

Distance Learning in the Education of Surveying Engineers

Aune RUMMUKAINEN, Finland

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SUMMARY

At Lapland University of Applied Sciences, land surveying education is provided both in fulltime studies and as multiform studies for those studying alongside work. The content of the courses is the same for both teaching methods, but the implementation is always considered separately. For the most part, multiform studies means distance learning, but students visit in the school a few times a year for classroom sessions lasting 1-3 days. These sessions involve studying things like the use of surveying equipment and computer software. At the same time, the students get to know each other and their teachers.

Distance learning means distance lectures, assignments and students presentations. The Lapland University of Applied Sciences uses the iLinc system for remote lectures. It can be used to display various materials to everyone and make speeches. At the same time, the participants can attend a chat session and post questions and comments. The students can also give their seminar presentations remotely. The distance lectures are recorded so students can return to them later. A fixed broadband connection is needed to give a distance lecture to ensure audibility, but wireless connection is enough to listen to the lecture.

The lecture materials are saved in the Moodle system. It also contains the assignments and the boxes for submitting them. Examinations can also be created in Moodle. Feedback on the assignments and examinations can be recorded in the system. In addition, e-mail is often used for student communications.

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1. BACKGROUND

Finland is a fairly large and sparsely inhabited country. The distances in sparsely populated areas are long. As society develops, some professions have become or are becoming obsolete. Indeed, the need for career changes has increased in the past few decades. Middle-aged and older people change careers for many reasons. The previous job may be ending or no longer interesting. Their studies may have been interrupted in the past due to starting a family, and once the children grow up, the parents have time to develop themselves again. Studies are also used to gain mental stimulation to balance boring everyday routines or serious, pressing worries.

Land surveying can be studied at Lapland University of Applied Sciences as multiform instruction while in employment. Most of the instruction is provided as distance learning. There are a few contact periods each year of up to three days at a time, from Thursday to Saturday. The contact periods focus on instruction on geographic information and IT, surveying technology practice and language instruction in English and Swedish. Students who study while in employment live in various parts of Finland (picture 1). Some of them have jobs that require travel in Finland or abroad. Some of the students have previous education or work experience in the field of surveying.

Approximately 25–30 bachelor's degree students start land surveying studies while in employment each year, and about 40 students start daytime studies at the same time (Laurila 2016a). Students can switch from daytime studies to multiform studies or vice versa, if they want. They can also complete a course in a different form than their other studies. Many daytime students who do a student exchange abroad complete a course as multiform studies during their exchange period.

In addition, a group of up to 20 master's degree students starts every other year. These students already have a bachelor's degree in surveying and at least three years of work experience as a surveyor in the field.



Picture 1. Students live in various part of Finland.

2. IMPLEMENTATION

The iLinc software is used for lectures in distance learning. Materials are distributed through Moodle, which can also be used to hold examinations and submit assignments. Email and other forms of communication are also used to keep contact. The distance learning includes many independent assignments, which are submitted to the teacher. Effort is made to connect assignments with the student's home region, job or hobbies according to his/her interests. When the students live in different parts of the country, the assignments feature many different examples from real life. They enrich the education. These days, the number of examinations is decreasing and, in some subjects, they have been completely replaced with assignments that are assessed.

The iLinc software and an Internet connection are required to hold a distance lecture. Lectures can be listened to via a wireless connection but holding a lecture requires a fixed broadband

connection with sufficient quality to transmit the sound, pictures and other materials. A USB headset should be used for speaking and listening (picture 2). As an alternative Madonna-microphone can be used, it is special wireless headsetsystem.

