended learning at the upper secondary/junior college level in Icelandic schools. First we will describe the early development between in 1994 to 2005 where a few schools took the initiative to provide access to their courses online. Then we will describe the period 2005 to 2009 when all of the schools started employing LMS's and to develop blended or online learning to various extent. We will then describe the results of an evaluation study done in 2010 on the three leading distance education providers at the time. Finally an overview will be given of the development from 2010 with selected cases.

The first distance education programs 1994 to 2005

Online distance education has been offered as an alternative form for learning at the upper secondary level since the early nineties. In 1994, Akureyri Comprehensive College (VMA), located in the main town in North Iceland, became a pioneer in offering online courses at the upper secondary level. It was initiated by a teacher who had been one of the most active members of the Ísmennt grassroots network of teachers. Most of the traditional courses offered in the school could be accessed online with the same requirement and credits as the regular courses. All teaching was done via email with no face-to-face sessions. The program was meant to make access to formal education at the upper secondary level available for people in sparsely populated districts and to enhance equity in access to upper secondary education in Iceland (Ágústson, 1999; Matthíasdóttir & Hermannsson, 2003a). The industrial-vocational programs have also offered most of the general academic courses online with face-to-face sessions in practical subjects. An important addition to the VMA is The School of Master Craftsmanship, which is offered as an online distance option with several face-to-face sessions during weekends or evenings. VMA was for about eight years the largest provider of distance education at the

secondary level in Iceland with several hundred distance students studying online. Women and people living in areas nearby the school formed the majority of the student group, however students living all around Iceland and abroad were enrolled (Matthíasdóttir & Hermannsson, 2003a). Increasing demand for online distance learning made upper secondary schools in Reykjavík soon follow suit. Planning and educational policy from the Ministry of Education, Science, and Culture in 2001 and 2005 also called for an increase in online and blended learning and that students would be able to study when it suited them regardless of residence/location.

In 2001, another school at the upper secondary level started to develop distance learning programs, that is the Comprehensive College at Ármúli (FÁ) located in Reykjavík (Matthíasdóttir & Hermannsson, 2003b). In 2005, another Reykjavík school followed suit, The Commercial College of Iceland (VÍ).

Research on blended and distance learning 2005 to 2009

A series of research studies on distance and blended learning were done during this time and data collected from all schools at the upper secondary level in Iceland (not counting special schools at that school level, e.g. in arts or horticulture). The data were collected in 2005 and 2006 from administrators (phone interviews) at 29 schools, and in 2009 from 31 schools (same 29 plus two newly established schools). In addition, in 2007, 25 teachers and 53 students from six schools were interviewed, most of them by phone (Jakobsdóttir, 2008, 2009; Jakobsdóttir & Guðmundsdóttir, 2010a; Jakobsdóttir, Jónsson, Elfarsdóttir, & Jóhannesdóttir, 2007).

Using the data from the administrators, the schools were classified into five main groups in terms of prominence of distance education and blended learning in the schools. Figure 1 shows how the schools were classified based on the interviews with school administrators in 2005, 2006 and 2009 (Jakobsdóttir, 2009).

