

# Distributed learning in the Nordic Countries and Canada

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## Abstracts

### English Abstract

Distributed learning is defined as learning that makes use of distributed resources and the breaking down of traditional boundaries between face-to-face and open and distance learning. Examples of distributed learning from three countries, Iceland, Canada and Finland, are discussed and the differences in approaches adopted by the three countries and that they are reflected in the policy, organization and methods used.

### Icelandic Abstract

Dreifnám er skilgreint sem nám sem nýtir margvísleg úrræði og brýtur niður hefðbundin mörk milli hefðbundinnar kennslu í kennslustofu og fjarnáms. Dæmi um dreifnám í þrem löndum, Íslandi, Kanad og Finnlandi eru rædd í greininni og skoðaðar mismunandi nálganir og útfærslur í tengslum við stefnu, skipulagi og þær aðferðir sem notaðar eru.

### Keywords:

Distributed learning, information and communication technology (ICT), remote areas

## Introduction

Information and communication technology opens new possibilities for establishing learning communities with participants who are dispersed in various locations and makes use of distributed resources. Being able to access information from everywhere and communicate with others irrespective of where they are widens the potential for learning and can create new forms of communication between teachers and learners, among students and between educational institutions.

Through the ages people living in remote areas have had to face the limitations that distributed habitation and distance pose for learning. Travelling teachers, peripatetic schools, school dormitories and school bussing are all means that have been used to provide educational services in remote areas. On upper levels of the school system, in upper-secondary and higher education, students living in remote areas have had to move, often with their families, in order to pursue their education.

Educational services in small towns and in remote areas are often limited and it is difficult to provide enough variety and ensure quality. Schools have relied on few teachers that are responsible for teaching many subjects and who have had to remain generalists without specialising in any subject. Many innovative educational practices have developed under these circumstances. More than one cohort of students are taught together, especially in specialized subjects, emphasis is placed on problem solving skills, cooperation among students and drawing on resources in the local environment and the community.

There are many other instances where students are separated from educational resources and teachers and educational institutions are only able to provide limited services to learners. This is for example the case when students are away from a learning institution due to illness, work, family circumstances etc.

Distributed learning is one of the models for learning which makes use of information and communication technology (ICT) in order to make use of distributed resources to provide better educational services. In a distributed learning environment students can study away from the place of instruction and can choose between courses offered at more than one location. Similarly teachers are not tied to one teaching institution and a group of students located there, but are capable of teaching students who are situated in different places and available at different time periods.

While people may agree on the possibilities of the use of ICT and distributed learning, the extent to which use is made of these possibilities and how, varies between countries. Geographical and societal situations differ between countries and may be reflected in government policy. The organisation of educational institutions is in most cases not conducive to distributed learning. The role of the teacher and the structure of her or his work within the school are usually defined in terms of traditional class-room based teaching, the model for the financing education may either reward or punish them for adopting distributed learning. On the individual level there are different attitudes toward the use of distributed learning. New forms of education may involve teachers in different situations with extensive additional and different work for which they are not trained or prepared. Teachers see this development in different light and vary in their motivation to use the media creatively and maintain a high level of interactivity with the students to ensure good quality of education.

The position of students is also of interest. What are their attitudes, motivations and experiences of new technology and new teaching methods? What kind of technology do they prefer and what kind of service are they expecting from the educational system? Will we expect the students of the future to be more flexible in their study, and ask for more variety in the presentation of material and do they want education that is less bound to time and place?

The ICT League is a cooperation platform of the Nordic countries, the Netherlands and Canada in the area of ICT in education. In this paper the intention is to explore the situation of distributed learning in the ICT League countries and to examine their experiences with this form of education. In the first part definitions of distributed learning will be discussed, its different forms and how it affects the relations between teachers and students. In the second part of the paper exploratory case studies of distributed learning in Iceland, Finland and Canada are introduced.

## 1. Distributed learning

There are many definitions of distributed learning but in principle the concept refers to learning that makes use of distributed resources as Brownman states (1999) "[Distributed learning] ... allows teachers, students, and content to be located in different noncentralized locations so that instruction and learning occur independent of time and place".

Distributed learning has further been defined as a student centred approach, which uses the possibilities of new technology to offer opportunities for active learning and communication. This gives the teachers possibilities to adapt the learning environment to the user (student) to be able to meet the needs of different groups and has the potential to offer both high quality and cost effective education (Bates 1993).