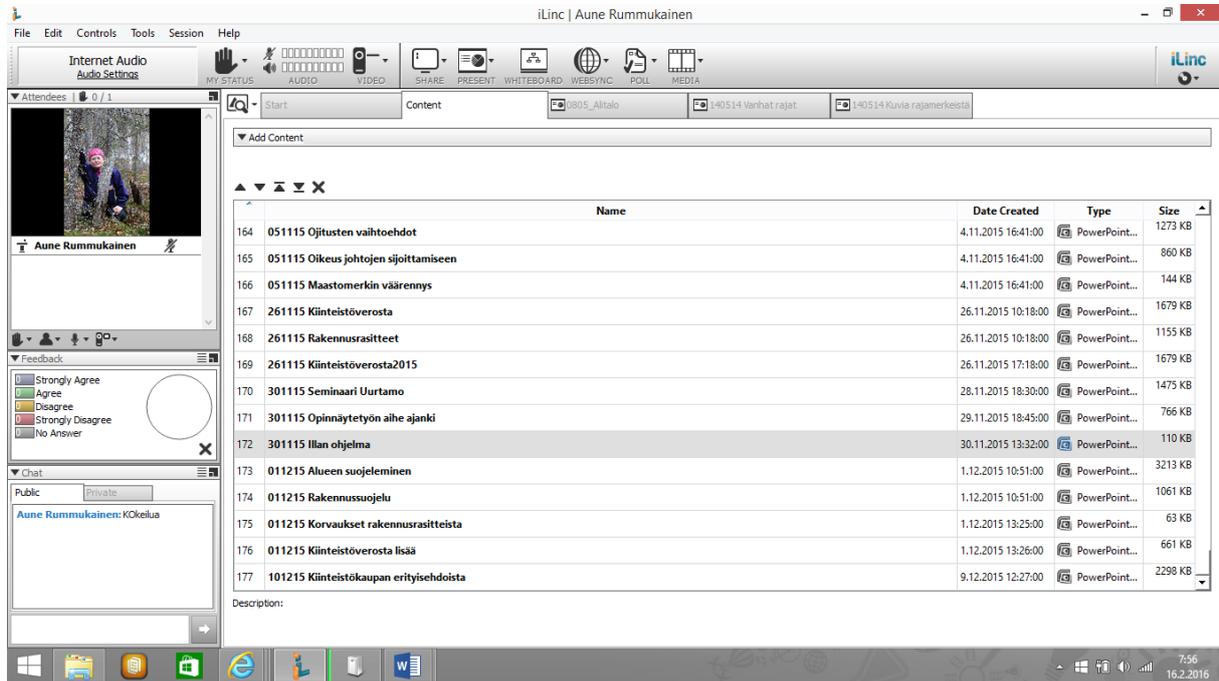


Picture 2. Distance learning lecture.

The iLinc software is compatible with Windows 7, 8, 8.1, Vista and Win 10. In Macs, iLinc is compatible with versions 10.7 and up; however, a Java installation is also required. iLinc is compatible with the most common browsers, such as Internet Explorer, Firefox, Chrome and Safari. iLinc is currently not compatible with iPad, Android or Chromebook. (Rousu 2016)