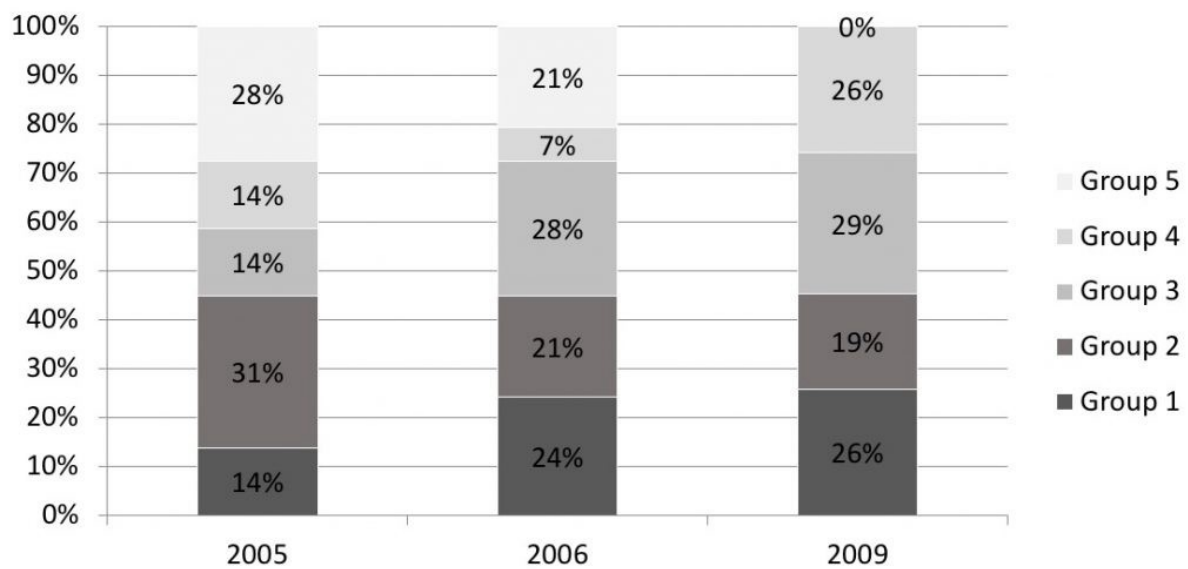


Figure 1. Classification of upper secondary schools based on prominence of distance education/blended learning in the schools (Jakobsdóttir, 2009).

The five groups displayed in Figure 1 are described as follows:

- Group 1 – Schools in this group with strong distance education stems (i.e., with large groups of students registered in distance education, and the distance education program even about equal to the regular program). Variable to what extent the distance education and the regular program was blended or separated.
- Group 2 – Sizable distance education programs, but lower rate of students than in group 1. Or small program apparently growing at a very fast rate (i.e., more top-down).
- Group 3 – Regular school program, but distance education starting in some ways for groups or courses and/or time. Some schools starting to use LMS highly and experiment with shorter school days or fewer regular classes as a result.
- Group 4 – Use of LMS's or intranet in high use in schools in this group by most teachers/student but attendance, length of school day, and schedule unchanged.
- Group 5 – LMS's or intranet in use in most or all schools but not as widespread as in group 4.

As can be seen in Figure 1, some trends were evident regarding distance education and uses of LMS's in the schools from 2005 to 2009. For example, the number of schools categorized in group 1 (i.e., strong/prominent distance education programs) doubled from four to eight, whereas at the the other end of the spectrum, there were eight schools in 2005 in group 5 with no distance education learners and/or without an LMS, which

dropped to none in 2009. In 2005, there were seven to eight schools (i.e., about one quarter of the schools) without an LMS, whereas all used one in 2009.

Among the schools, there was a clear trend regarding the use of open source software (i.e., *Moodle*) as an LMS in favor of foreign commercial software (*Blackboard/WebCT* and *Angel*). In 2006 reasons administrators gave for the choice of LMS included the language (i.e., Icelandic), access and user-friendly interface, development and adaptation, connection with other systems, cost, timing/history (i.e., best system when chosen), experience, and ideology (i.e., open source). However, after the economic crash in Iceland in 2008, the cost factor appeared to be much more prominent. Figure 2 shows the trends of the types of LMS's in the schools involved (Jakobsdóttir & Guðmundsdóttir, 2010a).

