UNIVERSITY OF GOTHENBURG
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LOG TIMBER EDUCATION IN SWEDEN

National assessment 2013-14

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1. ABOUT PRO LOG

Log building has been a dominant construction technique and uniting peoples in the Nordic-Baltic region at least for a thousand years. Nevertheless, log building has not succeeded in developing a consistent educational sector and forum for development in the field. The research, teaching, protection and development of log building is scattered between organisations dealing with building conservation, folk art, industrial log manufacturing, forestry etc.

The objectives of the project PROLOG are to build up a Nordic-Baltic cross-sectorial interdisciplinary network of stakeholders concerned in the development of log building education; to create a comprehensive report of the background, current situation and future of the field; to generate user-driven input for planning and evaluating log building training; to work out and test innovative ideas for log building education and to draw up an integral vision for the socially and economically sustainable future development of the field. The activities of the project include national assessments, participatory fieldwork and an analysis of the results in a synthesis report. The resulting new ideas will be tested and reflected on in workshops and pilot courses, and further actions will be planned. The results include a network of stakeholders in log building education in the Nordic-Baltic region; synthesis report of the history, current state and future possibilities of the field; and new methods in log building education.

The project is funded within NordPlus and run in cooperation between:
- Seinäjoki University of Applied Sciences (Finland)
- University of Tartu (Estonia)
- University of Gothenburg (Sweden)
- Oulu Vocational College (Finland)
- Ergli Vocational Secondary School (Latvia).

2. PREVIOUS REPORTS AND RELATED PROJECTS

Many previous surveys have been carried out to review the situation and analyse threats and possibilities concerning small craft-based enterprises. The specific need to transmit and develop skills in log timbering has been advocated mainly by the field of heritage preservation and building restoration. However, during the last decade, the commercial production of log-timber houses has developed. A driver in this process has been the National association for log timber manufacturers (Föreningen Svenska timmerhustillverkare). The association was established in 2000 and have run several development programs. The presentation of previous reports and related projects follows a chronological order, at the first section focusing the projects within heritage preservation and building restoration, secondly projects related to log timber manufacturing companies.

In 1981 the National Industrial Department (Statens Industriverk) investigated the situation of traditional crafts for the needs of restoration of historic buildings in “Hanverk. Produktion med tradition” (SIND 1981:2). By this time neither traditional nor modernized log timber techniques was represented in the curriculum of the national building program in upper secondary school. The timberman vocation and education has fully adapted to the required skills of modern building industry concerning wooden construction techniques. The investigator proposed the establishment of a national building center in Karmansbo in Västmanland for education and training in traditional techniques and materials. The proposal was not faced with recourses or capacity building. A proposal to develop a specialized program for traditional building crafts and restoration within upper secondary school was dismissed by the building trade. Although two buildings centres in Karlsborg and Gotland were established in response to the concept of the SIND investigation. Both these centres were linked to the long term restoration projects with the castle in Karlsborg and the City wall of Visby. Both projects involved mainly masonry skills, and developed as specialized construction firms rather than educational centres.
In the beginning of 1990, the curator Lars Sjöberg at the Swedish National museum initiated a cooperation with IKEA producing reconstructions of 18th century furniture in crafted wood. In 1994 Sjöberg and the log timber firm Delsbo timmerhus presented a reconstruction of a 18th century log timbered manor house “Sörby” origin from Närke. The projects were highly appreciated in media, and Sjöberg developed an education program in furniture making, Träakademien, in Kramfors, to transmit and develop skills in wooden furniture making.

In 1999 a commercial development project resulted in the log timbered design-house “Vistet”. The house was designed by Anders Landström, Tomas Sandell and Bertil Harström and was displayed at the housing exhibition in Helsingborg. The house appears in a small and a larger scale, both has been produced for private market in small scale.

In 1994-96 the National Heritage Board run a program to enhance Traditional knowledge for contemporary building production, “Tradition och byggnadsproduktion” (RAÄ 1996). The funding aimed at reducing unemployment, and the program supported many restoration projects that combined education for unemployed construction workers. Several projects concerned traditional log timber techniques. Three projects resulted in more permanent educational programs: the establishment of Qvarnarp Byggnadsvård, Dacapo Hantverkskola and Bygghyttan in Mälsäker. The basis for these educations was very different: Qvarnarp dwelled a municipal educational structure, Dacapo established in a new program for Higher Vocational Education and Mälsäker depended on unemployment education funding. Unfortunately, the very refined timber education at Qvarnarp has not been documented, passed on or developed in other structure. Mälsäker is also shut down but the education at Dacapo exists, now in cooperated in the Department of Conservation at the University of Gothenburg.