Lea and Nicoll (2002) have suggested that distributed learning is concerned with:

- "the breaking down of traditional boundaries between face-to-face and open and distance education;
- the growth of new information technology as mediating means in distributed learning settings;
- changes in our conception of the ways in which learning and teaching are distributed across space and time;
- learning as a shared enterprise distributed between individuals in several different contexts;
- learning as distributed between diverse contexts and not tied to formal institutional settings;
- the relationship between the global and local contexts of learning" (p.2).

In distributed learning an emphasis is placed on extensive use of the ICT and the Internet with focus on the student, not on the teacher, and on communication. It promises to change the traditional teaching bound to the lecturer and substitutes text books with a variety of e-material, multimedia and interactive material and connects the learning experience to the world outside the classroom. The distributed education model can be used in combination with traditional classroom-based courses with traditional distance learning courses, or it can be used to create a wholly virtual learning environment. In the traditional model, an institutional organization or function is at the center as Figure 1 shows, the student must move from place to place or person to person when pursuing his/her education.

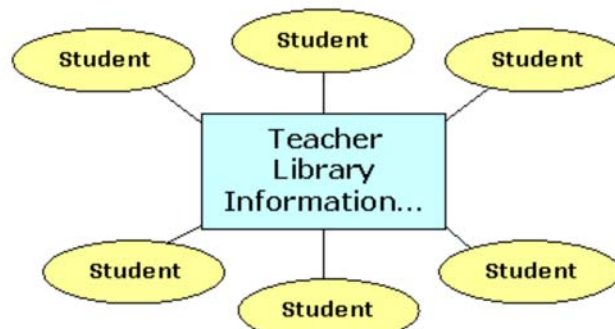


Figure 1. A traditional learning model

In the distributed learning environment the student is at the center, with flexible access to teachers and resources as Figure 2 shows.

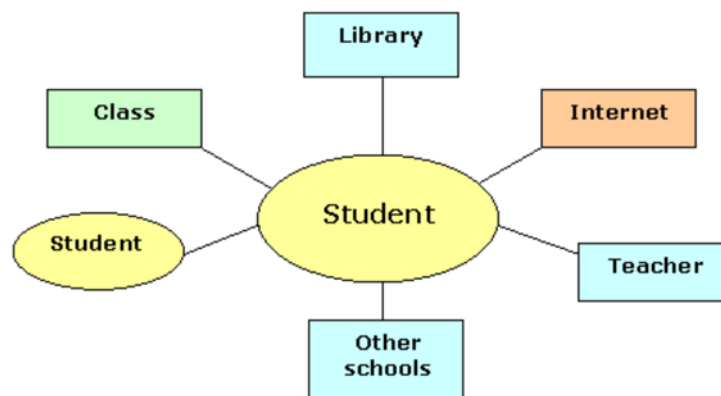
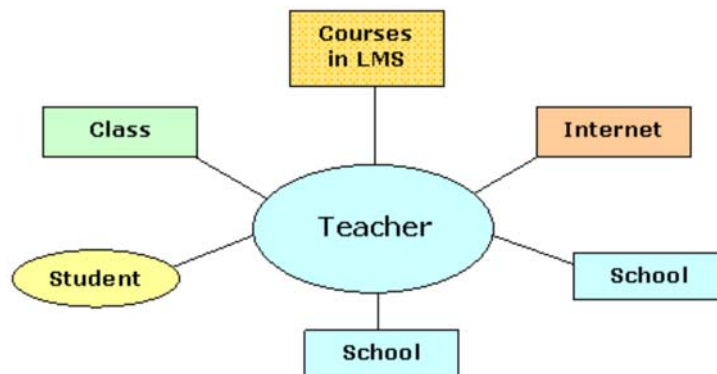


Figure 2. A Distributed Learning Model

Figure 2 implies that instead of the student having to move from place to place ICT can help bridge the geographical distance between him/her and the teachers, other students, libraries and so on.

Figure 3 focuses on the role of the teacher in distributed learning. In it teachers can develop courses for different locations and contexts. The teacher is not confined to one institution, but can f.ex. make use of learning management system (LMS) and communicate with students and other teachers in different locations through the Internet.



**Figure 3.** The Role of the Teacher in Distributed Learning

Distributed learning can be used as means to **course enhancement**, **hybrid delivery** or as a **virtual learning environment**. (Bowman, 1999).

Distributed learning as *course enhancement* can mean embedding new instructional technologies in traditional classroom settings to enhance localised learning. This includes posting course material on the web that is used during class and students can also access this material outside the classroom. This can make learning less dependent upon time and location and allows students to go through teaching material at their own pace, but the material and delivery is confined to one institution.

The *hybrid model* represents a more advanced distributed learning implementation. At this stage delivery is not tied to a particular place or classroom and more flexible use is made of time. Both teachers and students can be dispersed in different places, but it is assumed that they have one central location for learning and teaching.