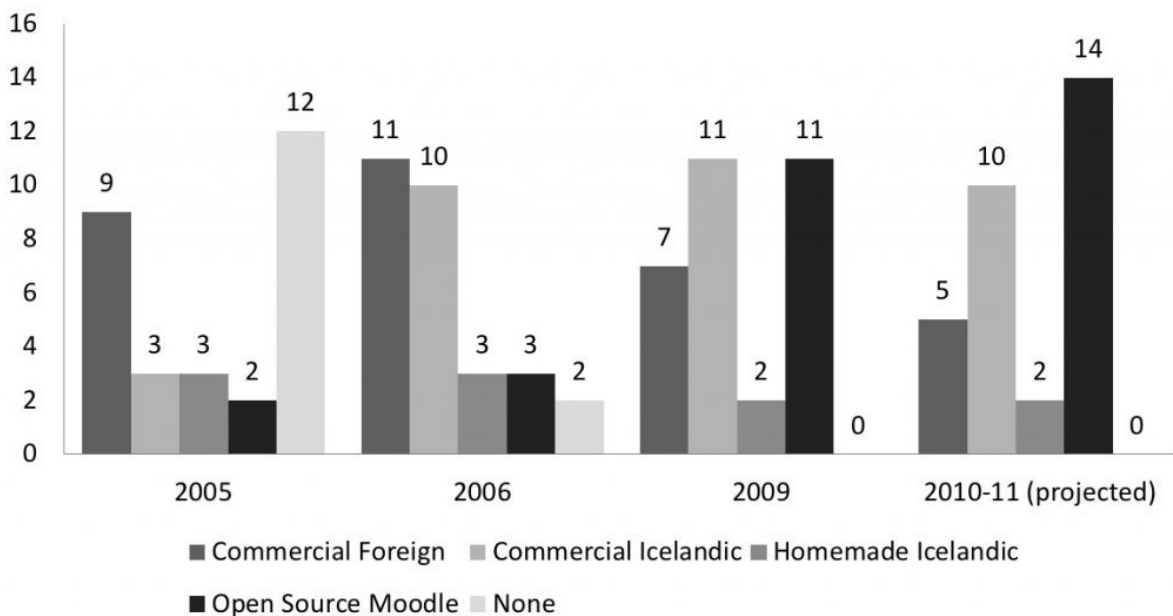


Figure 2. Types of learning management system's in schools at the upper secondary level (Jakobsdóttir & Guðmundsdóttir, 2010a).

The administrators interviewed in 2005, 2006, and 2009 tended to be pleased with the use of the LMS's. They thought that the use improved information flow between teachers and student, both in distance education and regular programs, and made access to information about courses and teaching much easier.

Students at the upper secondary level in Iceland in 2007 studying via distance and/or with the support of an LMS tended to be content in their studies (Jakobsdóttir, 2008). Distance learners had chosen that type of study for various reasons. Some craved access to education in locations where there was no high school. Many

emphasized the flexibility in location and time and a preference for studying online and/or using an LMS. New groups of distance learners emphasized benefits having to do with convenience and comfort rather than needs and necessity. However, some students reported that studying at a distance was more impersonal than studying in a regular program, there was not enough contact with teachers or students, and there was more need for self-discipline. Some students also thought that the LMS's could be used more effectively.

Teachers interviewed in 2007 felt that there were several benefits associated with distance education (Jakobsdóttir & Guðmundsdóttir, 2010a, 2010b). These included increased opportunities for small schools in rural areas, increased flexibility to coordinate residence, family, work and study. Students learned new practices and there was increased freedom for teachers and labour saving in the long run. On the other hand, drawbacks included increased workload for teachers (at least in the beginning) and isolation; insufficient teacher-student interaction and student-student interaction. Some maintained that distance learning was not for all schools or learners and that there might be greater risk of student cheating and dropout. Distance education required self-control and maturity. In addition technical problems were mentioned.

Among conclusions reached from these studies were that education at the upper secondary level in Iceland had tended to be compartmentalized. Going online might make it more so, and in some schools there might be a trend towards “independent study” with isolation of both students and teachers. It was felt that higher focus was needed in distance education on social elements, online community building, and effects of the use of LMS's needed more attention (Jakobsdóttir, 2008).

Evaluation study of the three main distance providers in 2010

In 2010, FÁ, VÍ, and VMA were the largest online distance education providers at the upper secondary school level with about three quarters of all distance education students (Jóhannesdóttir, 2010). The number of distance education students registered in these three schools was 3223 students, 66% female and 34% male. FÁ had general study lines for matriculation exams and vocational programs for healthcare professionals (ca 30% of the student population). The aim was to make as many of their general courses and specialized academic courses for the health care programs accessible online. VÍ had general programs for matriculation exams and all of their courses were offered as an online option. In both schools, distance courses were available also during the summer.

In 2010, the Ministry of Culture and Education launched an evaluation audit of the status and quality of the distance learning in these three schools (Jakobsdóttir & Jóhannsdóttir, 2010, 2011). They were all dual mode with online courses and on-site courses taught separately. The distance courses were to be equivalent to the on-site courses and often the same teacher taught both forms. The distance courses were planned entirely online without face-to-face sessions. In most of the upper secondary schools offering general academic courses online there were no obligatory face-to-face meetings, however, students might be invited to the schools for consultation or study counselling if they so wished. To ensure the quality of the distance program, the distance students were evaluated in the same way as the regular students by taking the same final exams.