In 2000 the regional museum of Jämtland, Jamtli, established a “knowledge centre” for log timber techniques named “Timmerdraget”. The centre was involved in various restoration and training activities, as well as in research on building history and development of modern log timber buildings. The centre run a long-term project on traditional north Swedish log timber buildings in cooperation with five county administrations in the north. The project “Det nordsvenska timmerhusets konstruktion” was trans-disciplinary formatted with professional timbermen, architects and conservationists that worked toghether with documentation and analysis of log timber houses. Another development project was “Wooden Culture” within the European Culture program. The project aimed at exchange of experiences in traditional log timbering. A restoration workshop was set up en each of every participant in Lithuania, Poland, Finland, Romania and Turkey. Timmerdraget was unfortunately closed down by 2004 when running out of project recourses and local support.

In 2001 the medieval church Södra Råda burnt to the ground in an act of pyromania. The church had a corner timbered structure dating to around 1309 and world famous wall paintings from 1323 and also later paintings from 1494 by Master Amund. Among Sweden’s 3400 churches and chapels, only ten medieval corner timbered churches remains. Hence, the Swedish national heritage board initiated a process, still on-going, proclaiming that the church should be reconstructed “as a pedagogical example to enhance craft practice and historical knowledge of medieval churches”. The “Södra Råda project” started with archaeological excavation, and between 2006-2010 the reconstruction was managed as an advanced education for professional log timbermen in medieval wooden building techniques. Since 2011 the project focus is set on research and communication activities.

In 2001 The National Heritage Board made a survey of educations within the field of historic building restoration. The focus was not specifically set on log timber constructions, although the field was covered. A similar mapping was made in 2007 by National Property Board, and in 2011 by the Craft Laboratory. These three surveys give an opportunity to evaluate the development of building conservation
and craft education in the last decade and present situation. The result shows that there were several building craft educations established in 1990th and beginning of 2000 within new programs for adult education. The results show that all except four educations are closed down. Educational forms within local and regional offices and labour educations has decreased and the university has developed programs in heritage crafts and conservation.

The survey in 2011 by Craft Laboratory was executed in the context of a new network for capacity building concerning restoration of historic buildings (KKBM kompetensförsörjning för kulturhistoriska byggnader och miljöer). The survey also involves mapping of quality assessment system for vocational education, analysis of educational levels, framing of concepts for craft education and concepts of courses in with reference to the European Quantification Framework (EQF). The Craft Laboratory performed 14 dialogue seminars in direct meeting with 340 professionals, mostly construction workers. Professionals in the field demand research and education in regional log timber tradition. In Sweden, mainly one technique rooted in Dalarna is spread and applied in new building production as well as in restoration of historic buildings. Also short-term and project based education, project based educations and networks for craftspersons and firms are distinguished demands.

the National association for log timber manufacturers (Föreningen Svenska timmerhustillverkare) was constituted in May 2000 by approximately 40 companies, i.e. the majority of all firms in this business nationally. In 2001 the association applied for and received support form EU budget (Goal 1 and 2) for a project to develop the log timber manufacturing enterprises. The first project period 2001-2003 focused on strategies for the trade and support for the members to become more competitive. The second project period had more focus on theological aspects of for instance energy efficiency and experimental developments in construction projects. The full-scale projects were not realised as planned but several activities to enhance the trade and generate and implement research has been done.

The association has initiated, defined areas for research and development and “planted” projects within universities and bodies for development and capacity building. Several graduation works has been produced concerning the log timber house and energy efficiency, life-cycle analysis (LCA) and various technical issues concerning log timber building (see eg. Dahlin 2003, Lindberg 2009, Einarsson 2010)

Supported by the log timber association, the National Institute for Workmanship, Arbetslivsinstitutet, made a survey of students attitudes towards working in manufacturing of log houses (Hedlund 2006). Opinion polls were made with students in beginning and in the end of their educations as log timbermen. The majority of the students entering log timber education came from small towns and rural areas. Motives for entering the trade was to work practically with your hands, to work with wood, to learn a craft and being creative. The combination of physical activity in a free outdoor environment and practice with problem solving and thinking was also pointed out. The satisfaction to build quality houses for costumers that will last for a long time was also stressed. The main motives for students to enter the trade refer to self-fulfillment. This is interesting because previous studies show that young people from rural areas usually value salary and employment stability, while self-fulfillment is a common motive for young people from large cities. Referring one student in the survey: “Almost everyone want to have a timber house when they see one manufactured! Then it’s gratifying to stand there with the ax. The result is so good and beautiful. It’s a lot of tradition ”

The survey conclude, even though working with log houses is seen as attractive by students, there are areas which needs to be developed to increase the attractivity, for example to offer healthier work environment and to make the transition from education to occupation easier. The sector of log house production also needs to make efforts to create and present the work as an attractive work. The areas which are seen as attractive, for example creativeness, should be conserved, developed and marketed in aim to attract and keep new log house builders in the sector.
3. THE LOG TIMBER MANUFACTURING MARKET
Today about **500 log timber houses** is produced each year in Sweden. This is far less than in Norway or Finland where the one leading company Honkarakenne produces 4000 log houses alone.

The Swedish log timber manufacturers trade is dominated by one person firms, whereof many of them work part time. A minority of the firms employ 2-5 persons and just handful 10-15 persons. A majority of the firms are concentrated in Dalarna but many also exist in Hälsingland and Jämtland.