At the *level of virtual learning environment* distributed learning has realized the principle of "any time, any place at one's own pace". Learning is independent of time and place and different students access the material from various locations and at different time periods.

The distance aspect of distributed learning can be viewed as coinciding with the use of technology to mediate distance between students and teachers. Hanna (2000) proposes the following three categories to represent the movement from teacher centred to a student centred approach and how it relates to the use of technology:

1. A vague use of technology and two-party transactions between a learner and a teacher. The communication between learners is rare but a close relationship may be established between the teacher and the learner as the teacher is the primary source of all information relevant to the students study and the education is very teacher-centred. Use is made of e-mail, telephone, video-cassette, audio-tape and even odd web site.
2. The second category is based on more extensive use of technology to extend the classroom situation to gain wider group of students. The emphasis is still on teacher-learner relationship but learner-learner communication is more often seen, although the emphasis is nearly exclusively on the use of technology to distribute material. Here we see the use of e-mail and other possibilities as before but also all kinds of television and video opportunities. The technology or the Internet is mainly used to distribute the material but the situation is still teacher-centred.
3. The third situation is characterised by a wider use of online opportunities with the Internet as the main source of information and communication. Communication systems are not only used for sending material but also for discussions and learning systems to build a learning community with simple accesses to educational resources. Here the technology can be used to change the teacher-learner situation and build a more learner centred situation as the teacher is offering learning environment for the student to work in. The environment can offer the student to relate to other learners, to the teachers and available information as well as relating with the learning experience (Hanna, 2000).

### Issues for the Future Development of Distributed Learning

The processes that shape the development of distributed learning vary between countries. One process is the technological change that allows for the provisions of content and affects communication between those involved in education. Related to this are issues related to the organization of teaching and learning, the role of teacher in distributed learning and his relationship to the school, the technology and students. There are also issues that relate to the individual, the attitudes of students and teachers, their motivations and experiences of new technology and new teaching methods. New forms of education may involve teachers and students in different situations and with extensive additional work, for which they are not trained or prepared. The role of teachers and students and the way in which they have adapted to the new situation is a matter of interest and concern. Finally there are societal issues, and political processes that relate to educational policy pursued by the government and the resources provided for distributed learning.

The Following Questions Concerning Distributed Learning are Proposed for this Paper:

- What is the situation in different countries regarding policy and the adoption of distributed learning?
- How is distributed learning organized in terms of the role of the government, exchanges between schools, course offered, financing, curriculum and support services?
- What methods are mostly used for teaching and supporting the students in distributed learning?
- What are the attitudes of teachers and students toward distributed learning
- What learning and teaching styles are most successful and supporting in this form of education?

In this paper these questions will be addressed by reflecting on the experience of distributed learning in Canada and the Nordic countries. The main focus will be on the primary and secondary education levels. Particularly the emphasis is placed on the hybrid model where students and teachers are situated at in the same location, but make use of distributed resources and distance education methods.

## II. Examples of Distributed Learning in Finland, Iceland and

## New Brunswick, Canada.

### Distributed Learning in Finland

#### By Ella Kiesi

In the national research and education information strategy 2000-2004 drawn up in 1999, distributed learning was set as one of the most important objects for development in Finland. The purpose was to embark on rendering traditional teaching more flexible and diverse, making education more readily available also in sparsely populated areas and on providing small educational establishments with opportunities to offer a wide range of courses in collaboration with other educational establishments. These plans formed the basis for setting up the national virtual school project, the primary aim of which is to promote distributed study, but also generally the introduction of information and telecommunications technology in Finland's schools. The project has been carried forward purposefully for more than three years now. The universities and polytechnics are also engaged in equivalent development projects.

### Upper Secondary Education for Adults

Virtual education in schools was developed on the basis of the Distance Upper Secondary School Project launched in 1997, which has continued to this day and is now entering a consolidation phase. The Distance Upper Secondary School seeks to meet the need of adults in working life for taking upper secondary school studies which they lack or for continuing uncompleted studies. People can study at the Distance Upper Secondary School by enrolling at one of a hundred educational establishments. Distance tutoring is provided by almost all adult upper secondary schools. A personal curriculum is drawn up for each student. Studies can, for example, be taken entirely by means of distance learning, but students can also have access to face-to-face teaching if necessary. To support study, a sizeable body of different study material has been compiled for almost all upper secondary school courses. The material comprises not only textbooks but also radio tapes and television programmes produced by the Finnish Broadcasting Company and web-based learning material produced by the National Board of Education. In addition, tutoring is carried out using various learning platforms in accordance with the choice made by the school. Study is free-of-charge for the student taking an entire qualification. The school receives the normal adult student's state subsidy for a pupil studying by means of distributed education. The school levies a charge from students taking individual courses. In total, there are now approx. 3,500 adult students engaged in distance studies and several hundred of them have already matriculated with grades that are just as good on average as those obtained by traditional students.