The mean age group was 20-30 years old but the age range was big from 15 to over 50. The distance students were living all around Iceland as well as abroad and were registered in most of the schools at the upper secondary level in the country, not just the three main providers. Many of the students were living in districts in Iceland that did not have upper secondary school in the neighborhood.

Reasons for choosing to study online varied with age (Jakobsdóttir & Jóhannsdóttir, 2011). The youngest group (15 or younger) had mostly one reason for signing up for DE courses. They wanted advance credits from the upper secondary level so they could perhaps go quicker through that school level later on. For the next two age groups (16-20; 21-25) the reasons were more varied but the main one was that they needed credits (for their diploma). These would include students who had failed a course in their day school, could not fit the course into their schedule or the course was not available at their school in the semester they needed it. The age group 21-25 needed the credits even more urgently – having been delayed in finishing their diploma and trying to catch up. Convenience and flexibility in time was high on their list and a reason to be able to work with their study was prominent. That reason was the main reason for the next two age groups: 57% of respondents 26-40 chose it and 66% of the people 41-50. These age groups had very varied reasons for enrolling in the distance education programs, especially the people in the 26-40 age group who needed a lot of flexibility while juggling work, study and family trying to get necessary credits. A prominent reason with that age group was being able to stay home with family/children which is not surprising given that this is the main child bearing age. Finally, the oldest age group (51+) appeared thirstier for knowledge than the others. About 80% of the oldest group listed a reason for their DE studies that they wanted to add to their knowledge although many also listed work with study, convenience and flexibility.

Attrition rate of distance education students in the three schools evaluated in 2010 was mainly measured by the percentage of enrolled students that showed up for the final exam or handed in the assignments required for assessment. The dropout rate was from approximately 27 to 40%.

The evaluation study revealed that the majority of the distance students thought they had a great need for distance learning, thought it was convenient to study online and that their educational outcomes were similar in distance and regular programs. Teachers tended to agree. Administrators, teachers, and students thought the quality of the programs comparable in many ways although students tended to think that teaching and communication with teachers was better in regular programs and communication with co-learners much better. An examination of the teaching methods in the distance programs showed that there were usually little or no requirements for student communications and collaboration. The LMS's were well used to organize the distance courses. Access to learning resources was provided, and students tended to have opportunities for self-tests and exercises but application of multi-media was not common.

Development of online and blended learning from 2010

In 2014, 4012 students were enrolled in distance learning in upper secondary schools in Iceland, which was a drop of 600 fewer than in 2010. There were 30 schools at the upper secondary level and 18 of them had distance learners enrolled (i.e., 60%) (Statistics Iceland, 2017c). Only 17% of the grade based schools had distance students/ program but 71% of the unit credit based schools.

Vocational education was usually offered as a blend of online and face-to-face sessions. Industrial-vocational studies including programs such as marine engineering, boatmasters' education, and education for health care and social workers were offered in online courses with periodical face-to-face meetings. Apprenticeship was as a rule an important part of this kind of education and needed to be completed on-site (Jóhannesdóttir, 2010). Based on the schools' websites and recent yearly reports, five schools in the capital area offered such programs, and nine schools in the countryside had formed a coalition to make industrial-vocational programs available for people living in rural areas (Fjarmentaskólinn, 2017). In the countryside, some upper secondary schools allowed pupils to enroll in blended learning organized for pupils to be able to stay at home while completing upper secondary education. In their hometown, they had access to a learning center where there were facilities for supporting their learning including a good Internet connection and a teacher or a mentor. In the learning centers pupils were connected to the school via Internet enabling them to participate in classroom teaching via video-conferencing or equivalent computer programs. Most of the learning resources were provided with an

LMS so that pupils could work on their assignments in the learning centres. In general pupils attended classes in the learning center three weeks and were then expected to meet up for face-to-face sessions in the school for one week per month where they are provided with housing in dormitories. During these weeks, besides the academic school work, social events were planned for the distance students to mingle with the on-site students. Three schools in the countryside had offered this form of blended learning for 5-45 students per year (Jóhannsdóttir, 2017b).