The production technique is still very traditional with corner cutting by axe and manual methods of production. Artificial drying of wood is rare. The logs are normally 5-6 inch although thicker walls are common in year-round dwellings. The manufacturing space is often home-bound on open sky courts. Crane or overhead crane does not always exist. The building is produced, dismounted and re-erected at the client. Normally the production is delimited to the framework, were other firms complete the house.

The traditional production methods is seen as an obstacle for developing the market and export opportunities. But there are also other issues. Problems to access skilled labour is noted. The average age of professional timbermen is high. The youngest among the members in the association for log timber manufacturers in 2000 was 45 years. By recent specialised educations the situation have improved.

Listed actions to improve the trade in terms of efficiency the use of ICT like CAD/CAM in design and communication. Modern tools and working methods in production is increasing, since the intensified use of chain saw now also with different types of milling and cutter machines for the logs and corner joints.

A challenge is relevant quality assertion systems to meet up demands from building control agencies and clients. The building legislation has recently raised the standards for climate and energy efficiency for dwellings as well as cottages that require complementary insulation. The association for log timber manufacturers have developed handy information about construction types, energy efficiency, climate, building guides etcetera for the member companies to provide clients and agencies construction. Although information, quality and efficiency actions are taken, the design of the log house is still neo-traditional cottage style. Exceptions of new designs are very few.

4. HISTORY OF LOG TIMBER EDUCATION

The first guild for timber builders was founded in the capital Stockholm 1454. The guild cared for quality of craftsmanship, number of practitioners, pricing and education within the system of master and apprentice. The guild was directing the marked of building construction in general except for masons who had their own guild founded in 1487. Carpenters developed their own guild dividing the types of woodwork from at least 1575. The name of the guild changed from timber building (timmermansämnet) to construction master (byggmästare), indicating that the skill of the master is more about contracting than crafting.

The education had a formal framework for the career but no curriculum stating what skills to learn. The statues of the guild provide information on procedures for market regulations, economy, social aspects and organization. The training as apprentice was normally four years, for youth between 16 and 25. A journeyman test was established in 1774 to compel the progression in carrier and salary. Normally the apprentices was housed at the masters home and worked under guidance of a journeyman, who often had the full responsible as foreman on the workplace. However, the master household in construction could be large enterprises with too many apprentices to reside, thus many had to take byworks (skälverk).

The commercially practice a craft was regulated by the guild, that in turn was regulated in the city burghers. The question is debated weather log timbering was a common ability among farmers, or a
profession even in rural areas. From 18th century craftsmen (gerningsmän) were listed by the parishes, given acceptance to perform crafts outside the city burghers, but here we find mainly tailors and rather few timber workers. It is possible to assume that there were specialists among farmers or resided soldiers, and also districts and villages where log timbering was common knowledge. Evidence in historic buildings give examples of both high quality workmanship and poor building craft.

During the 19th century the demand for literacy and drawing grew with advancement in technology and rise of proto industrial elements in production. Elementary school was established 1842 by the parishes that erected school buildings and provided teachers. Theoretical education as complement to vocational training was given in Sunday schools or evening schools by technical institutes or handicraft associations.

The hegemony of the guild was dissolved by a governmental enactment 1847 and finally ended in 1862 by the act of freedom of trade. From hereon building construction was a free marked and anyone could take a contract and perform a craft by will. Many guilds converted into craft and manufacture associations that provided education and training opportunities. A governmental initiative for vocational education was presented in the youth school reform by 1918. Different tracks for secondary school was designed where one career was set on vocational education. Sunday and evening schools combining work life as apprentice became apprentice school with flexible day education to vocational education on regular day scheme with components of workplace training. Log timbering was substituted by other skills required from new materials and construction types. Log timbering was still a strong tradition in the region of Dalarna.

In general the craft of construction workers concerned all kinds of work, including timber constructions, carpentry, mounting of elements, scaffolding etc. In Stockholm the union divided timbermen and carpenters among construction workers, where the timbermen had responsibility for heavy constructions and rougher woodworks structural woodwork, trusses and joists. During 19th century log timber constructions was still the most common wooden building technique, but in early 20th century log constructions with corner joints was replaced by vertical timber. The construction types were either 2-3 inch boards nailed together or rectangular modules of recycled logs. By 1950 the insulated timber frame construction was adapted in large scale that made the other techniques more or less obsolete. Wooden structures was selected mainly for villas and small houses in favour of concrete and iron structures in buildings from two storeys and more. Log timber know-how survived mainly by demand for restoration and repair and in prefabricated cottages for summer or winter vacation.
In 1972 a national reform for upper secondary school was implemented where the two-year Construction program (bygg- och anläggning) was one of 13 possible vocational careers. Within the program there were 9 tracks and woodworker was one track. Log timbering was in the national curriculum not represented. Log timbering education existed by sporadic courses in forestry schools, agricultural schools, regional and municipal adult education and folk high schools. The National and Regional Labour Board (AMS and LAN) provided education and training opportunities for unemployed by education centres (AMU) or project based training (eg. ALU).