### Vocational education

Similar decisive development work has also been carried out in vocational education. Twenty networks for various vocational fields have emerged in vocational education for young people. Approximately eighty educational establishments, i.e., about a third of the total, are involved in development work. In addition, there are around ten networks at over twenty educational establishments in vocational education for adults.

No attempt has actually been made in vocational education to create opportunities for taking complete qualifications by means of distributed learning, since face-to-face teaching is also always required for learning skills. For example, the possibility of taking a minimum of two credits (study weeks) by means of distributed learning in each field has been set as a goal of vocational education. However, the quantities will vary between different fields, since distributed learning is better suited to some fields than it is to others. The greatest progress has been made in the development of courses in economics in educational establishments situated in Eastern and Northern Finland. There, distances are greater and the educational establishments are smaller than in the South of Finland.

### Upper secondary education for young people

The size and location of educational establishments also appears to be of significance whenever methods and materials developed at the Distance Upper Secondary School start being applied in upper secondary school education for young people. Small upper secondary schools with fewer than a hundred students account for approximately a quarter of the 450 educational establishments in Finland. These are also generally located in areas where the population is declining due to migration. That is why many of these upper secondary schools are networking with each other or with adult (distance) upper secondary schools, in order to be able to continue to provide their students with an adequate range of courses, for example, acquired or exchanged at a distance from another educational establishment.

### Primary education

There are also similar needs in basic education. In that sphere, we have numerous pilot projects underway, both in the archipelago municipalities and in the small municipalities of Northern and Eastern Finland. For example, teaching of the optional language (French, German or Russian) that begins in the third and fourth forms has been arranged in the form of distance tutoring in several projects on a trial basis. Almost a hundred schools from different parts of Finland are involved in a literature teaching project. However, similar networks, in which co-operation would already have been established and in which joint national services would be created, as now happens in post-comprehensive education, have not yet emerged on the primary school level.

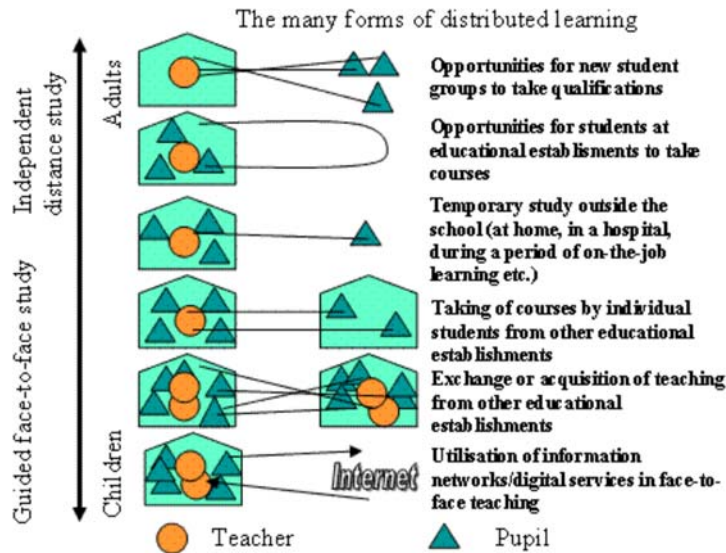
### Development work

Development work in distributed learning is taking place in Finland on a very broad front. More than a thousand educational establishments, i.e., about a quarter of the total, are involved in state-supported projects. In post-comprehensive education, the ratio is greater and in basic education smaller. The switch to distributed learning and study does not take place automatically. Those who have made the greatest progress have several years of development work behind them. They have started by updating teaching methods and learning to use new tools. This has called for teachers' career training, trials and development lasting several credits (study weeks). Researchers have also been involved with the educational establishments in developing counselling and tutoring models. For example, a dialogue teaching and learning model was developed for the needs of post-comprehensive vocational education. Gradually,

teachers are switching to planning new kinds of learning materials suitable for these methods. At present, various learning objects that are suited to both traditional learning and distributed learning under a teacher are being developed. Training for those producing the materials has also expanded as the projects have progressed.