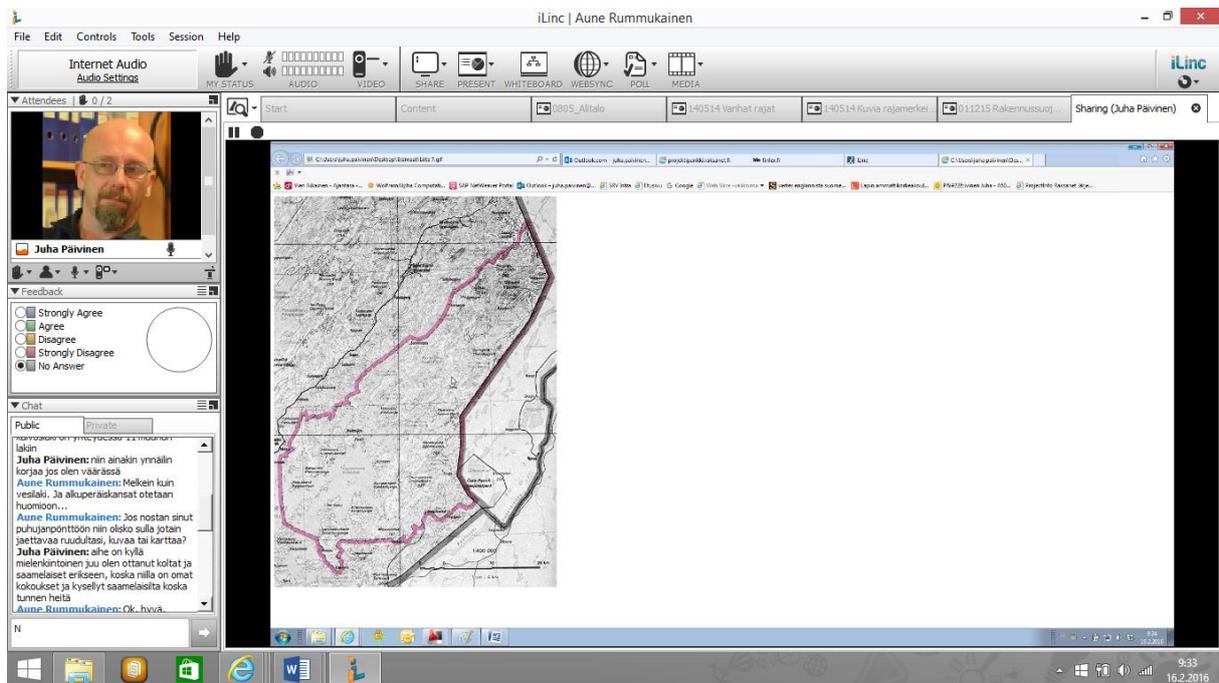
Distance learning services personnel are on duty according to the timetable to support distance lectures. In non-urgent issues, they can be reached by email, and they train students and lecturers in how the distance learning works. Each lecture has a dedicated distance learning service person. During lectures, that person follows the lecture and can be contacted by telephone. In case of technical issues, he/she can remotely control any computer on the user's behalf and solve issues.

Each lecturer has a personal, named workspace in iLinc. Special workspaces can also be established for student groups. The lecturer can upload the PowerPoint materials of lectures to iLinc (picture 3). All materials can also be shared from a personal computer, either by software or as a full computer screen. The lectures are recorded and so they can be reviewed later on as well.



Picture 3. iLinc content on lecturers workspace.

The students present their practical work and give seminar presentations in iLinc. The lecturer can also give students the floor at other times when the lecturer wants or upon request (picture 4).



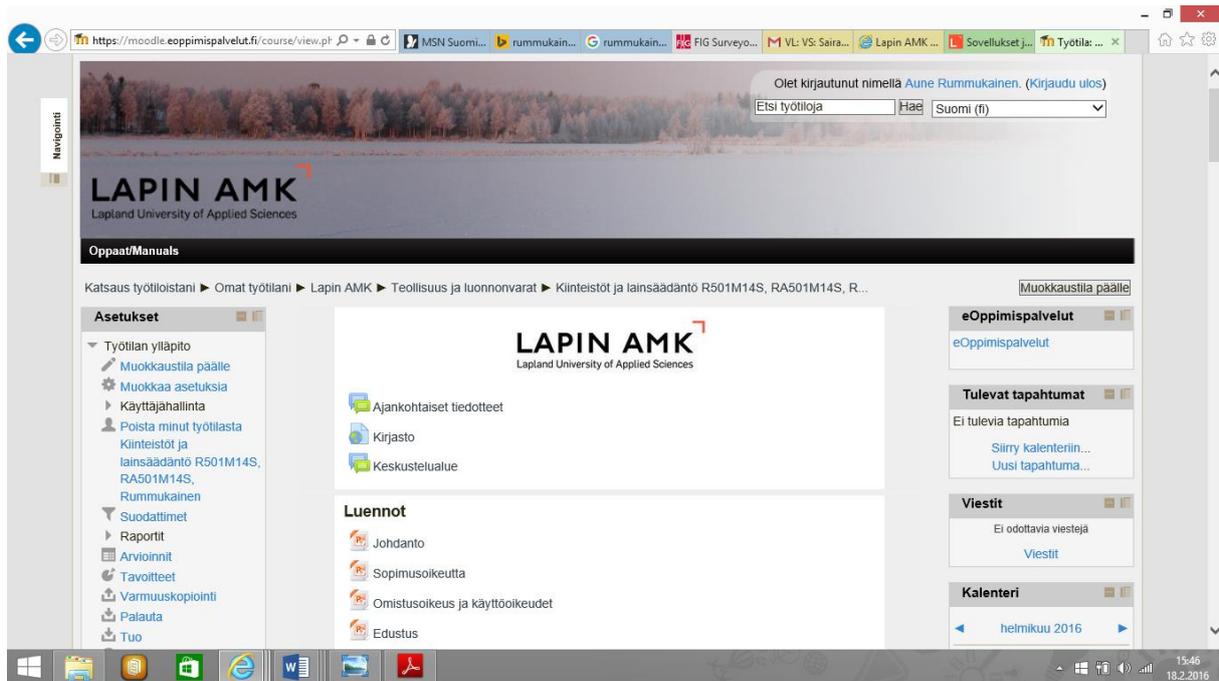
Picture 4. Student presents map by sharing it from his computer.