In 1990th and beginning of 2000, several educations programs was developed within two new formats for adult education. “Kunskapslyfter” was a temporary program within municipal adult education that opened for heritage craft and restoration curriculums in Hedemora, Ljudsal, Vindeln, Eksjö and Kramfors. The second format was the Qualified Vocational Education “KY” that provided several careers for craftsmen, for instance the building restoration program in Sala, Kungälv, Upplands-Väsby, Nacka, Dacapo in Mariestad and a specialized log-timber education in Rättvik and another in Leksand. Today all except four of these educations are closed down. The comprehensive building restoration program at Vindeln Folkhögskola remains and the log-timber education in Avesta, Sjövik is still a higher vocational education “YH”. Dacapo has developed within the University of Gothenburg as “Träakademien” in Kramfors entered Umeå University. These two programs – Dacapo and Träakademien - have become longer and adapted to academic standards.

5. SWEDISH EDUCATION SYSTEM

Log timber education exists in Sweden in vocational careers in upper secondary school, folk high school, higher vocational education, university education and in private autonomous regime.
Between the age of 6-7 children attend **compulsory school** (grundskola) during 9 years until the age of 15-16. The vast majority of schools in Sweden are municipally run, but there exists publicly funded schools with private principal.

**Upper secondary school** (gymnasieskola) is since 2011 reconstructed with distinguished two-year vocational programs and three year program studies designed for future higher education. Both degrees comprise 2500 credits for a vocational degree (yrkesexamen) or high school degree (gymnasieexamen). General courses like language, mathematics are 600 credits in the vocational programs. The credits have different value. In the three year program 1 credit have some correspondence to 1 hour education.

Agriculture and forestry are managed by schools with regional principal and funding. Since 2012 there is an opportunity to follow and get a degree for an **Apprentice program**. There are possibilities to pass secondary school programs in **Adult education** (Vuxenutbildning) or in Folk high schools. The **Folk high schools** (Folkhögskola) may have many different principals of NGOs, unions or public bodies. A broad spectrum of programs and courses are offered in eg. music, theatre, film, artistry and crafts.

A **Higher vocational education** (Yrkeshögskola, former Kvalificerad yrkesutbildning) was initiated in 1996 and runs 1 to 3 years. There is also a possibility to follow an **Apprentice program** managed by the National Craft Council in Leksand. The Higher vocational education requires grades from upper secondary school or equal. There may be different principals, and the aspirants apply to a national board to run an education and may get acceptance and funding for two education periods. This procedure is kept to have flexible range of education that meet up contemporary needs. 200 credits are equal to 60 ESCT corresponding to 40 weeks, one year of studies.

University or University-college runs the parallel higher education. The main difference is the possibility to examine advanced studies in masters and doctoral programs. The university is adapting to the Bologna system, although there are still traditional national standards like the existence of a short under-graduate master (magister) and a licentiate degree half-time in doctoral studies. The bachelor or candidate is three years, but advanced studies could vary 1+4 or 2+4 but not yet in the Bologna standard 2+3. 60 ESCT corresponding to 40 weeks, one year of studies. Bachelor requires 180 ESCT.

6. DESCRIPTION OF LOG TIMBER EDUCATIONS

Currently, log building education is given by five organisations within formal education system on regular basis (educations that will be further described are marked *):

- The building program (BA) at the University of Gothenburg*
- The building preservation and craft program (BA) at the Mid Sweden university*
- The log timber program (YH) in Higher vocational education at the Folk high school in Sjövik*
- The building preservation program as adult education at the Folk high school in Vindeln*
- The Construction program, majoring in building construction, as Upper secondary school at Trägymnasiet in Ljusdal*

Short term and privately funded courses in log timbering are also given regularly or occasionally in informal education at companies or by NGOs:

- Gränsfors Bruk, Bergsjö*
- Logosol, Härnösand*
- Skansen, Stockholm
- Bergslagens Timmerhus, Vretstorp
- Fursteli Gård, Brunflo
- Träkultur, Degersjö
- Gyllbergen, Borlänge
- Grön Byggnation, Örebro
Courses in log timbering are given recently or occasionally in adult education at:
- Torsta in Ås, Östersund
- Tornedalen Folk high school, Övertorneå
- Stensunds Folk high school, Trosa
- Malung Folk high school, Malung

**Sjöviks Folkhögskola**
The only longer specialised education in log timbering is the Higher vocational education (YH) named Dalarnas timringsutbildning given at Sjövik Folk high school in Avesta, Dalarna. The Folk high school give seven different education programs but the log timber education is the only higher vocational education at the school. The funding is not long-term, and acceptance for the school is given for two education period. This education form makes long-term investments and recruitment of personal difficult.