The next challenges are to determine how costs are to be reimbursed and who is to pay when pupils are given opportunities to take studies from educational establishments other than the one where they are enrolled. After all, the objective would be for students to be also able to choose flexible studies from other educational establishments, if the courses which they want are not available at their own establishment. After all, this is often the situation specifically in small educational establishments. Up until now, the situation has usually been resolved by the educational establishments exchanging courses or tutoring evenly.

The following picture shows the possibilities for the development of distributed learning with different relations between teachers, students and schools.



**Figure 4**

#### Distributed Learning in the Francophone Sector in New Brunswick

**By Jacinthe Robinchaud**

All of the online courses offered to date have been optional grade 11 and 12 subjects and favour open pedagogy and student-centred learning, benefiting from a variety of pedagogical strategies and blended learning approaches. By 2005, 20 courses will have been developed for students. Four other courses will be professional development courses for teachers in the public school system. (see: <http://cllc.nbed.nb.ca/>)

These learning opportunities were made possible by a partnership with the IDITAE team at the Université de Moncton (<http://eformation.umoncton.ca/>). The pairing of experienced teachers and content experts with IDITAE expertise (instructional design, project co-ordination, etc.) results in a high-quality course from an instructional point of view, with the added power of multimedia.

It should be pointed out that human interaction and educational support for student learners are important factors in the growth of this initiative. By choice, these courses are not self-directed. Distance education teachers can rely on assistance from a distance education facilitator in each participating school. Moreover, distance education teachers meet with the students at the beginning of each semester to help create an even better learning environment. Also, teachers are able to plan their teaching judiciously because a variety of activities are available, both synchronous (via Interwise or NetMeeting) and asynchronous (using Theorix). It should be noted as well that the New Brunswick Department of Education provides training for all distance education facilitators on the teaching staff of the schools so that they can play a major support role, as much for the distance education teacher as for the students in their schools.

The majority teach half-time online and the other half-time in face-to-face classes at their own school. The role of the local facilitator is extremely important. This person works in concert with the online teacher, supporting the student locally. Enrolments are on the rise (having more than tripled in 2 years) and the inherent challenges are keeping all of us on our collective toes! This is why we feel an almost visceral need to have feedback from the learners, the teaching personnel and if possible, the community. It is this feedback which enables me at this time to speak to you about the following elements previously identified.

#### Who takes online courses and what do they learn?

The students who take these courses do so by choice. They need or want to take Spanish, or Law or Advanced Physics; they aren't "forced" into a course and school administrators do a great job in assisting students in their selection. Typically, the students are academically strong, but two things should be emphasized: their school, which is often quite small, cannot offer as great a range of optional courses as can a larger school. The availability of online courses thus serves an extremely commendable principle of equity of access. Also, it provides a means for these students to prepare themselves for a smoother transition to their postsecondary studies. One student said to us: "I find that this experience has prepared me well for university. I feel ready to enrol in online courses and am more confident with respect to my studies."

These students indicated to us they find there are several benefits in taking a course online. However, in the comments collected, one factor arises very strongly: the TEACHER makes all the difference! Yes, they like the activities, great interactive animations, etc. but above all, they appreciate the human being at the other end, his passion, his engagement, his diligence and even his requirements. Not surprising then that they learned as much as in a course delivered in a classroom setting and some learned even more:

increased oral communication skills, greater ease with Office tools such as word processing, spreadsheet and presentation software, better sense of personal organization and others. I will come back to this point at the end of this text.

### **What are the teachers, the school administrators and parents saying?**

It is important to distinguish between two groups; the teachers, administrators and parents of the participating schools and those of the other schools which have only started to consider this mode of delivery. Without trying to give you the impression that all is beautiful and rosy in the schools which offer online courses - because there are always teaching, administrative and technical challenges - I would like to share with you three comments, which are, in my opinion, representative and vivid.

From an online teacher: "To my great surprise and rather quickly, I realized that my virtual classroom was almost the same as a traditional class ... It is possible, even at a distance to establish a good student-teacher relationship, a relationship which is so important to student learning."

From a principal: "Thanks to the online courses, I can offer choices to my students, especially in the 2nd semester. Before, they had all their credits for their diploma by Christmas; they went to work at the mill and I didn't see them again until the prom in June."

From a parent (during a virtual parent / teacher meeting): "At the beginning, I wasn't too sure about my daughter taking a course online, but having seen her working on it and talking about it so much at home, I'm happy with her choice and I congratulate the school for having suggested it to her."

For teachers in the nonparticipating schools, it's primarily a demystification of online learning that is needed (and this is already underway). What usually follows is a reaction of relief ("I thought it would mean job losses"...), often accompanied by a great curiosity about learning objects and online activities ("How will I be able to have access to your courses online and to use them with my pupils?") Progress is slow but steady...!