Furthermore, iLinc hosts chats during lectures and presentations. At its best, the discussion is informed and students actively write questions and comments. In addition, lecturer can make surveys and polls during lectures and answers he/she or all participants can see on their screens. Each participant can also upload his/her photo on iLinc, putting names to faces even during distance lectures.

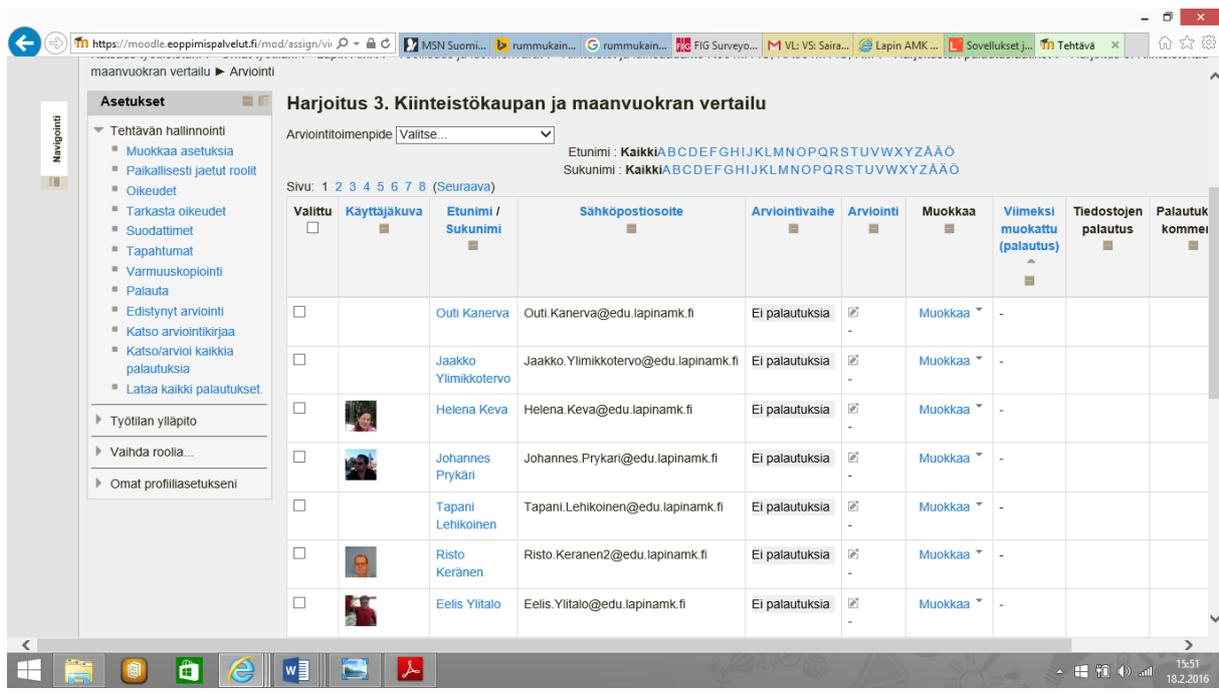
iLinc lectures can last from one to five hours. The lectures start in the evening, sometimes at 5 pm but most often at 6 pm. Long lectures include breaks. There may be time between lectures to complete independent assignments before the solutions are given. Students can be divided into groups for assignments. iLinc is also used for tutoring hours. For practical reasons, it is best to give the floor in turns; otherwise the discussion gets muddled due to the slight delay in transmission. Background noises may also disturb lectures, and the iLinc discussion may cause feedback or be heard as a sort of echo in the background.