Sjövik has this two-year program based in log timber practice with theoretical courses in legislation, quality assessment, working environment (OSH), building physics, history and construction drawing. Education at school is combined with periods of workplace training (LIA) at entrepreneurs and building manufacturers. Workplace training is about 1/3 of the education period. A thesis, normally by a documented and reflected practical case, ends the education and gives the diploma to a higher vocational education degree by 400 credits.

The course is led by an experienced timberman, Björn Frost. In courses they practice both traditional and modern techniques, the use of axe as well as chain saw and other cutters to produce the fitting and corner joints. The goal is to prepare the students to work with modern manufacturing methods, traditional methods and with restoration of historic buildings. Theoretical courses are given by teaching staff at the school. There is a tight connection to the Association for log timber manufacturers that also supply with education activities and tutoring. The 15 modules or courses are:

- Forestry, felling and sawing (15 credits)
- Log treatment (20 credits)
- Mechanical log timber methods (20 credits)
- Timber, corner joints, ridges, beams (80 credits)
- Restoration and repair of timber constructions (30 credits)
- Foundations and roofs (15 credits)
- Carpentry and interior design (20 credits)
- Planning, surveying and drawing (10 credits)
- History of building and craftsmanship (15 credits)
- Health and safety, environment and quality (10 credits)
- Tool handling and ergonomics (5 credits)
- Entrepreneurship and economics (30 credits)
- Building Physics (15 credits)
- Workplace learning, LIA (100 credits)
- Master thesis (15 credits)

Entry requirement is a degree from upper secondary school or equal competence. Selection is made by appraisal of grades, valuation of previous education and work merits, and a practical test. The test comprises of a woodwork to show skills in handling tools but no specific requirements as woodworker is demanded. The course gives access to governmental subsidise and loans. There are no costs for the education except literature, tools and work ware.

Department of Conservation, University of Gothenburg
The Department of Conservation, University of Gothenburg, give five bachelor programs, one Masters and one Doctoral program in the common subject Conservation. The department has in all 350 students, about 60 teachers and researchers within three subordinated academic subjects: built environment, heritage conservation and crafts. The BA programs are Conservation Science, Heritage planning and built environments, Sloid and handicrafts development, Landscape and gardening crafts, and Building crafts. The department is located in both Gothenburg and Mariestad. The environment in Mariestads, approximately 180 kilometres north west of Gothenburg, is oriented towards craft education and research.

The building craft program has two exits, one for a Higher education degree 120 credits, and a Bachelor at 180 credits. Entry requirement to the Bachelor program is a degree from upper secondary school or equal competence. Selection is made by appraisal of grades, valuation of previous education and work merits, and a practical test. The test comprises of practical tests to show skills in handling tools, understanding of measurements, materials and efficiency and safety in working procedures. There are no specific entry requirements as craftsman is demanded. The course gives access to governmental subsidises and loans. There are no costs for the education except literature, tools and work ware.

The Building program has two different tracks for masonry (bricklaying and plastering) and one in woodworking. All students gets a common platform with courses in documentation, building history, contracting and projects, statics and building physics and sustainability, restoration and conservation ethics, and craft research methodology. The woodworking track consists of three vocational domains in carpentry, timber framing and log timbering. The students follow all courses on the track with additional workplace training and final graduation work.

Common courses are:
- Introductory Course 7.5 credits (ESCT)
- Architecture and building history, 7.5 credits
- Documentation, 7.5 credits
- Conservation and restoration history and theory, 7.5 hp
- Theory and methods in craft research, 7.5 p
- Workplace training I-III, 22.5 credits
- Building construction and statics, 7.5 credits
- Building Physics, 7.5 credits
- Construction management, procurement and calculation, 7.5 credits
- Sustainable building, 7.5 credits
- Individual specialization in the construction crafts, 7.5 credits
- Graduation work (BA), 22.5 credits

Courses in masonry:
- Masonry I-III (bricklaying and vaults), 22.5 credits
- Plaster Technique I-III, 22.5 credits
- Stoves and ovens, 15 credits

Courses in wooden crafts:
- Carpentry (windows, doors, tools) I-II, 15 credits
- Timber framing I-II, 15 credits
- Log-timber construction I-II, 15 credits

The program have two courses specialized in log timbering, above one course in forestry, felling, modern sawing techniques as well as traditional log hewing. A course module for a mandatory certificate for professional use of chain saw is provided. To enter the specific log timber courses you have to follow the
program. The first specialized course, Log timber construction 1, is 5 weeks and 7.5 credits. The course gives comprehensive skills in log timbering, including selection of timber, measurements, scribing and cutting of logs and common straight and pitched corner joints. General knowledge is taught about traditional construction principles for log timber houses concerning for instance grounding, insulation and fittings, as well as matters of safety, scaffolding and functionality and maintenance of tools. The second course, Log timber construction 2, also 7.5 credits, develop the skills and knowledge of round timber constructions and southern so-called “såtlös” log timbering.