The three schools that were the biggest distance education providers in 2010 are still among the largest providers while other schools have been increasing their distance students' enrolment. In the following sections, we will give an overview of selected cases, which shed light on the development of online and blended learning from 2010 at the upper secondary level in other schools entering the distance education scene in Iceland.

The Technical College. In 2014 the Technical College in Reykjavík offering industrial-vocational programs, has become the second biggest distance education provider, enrolling 645 distance students. In 2009–2010, The Technical College was already an important provider of distance programs, being in the fourth place after the three mentioned earlier. The college is made of 14 schools (or departments) with different industrial-vocational education of which seven offer blended learning. In the spring term 2016, the highest number of their distance students were enrolled in the School of Master Craftsmanship which is offered as evening school and/or distance learning courses with several face-to-face sessions. Other programs at The Technical College include boatmasters, construction, electro-technology, technology, information technology, and mechanical studies. The school serves a different population of students than general upper secondary schools with males between the ages of 32 and 36 being their largest subgroup of distance learners (Jónasson, Jónsdóttir, Ólafsdóttir, & Guðmundsdóttir, 2016).

Borgarholt Comprehensive School. Another upper secondary school in Reykjavík is Borgarholt Comprehensive school (BHS), which offers vocational programs as a blend of online and face-to-face sessions organized for students 18 years and older. The schedule takes into account that the students are working alongside their studies. Programs offered are: social service program for social assistants and school assistants, industrial metal work, practical multimedia, and automotive industry (Borgarholtsskóli, n.d.). In 2014, 230 students were enrolled in these programs as distance/blended learners (Statistics Iceland, 2017c).

Keilir Academy. In 2014, the numbers from Statistics Iceland (2017c) showed that Keilir Academy had become among the most important providers of online and blended learning at the upper secondary school level with

large growth in enrollment. Two programs were offered as a blend of online and face-to-face meetings at Keilir, including preliminary university studies and sports training. Preliminary university studies was a popular program offered both as fulltime studies and part time for students who are in the labour market. Keilir has been in the forefront of using flipped teaching, varied assessment methods are emphasized and the attrition rate is almost 100% (Keilir, 2017).

Egilsstaðir Upper secondary school. In 2014, Egilsstaðir Upper secondary school (ME), had become an important provider of distance education in addition to the formerly mentioned institutions. ME is situated in East-Iceland offering general academic programs for both online and traditional learners. These programs have shown increased enrollments in online courses with students taking an average of one to three courses online each year (Guðmundsson & Þorsteinsson, 2016). Usually the upper secondary schools organize the school year in two 15 weeks semesters, the fall and spring semesters. In ME, each semester is divided in two shorter terms which gives the pupils the possibility to focus on fewer subjects and finish their credit units in 7 weeks. This is part of the attraction of the distance courses in ME. Different from the biggest providers of online courses, the VÍ and FÁ in Reykjavík, in ME distance students are enrolled in the same courses as the regular students with access to an LMS where resources and teaching are provided for both groups. The reasons for this arrangement is that with smaller cohorts of regular students the group sizes were getting too small and in order to make it feasible to run all courses needed for finishing final exams, distance students were invited to enroll to make the groups bigger. Thus, enrollment of distance students has helped the small rural school to sustain its operation, in spite of fewer regular students. The attrition rate in ME has been similar to the bigger schools and in the years 2011-2016 the mean rate has been 71% of enrolled students that have signed up for final tests of which 85% have passed (Guðmundsson & Þorsteinsson, 2016). Records are kept of where in Iceland the distance students live while enrolled in the online courses. . In the school year 2016–2017, 20% lived in East Iceland where the school is situated, 14% lived in Western part of Iceland, 13% in South and South West Iceland and the biggest group, 48% lived in Reykjavík and neighborhoods; 3% of students were living abroad. The majority of distance students were females (ca. 60%).

Tröllaskagi upper secondary school. In recent years, another small rural school entered the market of providers of distance education at the upper secondary level. The Tröllaskagi Upper secondary school (MTR) is situated in North Iceland. The school was established in 2010 and is the most recent upper secondary school in Iceland. The school has attracted attention for innovative approach to teaching with intensive use of ICT and for

networking on local, national and international levels (Jóhannsdóttir, 2017a). All courses are set up in an LMS where learning resources are available and assignments submitted. Students are expected to bring laptops to classes and be prepared for working on their assignments online. Following the school policy, formative assessment is the norm and there are no final exams. Students are expected to submit diversified assignments each week and teachers are to give weekly feedback taking into account competence criteria set up for each subject. Teachers work according to the learner centered pedagogy on which the school culture is based. Similar to ME, the majority of the distance students enrolled in MTR live in the capital area.