I believe firmly that the return on the significant investment made by the Department of Education in this adventure must be measured above all in successes (read: learning) of the students who benefit from it... As much in advanced concepts in mathematics or learning a 3rd language as in the attainment of trans-disciplinary learning outcomes which will be so useful in the lives of young New Brunswickers. This is so they can acquire the necessary qualities to become lifelong learners in order to develop fully and to contribute to a changing, productive and democratic society.

### **Distributed Learning in Iceland**

Iceland is a sparsely populated country with a population of 285 thousand living in an area of 102 thousand sq.km. With changes in the economy and stronger emphasis on education, a growing debate has arisen in the country on how to provide educational services in remote and sparsely populated areas. The model of distributed education has been adopted in government policy with emphasis on providing equal access to education and making use of distributed resources.

The government has in recent years worked to develop infrastructure for distributed learning by developing high speed networks, teachers training in ICT and variety of services that will be joined in an educational portal (<http://www.menntagatt.is/>). Many of the issues that have to be faced when expanding distributed education are organizational and also concern the social aspect of learning. This is particularly important as it relates to the different age groups of students. The implementation of the policy on distributed learning has been based on encouraging and supporting initiatives by schools and communities, but a centralised organisation and coordination has not been practiced.

### **Upper-secondary level**

Distributed learning on the upper-secondary level has evolved out of the distance education model, but more recently also as an extension of a class-room based teaching.

The number of students enrolled in distributed learning has increased by 560% between 1997 and 2002. The most significant increase occurred in part between 2001 and 2002 where the number increased from 795 to 1537 or 93%. It is estimated that the largest part of this increase is due to students taking distance learning courses with regular class-room based study and that this group now constitutes one third of the total number of students engaged in distributed learning.

The history of distance education with use of computers in Icelandic upper-secondary schools dates back to 1994 when Verkmenntaskolinn in Akureyri started offering distance learning courses. At first only two courses were offered with the use of e-mail, but today 155 courses are offered and students can graduate through distance learning. The development of the use of technology has been slow and the majority of courses are electronic correspondence courses, but a few have been developed with more advanced use of technology. The main emphasis in distance education has been on small student groups and close relationship with the teacher with the use of weekly teaching letters and weekly responses from the student. The approach is teacher-centred and based on vague use of technology to distribute material. The close teacher-learner relationship has, however, had good effects on the drop-out rate which is about 20-25% and is considered rather low for a distance course.

A different approach has been developed in another upper-secondary school. It now offers not only courses during the two winter semesters but also summer courses. A learning environment on the Web is provided and the student has a choice when to attend without much interference from the teacher. The teaching has therefore moved from being teacher centred to being student centred and the makes more advanced use of technology. The main problem has been student dropout, which has been about 60%.

The main emphasis seems to have been on getting the students to work outside the classroom both individually and in groups and e-mail or a learning management system is used to communicate with the teachers. Some schools seem even to call all project work outside the classroom distributed study. Sending out projects to the students and getting them back for evaluation was in the beginning the main work of the teacher but as both teachers and students become more familiar with the system they make more use of the technology for communication. It can be said that distributed education is aiming at more learner centred education with the teacher as a mentor or tutor for the student.

Three upper secondary schools in the East of Iceland have set up a joint project where each school specialises in a certain subject area and then teaches that subject to the students in other two schools. The

schools primarily use the video conferencing medium, but up to 20% of each school's courses are taught long distance.

### Development work - Distributed learning school

On the upper-secondary level for three years there has been an ongoing project of distributed education in the municipality of Grundarfjörður on the West-Coast of Iceland. There 14-20 students have been taking regular courses for the first two years of upper-secondary school. The regular course offered is provided via distance teaching by Verkmenntaskólinn in Akureyri. The Municipality of Grundarfjörður provides facilities for the students with computers and study room and a teacher to assist the students with their studies.

This programme of distributed education at the upper-secondary level has been successful in that almost half of each cohort in the municipality stays for their studies. Also older people who have not finished their upper-secondary education have used the opportunity to go to school the municipal school. This programme has been gradually expanded and students now take distance courses from more than one school. Now preparation is underway in establishing a formal upper-secondary school in Grundarfjörður with teachers that are able to teach locally, but would also offer courses to other schools via distance teaching.