Previously, a work place training period in restoration of log timber houses was mandatory, but today the choice of company or project is up to the students’ preferences. Instead there is a one-week workshop concerning restoration methods in the second course. The log timber courses are led by the experienced timberman Jerker Jamte. The student works with manual tools and traditional methods. The students produce in groups of four student one small log timber house. The completion of the house with floor, roof and rafters is subject for another courses in building carpentry.

![Image](image_url)

*Fig 3. The workplace for log timber education, Mariestad. Photo: Göran Andesson.*

“Träakademien” at the Mid Sweden University

Träakademien in Kramfors in Västernorrland is part the Mid Sweden University. Träakademien is a municipal organisation but the education in Furniture Making and Building Crafts is approved and financed within the university for a Higher Education Diploma, 120 ESTC.

Entry requirement to the program is a degree from upper secondary school or equal competence. Selection is made by a personal letter and a practical test. There are no specific entry requirements as craftsman demanded. The studies gives access to governmental subsidises and loans. There are no costs for the education except literature, tools and work ware.

The program in Furniture Making and Building Crafts offers three tracks: Building rafts, Furniture making and Upholstering. The training is organized primarily as project work and internships that provide training in practical crafts, complemented by lectures, classes, seminars and field trips. All students gets a common platform with courses in crafts theory and history, artistic training, academic training, business administration and heritage preservation. The Building Crafts track is specialised in building interiors and related carpentry, although the students get a common platform in building crafts. The education begins with a documentation of a house that the students will examine and make up plans for following restoration actions. During the first year the students gets broad experiences in common crafts in traditional construction, in all 48 credits of studies. The second year goes deeper into the interior
carpentry and joinery. The students make drawings and manufactures replicas of interior panels, frameworks, doors and windows with different lining and mouldings and banisters from different eras. First year:
- Basic course in crafts, 48 credits
- Artistic training and technical drawing, 4 credits
- History of Swedish arts and crafts, 4 credits
- Academic training, 4 credits

Second year:
- Advanced course in crafts, 30 credits
- Artistic training and technical drawing, 3 credits
- History of Western European arts and crafts, 3 credits
- Conservation, Introduction, 2.5 credits
- Crafts Theory and History, 2 credits
- Business and Management, 4.5 credits
- Graduation work, 15 credits

One part of the craft training course in the first year focus on log timbering techniques. The education in log timbering is approximately three weeks in the 10-week course. The course has a practical object for the students to work with hands on. Previous years the students have worked with small log houses; this year the students made a smaller superstructure on a root cellar. In the course repair of logs is practiced in a case. The goal of the course is to get a broad experience in building crafts and comprehensive training in log techniques. The students work with a simple straight cut knot. In the 4-week work-place training, the students can choose a log-timber project or manufacturing company.

**Folk high school in Vindeln**
The Folk high School in Vindeln has about 200 students. The location is Vindeln in Västerbotten close to Umeå. The school also has an annex in Umeå. The school offers one comprehensive education comprising upper secondary school subjects and specialised programs in interior design, leadership, health educator, project leader in integration and antiracism, woodworking and forging and also a program in building restoration.

The building restoration program is one year of studies, 36 weeks, combining theoretical and practical forms of education. There are 12 students in the program. The goal is that students could work in the field of preservation and restoration of historic buildings, and to prepare for advanced studies in the field. There is no experience required to enter the program. Selection is made by interest and motivation; application must attach a cover letter in which they describe themselves and why they want to attend the program. Tuition is free but costs for work wear, materials and tools exist.

The program is broad with various themes and crafts. Teaching gives perspectives on ecology and sustainable building, drawings and documentation including model building. Training involves mainly wooden crafts and building constructions like foundations, log construction, floors, ceilings, windows and doors. The training is made with mainly hand-tools, and the students produce their own tool-box during the course.

The log timber course is 5 weeks with additional one week of fieldwork with repair of log-timber houses and exchange of sill-logs. The students’ work with two small log timber houses; altering one house that is started in the course and another half-made from the previous course. One log construction is finished during the course, that the students deconstruct and learn how to mark up. The school buy timber sawn on two sides that is manually hewn by the students. The students work manually with all procedures, the
undercut and fitting of the logs and joints. The teacher is the log-timberman and building craftsman Jörgen Åsberg.

“Trägymnasiet” in Ljusdal
The Wooden Gymnasium, “Trägymnasiet”, is a private upper secondary school, located in Ljusdal, Hälsingland. The school gives two programs, one in Crafts and the other in Building construction. Both programs follow the national curriculum for upper secondary school, but they provide special courses in traditional crafts. The program in Building construction teaches the fundamentals of building, maintaining and renovating buildings, majoring the woodworker’s profession in the field of construction. The school in Ljusdal has 48 students in the program of building construction, 16 students each year.