Already when the MTR upper secondary school was established a matter of concern was being able to offer the necessary provision of courses due to small student cohorts living in the area. Addressing that problem, a contract was made with VÍ, one of the big providers of distance education in Reykjavík. Access to the online courses in VÍ was opened for all students at MTR. Many other upper secondary schools in rural areas were facing the same problem which later led to a collaboration among them and the Distance College entered the scene of online provision in Iceland.

The Distance College – a network of upper secondary schools in the countryside. Diminishing cohorts of students in the rural communities, made it feasible for the smaller schools to exchange students and teachers, for being able to offer quality courses in all subjects taught by specialized teachers, and economic class size. Some of the schools had collaborated on projects for enriching the educational offerings in the countryside which in 2013 led to formation of the Distance College (Fjarmenttaskólinn, 2017), grassroots initiated collaboration of 13 rural upper secondary schools, most of them enrolling from 100–300 students while two of them are enrolling more than 500 students. The participating schools are committed to open their general education courses for online students from other schools in the network. Shorter vocational programs are offered periodically by two to four schools collaborating on each project. Professional collaboration of principals and vice-principals take place on a regular basis and a part time project manager has been hired for coordinating the work.

The circumstances that initiated the Distance College Network were diminishing population in the rural communities together with the decision of national authorities that the upper secondary schools that used to be four years for achieving matriculation exam should be shortened to three years. This situation has threatened the existence of some of the small schools. In order to survive the schools needed to prove that they had a capacity to offer a qualitatively recognized education for the rural youth at a reasonable cost. This called for schools in

similar situation to work together. The Internet was the tool that made the networking feasible and visions for the importance of local schools among the school staff stimulated the formation of the network.

The prerequisite for participating in the exchange of students and teachers in the Distance College is a knowledge of the use of ICT for distance teaching and learning. However, in this respect the school practice in each school is different. While some schools, like MTR, are recently founded and use ICT widely for their teaching and learning and teachers are accustomed to collaboration, others still use traditional teaching methods with teachers independently teaching in their classrooms. Some schools had offered distance learning on a general market before they entered the Distance College Network while others had very little or no experience of teaching online (Jóhannsdóttir, 2017b).

In the autumn 2016, three years from the foundation of the network, the exchange of distance students is different in the participating schools. The schools that accept the most distance students enroll 20 to 40 distance students from other schools in the network, while others don't enroll any from other schools. Some of the schools that did not offer distance learning before, have taken the opportunity to develop their know-how in online course offerings and have managed to attract numerous distance learners from all over the country, like the ME in the East and MTR in the North mentioned above. Two more schools have managed to add 50-100 distance students to their regular student group (ca. 100-200 students). In these schools, the distance students' enrollment has been crucial for the school's operation, both financially, and professionally. Other schools have planned for and advertised distance learning courses without success. Interviews with school authorities show that three issues needed to be in place in order to attract distance students: knowledge in use of ICT for online teaching, coordinated rules for the practice of teachers teaching online and collaboration of teachers and willingness to share expertise. The schools which had succeeded in attracting distance students were all concerned to use formative assessment and based their teaching on learner centered pedagogy and were committed to take care of individual learners by personal communication online (Jóhannsdóttir, 2017b).

Some of the schools have a tradition of providing industrial-vocational education and for them the benefit of the Distance College's network is to be able to form a temporary collaboration of three to four schools for providing vocational programs when there are too few students in each school. In these cases, the Distance College functions as a platform for forming smaller networks within the overall collaboration when needed. The small industrial-vocational schools also collaborate with the bigger schools in Reykjavík (e.g., the Technical College for boatmasters education, which is in high demand in the fishing towns in the coastline regions around

Iceland). Education for health care services and school assistants is also a high area of need and the collaboration of several schools makes it possible to gather sufficiently large groups to be able to offer learners access to a blend of online courses and work-based sessions provided in collaboration with hospitals and schools in the smaller towns around Iceland. These arrangements call for a different kind of collaboration than the exchange of students in academic courses as distance learners. Some of the schools are focusing on either form and several are involved in both forms.