### Compulsory level

A project of distributed education on the compulsory level (age 6-15) is now being developed in remote areas on the Vestfjords on the North-West coast of Iceland. In one municipality there are three widely dispersed compulsory schools serving small populations. Communications during the winter are difficult with mountain roads and bad weather conditions. A project has been initiated to connect the compulsory schools with a high speed network and make use of ICT to implement a hybrid distributed learning model. The purpose of this project is to:

- Increase the quality and variety of educational offerings by developing "co-teaching" and distributed learning between schools in the community.
- Test methods of distributed learning that can benefit other schools in remote areas.
- Increase efficiency in schooling by establishing cooperation among schools.
- Adapt students to distributed learning methods so that they are better prepared to continue their studies on upper levels of education in their home town.

### Continuing education centers

Based on the initiatives of municipalities in different areas and with government support nine continuing education centers have been established in different regions across the country. These centers have served mainly distance education at the university level and continuing education in general by providing technical, organisational and social facilities, such as videoconferencing, recruitment of students, support and opportunities of group work. There are now plans to expand the role of the continuing education centers so they can serve as university education centers with expanded facilities for both students and professors and tied to research activities. Services of the continuing education centers for upper-secondary education are also being developed.

### Analysis

At the outset of this paper several questions were posed regarding distributed learning in different countries. They will now be addressed with reference to the examples from the three countries outlined above.

- *What is the situation in different countries regarding policy and the adoption of distributed learning?*  
Both Finland and Iceland have in their government policy a strong emphasis on distributed learning. Finland is implementing this policy in a systematic and way and with strong government support, but in Iceland a greater emphasis is placed on the initiative of individual institutions. In francophone sector of New Brunswick the government has initiated a development of distance courses and engaged teachers to provide services to small schools.  
Of the three countries distributed learning seems to be most widely adopted in Finland. There networks of schools have been established and programmes have been run for adults, on the secondary and primary level of education. In Iceland the number of students engaged in distributed learning has increased rapidly, but they are mainly confined to two upper-secondary schools. In francophone New Brunswick several courses have been developed for optional 11 and 12 grade subjects and the enrolment has more than tripled in three years.
- *How is distributed learning organized in terms of the role of the government, exchanges between schools, course offering, financing, curriculum and support services?*  
In both Finland and francophone New Brunswick the government has taken an active role in developing courses for distributed learning. Specialised agencies have been engaged to develop courses, content and pedagogical methods. In Iceland the government has promoted distributed learning, but the schools have largely been responsible for developing courses in this area. The government has worked on developing a new upper-secondary school based on a distributed learning model, but it is foreseen that the school will develop its course offered by itself in cooperation with other educational institutions.  
In all the countries exchanges between schools are important in the development of distributed learning. Finland has purposefully worked on developing networks of schools to exchange distributed learning courses. In Iceland upper-secondary schools in one region have established a network among themselves in order to exchange courses. In francophone New Brunswick distributed learning courses in optional subjects are offered directly from the government to individual students in rural schools.  
In terms of the curriculum both in Finland and in the francophone New Brunswick courses in specialised (e.g. vocational studies), advanced (e.g. advanced physics) or optional (e.g. languages) have been developed for distributed learning. In Iceland, and to some extent Finland, a wide range of courses have been developed for distributed study on the upper-secondary level in order to fulfil the needs of adult learners and to create flexibility (e.g. in length of schooling) for regular students. The financing of distributed learning courses has been based on even exchanges of courses

between schools (Finland and to some extent Iceland), government paying directly for development costs and to some extent the running of courses (Finland and francophone New Brunswick), and including distributed learning in the regular financial model of schools (Iceland). As mentioned in the chapter on Finland "...The next challenge is to determine how costs are to be reimbursed and who is to pay when pupils are given opportunities to take studies from educational establishments other than the one where they are enrolled."

- What methods are mostly used for teaching and supporting the students in distributed learning?*

In New Brunswick francophone pedagogical methods and course content have been developed specifically for distributed learning by experts. Both synchronous and asynchronous methods are used and courses are developed into a learning management system. A great emphasis is placed on the interaction between the student and the teacher. A distance education facilitator is engaged at the school where the student is studying.

In Finland a sizeable body of different study material has been compiled for almost all upper secondary school courses. Methods and content are also developed within the networks of schools and use made of both synchronous and asynchronous methods.

In Iceland teaching methods for distributed learning have emerged out of distance courses as well the extension of class-room based courses. Video-conferencing is used along with learning-management systems. Most of the development work has been de-centralised in the schools and by individual teachers and the methods and the content vary between institutions.
- What are the attitudes of teachers and students toward distributed learning and what learning and teaching styles are most successful and supporting in this form of education?*

From the survey and responses quoted in the francophone New Brunswick example there seems that both students and head-teachers of the schools receiving distributed learning courses are pleased with the services. They welcome the added variety of subjects made available through distributed learning and the opportunities for further study. A great emphasis is placed on the interaction between students and teachers. Support from the school where the students are studying is also of great importance.