The program is three years where the first year of study is comprehensive within construction, and the second year specialise in wood house building. The education gives a vocational degree, and followed by further workplace training as apprentice, with a apprentice salary, after 18-36 weeks results in a work-certificate for the construction industry. The general national curriculum is:
- Common subjects, eg. mathematics, natural sciences, history, language, 600 credits
- Character subjects, Building Construction, 400 credits
- Major subjects, Building Construction, wood working, 700 credits
- Individual choice, 200 credits
- Graduation work, 100 credits
- Program specific specialisation, 300-800 credits

In the second year of studies, log timber construction is taught in a major course in Building construction and woodworking. The log timber education consists of 100 credits, more or less equal to 100 education hours. The course is indoor in the school workshop. The students practice on full-scale log models making two different knots from the regions close by. The teacher is the log-timberman Anders Jonsson och Tomas Jungström. During the 15 weeks of work-place training (APL) the students can choose a project or manufacturer of log-timber houses. One of the owners of the school, Timmerblock AB, is a log timber manufacturer. The school has as a goal to develop opportunities for individual choices to specialise in log timber crafts.

Gränsfors Bruk
Gränsfors is a manufacturer of axes. The company runs courses in forging and also a course in log-timbering. The course is seven days and is normally given twice a year during summer. The course is for do-it-yourself purpose and focus on the small simple timber cottage. As Gransfors has expertize in manufacturing of axes, there are extensive information about how to sharpen edge tools, eg. different edges and their grinding technologies, different phases, coarse and fine grinding, browning and strigling. The course is in Swedish and English as there has been several students from abroad. The cost is about 1000 EUR including lunch and dinner. The participants also get a new Gränsfors hewing axe. Cheap living is offered in cottages that are produced in previous courses. The location of the course is at the company Gränsfors in Bergsjö, Hälsingland, close to Sundsvall. The education is informal. There are no prequalification requirements for entry, but the student has to be 16 years old. The course leader is Tomas Ljungström, experienced log-timberman and teacher in construction.

Subjects that are presented during the course are:
- The simple timber house construction
- Foundation
- Timbering tools and sharpening of edge tools
- Acquisition, selection and drying of timber
- Preparation of timber by using the mini-sawmill
- Handmade undercut and mechanical milling of logs
- Hewing techniques
- Knot types
- Doweling
- Door and window openings
- Roof structure

**Logosol**
Logosol is a manufacturer of machinery and equipment for forestry and woodworking. Since a couple of years the company runs short-term courses in carpentry and log timbering. The log timber course is one week long. In 2014 they give in all six log-timber courses. The cost is about 700 EUR including full pension at Nordviksskolan, in Noraström close to Härnösand. The education is informal. There are no prequalification requirements for entry. The goal of the course is that the student shall be able to produce a log timber house for own needs, not commercially, without demand on efficiency. The course runs for maximum 12 persons. There are two timbermen altering as teachers; Tycho Loo and Leif Johansson.

Subjects that are presented during the course are:
- The selection of trees
- Foundation
- Timbering tools and how to maintain and sharpen tools
- Acquisition, selection and drying of timber
- Cutting of timber by Logosol equipment (M8)
- Undercut, milling logs with Logosol equipment (Log Moulder)
- Hewing techniques
- Knot types
- Doweling
- Door and window openings
- Roof structure

During the course the group, limited to 12 participants, produce a small log timber house. The logs are ready-made, with sawn sides and milled undercut by Logosol equipment. The pitched corner joints are made by hand and the logs are put in place and doweled together. There are some films made of the course, mainly for inspiration and marketing purpose ([http://www.logosol.se/inspiration/kurser/timrahus.html](http://www.logosol.se/inspiration/kurser/timrahus.html)).

**7. EXAMPLES OF GOOD PRACTICES OF TEACHING**

A majority of the educations are directed by the principle “learning by doing”. In almost all courses the students produce a log timber house construction. Many times the production of the house is part of the budget to finance the course. In Gränsfors the curses produce houses that are set up in a close by environment of cottages for rent, in witch future students resides. The Department of Conservation work with small timber construction modules for the purpose to obtain as many corners as possible, as well as a feasible dimension and weight of the log, so that each student shall maximise the core practicing of the skills of timbering. In the progression of the course, full-scale timber constructions are made to get the real work-life situation and the additional techniques of doors, windows and roofing construction.

The duration of the education is important, to have enough time to practice and build up experience, and at the same time goes deep into the different work processes, construction types and material knowledge related to log-timbering. The education in Sjövik is the most specialised education, were the students have time to practice and deepen both their skills and theoretical knowledge. As the school is located in a region
with many log-timber manufacturers, and has developed network with the trade, the students are offered good workplace training and career opportunities.

The education at the Department of Conservation is more complete, as the students practice a wider range of building related woodworking skills. Even though the specialised log-timber courses are 10 weeks (15 credits), there are additional courses 7,5 credits in forestry and processing, 7,5 credits in documentation, 7,5 credits in building history etcetera. The students at the Department of Conservation gets a profound historical perspective, and also develop analytical skills to survey and “read” historical building through traces of tool marks, constructions and procedures of working.