The network is important for the upper secondary schools in the countryside because the schools are often dealing with similar problems and the network has functioned well as a platform for consultation among the schools. In the autumn of 2016, the collaboration in the Distance College Network was not yet fully formalized. Administrators in the schools are learning to develop changed practice in and between the schools. The Distance College is an interesting example of the way in which educators in sparsely populated regions in Iceland are taking the Internet in their service to respond to problems of diminishing student cohorts well known all over the world at the same time as schools and education is the lifeline of rural communities.

Conclusion

The national curriculum guide states that “compulsory school pupils should preferably be offered to take distance or flexible education at upper secondary school as part of their compulsory education without special fee” (Icelandic Ministry of Education and Culture, 2014, p. 80). Following this policy the majority of the unit-credit-based (i.e., course based) upper secondary schools have made their courses available for students who have capacity to add courses to their compulsory schedule. LMS’s have made it practical and easier for upper secondary schools to open access to their courses which some are offered fully online. Other schools have preferred to organize on-site teaching in collaboration with compulsory schools in their community, however supported by LMS’s. This arrangement, which is a kind of advanced placement, calls for collaboration of both school levels which may be bridging the gap between them and supporting many pupils in moving to the next school level.

In the compulsory schools, the use of LMS’s has increased collaboration between schools, such as sharing of learning material through the *Moodle* platform between teachers and schools within Reykjavík. The number of projects initiated by enthusiastic teachers are indicative of their wish to use new technologies in the service of better education for all, with concern for social justice. The case of the Language Centre shows that online

education at the compulsory level can be effective and successful. However, some other projects, although having shown promise, have not managed to become sustainable or to be scaled up. Too often there has been a lack of understanding and support/funding on behalf of educational authorities, such as in the case of the Icelandic school for children living abroad. When it comes to use of online and distance learning, Iceland is at different end of the scale compared to more populous nations. In the Icelandic context, the main concern is not how to educate the masses, but how to reach the few when cost is high per student.

As for the upper secondary schools/junior colleges online learning has become an important part of the way in which the schools organize their programs with different blended learning models. In general academic programs the possibility of taking several courses online has enhanced flexibility for upper secondary students for catching up or advancing quicker through the three to four years for matriculation exams. An OECD assessment from 2015 found 73% of Icelanders in the age group 25–64 had earned the equivalent of a high-school degree, which was lower than the OECD average of 76% but in 2017, 78% of adults aged 25-64 had completed upper secondary education while the OECD average had dropped to 74%. (OECD, 2018). Without the opportunity of distance education at the upper secondary level this rate would be even lower. For older people who quit school without finishing a high school diploma the online offerings give possibility to combine work and/or family and study. This applies to students in industrial-vocational programs who are usually older when they enroll. The Technical College in Reykjavík and the comprehensive schools in the countryside have taken this into account and offer many of their programs in a blend of online and face-to-face sessions which are planned for in the evening or weekends to make it possible to combine work and study. The Distance College Network of the small schools at the countryside has been crucial when several schools work together and gather students from several places in one cohort for being able to offer one to two year programs for vocational studies. In this way it has been possible to provide education for groups like paramedics and social- and school assistants as well as boatmasters and mechanics, for which there is high demand in the labour market in the countryside. The smaller schools' exchange of students and teachers online, has become a lifeline for rural schools, which many are situated in vulnerable communities. It is worth noting how some of the rural schools have managed to attract students from the capital area in response to diminishing student cohorts in their area. The Distance College is a good example of what grassroots movements can accomplish. However, their work is not always appreciated by the educational authorities and although small grants have been allocated for supporting the network, the existence of the small schools continues to be threatened.

The feasibility of use of ICT for networking of small schools for supporting education and sustaining rural communities needs to be examined for informing policy in which the value of education for such communities is taken into account. There is a need for stronger policies and support from authorities regarding the development of distance, online learning and blended learning at the primary and secondary level in Iceland. Allocating funds for developmental projects and identifying and disseminating examples of best practice is recommended.

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