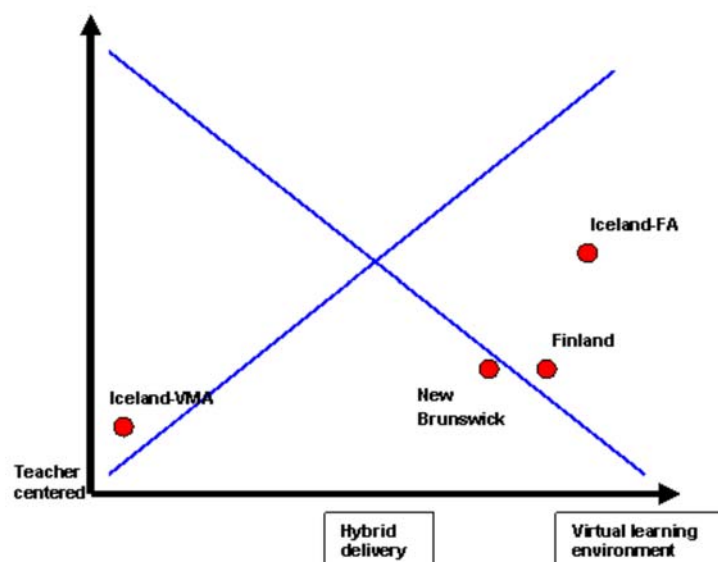
In Iceland surveys among students in distributed learning courses show that they are also pleased with the greater variety of courses offered and put high value on student-teacher interactions and regular feedback. There is a great difference in the drop-out rates between a school providing regular feedback through simple technology such as e-mail and another school providing structured courses and content in a learning management system. The former school has a drop-out rate of 20%, but latter as high as 65%. The Finnish example does not provide information about student or teacher attitudes in this paper.

## Discussion

An analysis of the examples of distributed learning in three countries shows that there are both differences and similarities in how the mode of learning has developed. In all three countries there is an emphasis on distributed learning as a means to provide better educational services in small schools in sparsely populated regions. This policy is, however, implemented in different ways with regard to the resources provided and the role of government. Both in francophone New Brunswick and in Finland the government takes a more active role in organising distributed learning courses. Finland has put emphasis on building networks among schools and the exchange of courses, while in Iceland individual schools have without any direct government support developed distributed learning courses.

The organisation of distributed learning seems to be based on the existing curriculum with an emphasis on expanding the variety of courses and enhancing the quality. The basic models of financing of courses have not been adapted to distributed learning.

The methods for distributed learning are not easily categorised in terms of teacher-centred vs. learner-centred approaches. It has been argued that distributed learning is learner-centred in that it places the student at the centre and places responsibility for learning on his shoulders. It is also claimed that it opens opportunities for interaction among students and for students learning from each other. Another aspect of the method refers to the mode of delivery as course enhancement, hybrid delivery or virtual. On the following graph in Figure 4 these two dimensions of methods are shown and an attempt made to map the two examples from Iceland and the Finnish and New Brunswick francophone cases along the two dimensions. It should be emphasized that this graph is a very preliminary attempt to represent the methods used for distributed learning in the three countries. It gives an indication that there are differences between the three countries and that there perhaps are no clear lines of development of methods for distributed learning.





**Figure 5.** Modes of delivery and teachers centred vs. learner centred approach

The two Icelandic cases differ much in their methods of delivery. One is basically a traditional distance teaching using a correspondence school method with the web used as course enhancement. The other Icelandic case represents a more virtual and learner centred approach, but little support is given to the student by the teacher. Both in Finland and in New Brunswick francophone the emphasis is on teaching in a virtual learning environment, but emphasis is also placed on interaction between students and mentors in home school or distance education centers.

There is no clear picture at this stage which methods are most effective in distributed learning. The type of studies, the age of the student and the context of studies will all affect which methods are best suitable. Further research is needed into the relations between learning context and teaching methods. It can be argued that any polarization between teacher centred and learner centred approaches is a simplification as the relationship between the teacher and the student will always be highly important in the learning process. A virtual learner centred approach is therefore probably unrealistic, but a tendency will be towards a hybrid model where the teacher formulates and shapes the course, but a more notice is given to the learning style and the context of learning of the students and interaction among the students.

The presentation of the examples of distributed learning from the three countries demonstrates that there are differences in approaches adopted by the three countries and that they are reflected in the policy, organization and methods used. A more systematic selection and analysis of examples is needed in order to further explain the possible causes of these differences.

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