8. EVALUATION

The educations in log-timbering do not make use of ICT learning recourses. The model of teaching in general is a master craftsmen and a group working with a small conventional log timber structure. The group is divided in sub-groups working with one house-corner. There are normally only one or in cases two types of knots in the practical training. New design and construction techniques are not normally regarded. There is a scarcity with advanced course literature in craft training. Three titles in course literature is frequent: Håkansson (1999), Jansson (2005) and Sjömar (1988).

A general strength concerning log timber education is that there exists a wide range of education alternatives, in different levels and duration. Although, a present threat is that few educations has long term conditions. For instance, the most advanced log-timber education in Sjövik have only acceptance for two education periods at time. Every third year the school has to apply and compete with thousands of other possible educations, in all fields of practices, to continue existing.

A weakness concerning the existing educations and courses is that the different formal levels of education do not necessarily correspond to real a progression of skills. A course on a lower level may be more advanced in terms of real skills than in a course in an advanced education. There are many entries to log-timbering, but a diffuse progression seen as an education system. The progression is only fulfilled within each education. Most courses are very alike in syllabus. There is mainly one type of knot that is thought.

There is a possibility to adapt the courses to the EQF system (European Qualification Framework). Another weakness, that is not investigated in this assessment but known through previous surveys, is that the knowledge of log-timber construction and craftsmanship is very poor in the education syllabus of architects, engineers, conservators and art historians (eg. Lindblad 2011). This affects the marked demand and advocacy for the skills negatively.

Strength for the existing log-timber educations is the support from the National association for log timber manufacturers (FST). The University College in Dalarna, in the region where most of the log-timber manufacturers are located, also supports the trade and vocational educations with research and development. Strength is also the demand and support from the field of heritage preservation, as a market for restoration with project subsidises for historic buildings, but also for project-based education opportunities, research and development. A possibility for the future, to safeguard and sustain formal and informal education in traditional log-timber craft skills, may be listing and appointing of this traditional craft as an intangible cultural heritage related to the UNESCO convention for safeguarding of the intangible cultural heritage. This work of safeguarding log-timber crafts as intangible cultural heritage could be developed in a trans-national multilateral cooperation.
9. REFERENCES


Tillgänglig på Internet: http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-29885


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APPENDIX 1. LIST OF ORGANISATIONS AND CONTACTS

List of learning institutions that gives the education of log building

1. University of Gothenburg, Department of Conservation, Göran Andersson, +46(0)317869300, goran.andersson@conservation.gu.se, Mariestad, http://www.gu.
2. Sjövik Folkhögskola, Björn Frost, +46(0)22667800, exp@sjovik.eu, Folkärna, www.sjovik.eu.
3. Träakademien, Mittuniversitetet, Marianne Jämtsäter, +46(0)61280000, Kramfors, info@traakademien.se, http://www.traakademien.se
4. Vindelns Folkhögskola, Jörgen Åsberg, +46(0)72-2234990, Vindeln, info@vindelnsfkhogskola.se, http://www.vindelnsfkhogskola.se
5. Tornedalens folkhögskola, +46(0)92779570, info@tornedalen.se, www.folkhogskola.nu/Sok-kurser/Norrbottens-lan/Tornedalens-folkhögskola/
6. Träutbildningar i Hälsingland AB, +46(0)651169 00, Anders Jonsson or Hans Eriksson, yrkes@trautbildningar.se, Ljusdal, www.trautbildningar.se/wordpress/
7. Torsta AB, Eva-Lena Blom, +46(0)64018800, eva-lena.blom@zonline.se, Ås, www.torsta.se
8. Malungs folkhögskola, John Erik Eriksson, +46(0)280 14313, info@malungsfolkhögskola.se, http://www.malungsfolkhögskola.se
9. Stensunds folkhögskola, Anette Ljungberg, +46(0)156 532 00 stensund@stensund.se, http://www.stensund.se/

List of companies or NGOs that give the education of log building

1. Gränsfors Bruks AB, Olaf Jung, +46(0)65271090, courses@gransfors.com, Bergsjö, www.gransfors.com
2. Logosol, Tycko Loo, +46(0)61118285, info@logosol.se, Härnösand, www.logosol.se
4. Skansen Byggnadsvård, Olof Appelgren, byggnadsvard@skansen.se, +46 (0)8 442 80 04, http://www.skansen.se
5. Fursteli Gård. Johan Ranbrandt, +46(0)70666 27 53, fursteligard@gmail.com, Brunflo, www.fursteligard.se/timringskurs
6. Träkultur, Marcus Lindgren, +46(0)705440565, Degersjö, www.trakultur.se
7. Gyllbergen, Clas Jacobsson, +46(0)705653146, clas@gyllbergen.se, Borlänge, www.gyllbergen.se

8. Grön Byggnation, Ronny Östling, +46(0)702860330, info@gronbyggnation.com, Örebro, www.gronbyggnation.com

9. Qvarnap Byggnadsvård/Sydsvensk Byggkultur, Pierre Bosson, +46(0)38251050, sydsvenskbyggkultur@telia.com, Svenningeby, qvarnap@hotmail.com.