Moodle is used as a database but also as a channel for submitting assignments. Lecture materials and supplementary information or links can also be collected in Moodle (picture 5). Timed examinations or assignments can also be created in Moodle. Usually, students can submit pre-assigned assignments at their own pace in special submission boxes, in which comments are also marked (picture 6). Comments can also be emailed to the student for information. On literature-based courses, synopses or assignments are submitted to the

teacher. Thesis are also submitted for comments in this way.



Picture 5. Scene of lecturers workspace in Moodle.



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Picture 6. Submission box in Moodle.

Most of softwares used in surveying studies students can use by remote access with Citrix-service. This includes AutoCAD, Mapinfo, ArcView, 3 D-Win and XpLocal. Trimble Business Center software is in students use only on campus computers. Things are same way with Novapoint used with AutoCAD to land use planning and modelling. (Laurila 2016b)

Mathematics and physics education, in particular, uses a Epson smart projector, which helps calculations progress in real time during a lecture. Smart projector enables same time teaching inside the classroom and distance teaching, which is not practically possible to do same time by other ways of teaching. Using smart projector Madonna-microphone is useful because of ergonomics. Using it lecturer can move freely during lecture and work while sitting or in a standing. For teaching mathematics and physics following softwares are used: Geogebra, Microsoft Mathematics, Maxima and Mathematica. (Torvinen 2016)

3. THE FUTURE

There seems to be plenty of interest in studying while in employment even though the workload requires a lot of perseverance from the student. However, a lot of attention should be paid to the quality of lectures in multiform education because the students want to learn things that are useful in their future profession, and adults already possess a variety of skills. These students often have questions about the subject, and they also want to have their questions answered, sooner or later. They may also have requests about the contents of lectures.

Any disturbances in broadband connections detract from the quality of lectures. Some disturbances do occur. The file size of materials that can be uploaded to iLinc is limited and it cannot take most maps; maps should be shared directly from the lecturer's computer. There is a maximum amount of lecture materials that can be uploaded to iLinc, after which it will not allow any more uploads. As for Moodle, the Java software installed on the computer impedes the transfer of compressed folders to Moodle. The distance learning service works well and is extremely useful because there are occasionally issues with lectures or with student presentations or sound, and the service can provide immediate assistance.

Master's degree studies in the field of land surveying has been organised at Lapland University of Applied Sciences every second year. In these studies, the needs of the surveying field are in subjects specific to the field, such as land use planning, surveying, legal matters, cadastral surveying and modern surveying technique. It is a general goal of Lapland

University of Applied Sciences to have master's degrees be degrees in management and development. For this reason, the master's degree studies in the field of land surveying may be discontinued in the coming years. This would be unfortunate because the programme is the only one of its kind given as multiform studies in Finland. The students have also been very motivated to study.

Distance learning might be a way to make the field of land surveying in Finland more international. There is, after all, very little surveying education available in English. Distance learning would also enable co-operation and student mobility between educational institutes. For lecturers, distance learning offers opportunities to work remotely. When the students study remotely, the lecturer can also work from home, for example. Specialists from private companies, municipalities and state organizations can be easily used as lecturer by remote access systems. Thesis principals can follow thesis seminars too from their own offices.

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