BENEFITS OF USING THE LBD MODEL IN MASTER´S LEVEL DIGITAL ACCESSIBILITY COURSES

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Abstract

Digital accessibility addresses the ability of people with different disabilities to access modern digital resources such as the internet. When online services are correctly designed, developed and edited, more users have equal access to information and functionality.

To ensure digital accessibility for everyone, EU has created legislation and standards to support digital accessibility. The WCAG 2.1 and EN 301 549 V3.2.1 standards, referenced in EU accessibility directives, define the EU´s accessibility requirements in technical detail. Since these standards contain a lot of condensed information, education systems should support the transition towards an accessible digital society. Technical, and sometimes complicated accessibility requirements can be fulfilled only if effective courses and other learning possibilities are offered by the education systems. To reach the goal, using, experimenting and evaluating pedagogical models is important.

The article describes the use of Laurea's LbD model (Learning by Developing) in a summer course for master's level students. To conclude, the LbD pedagogical model seems to produce promising results for all parties, from students to project partners. 91% of the students with accessibility assignments felt that the LbD model offers better learning opportunities than traditional teaching based only on lectures and exercises. The real-life customer offering the course projects graded the quality of the students´ accessibility evaluations with an average grade of 4.5 out of 5. In addition, important product development information about the tools used in the course was delivered to the student course's partner company as evidence of the side benefits of the LbD model.

Keywords: accessibility, LbD pedagogy, higher education.

1 INTRODUCTION

The area of digital accessibility is wide, and more trained workforce is urgently needed to improve the accessibility of online services based on EU´s long term goals [1] and new requirements especially for the banking and ecommerce sector in EU Directive 2019/882 [2]. In response to this demand, Laurea (Laurea University of Applied Sciences) has increased the number of courses in digital accessibility in recent years. As newest additions, some courses are especially aimed at master's level students. However, students on these courses come from master's programs which are very different from each other, and since students' ICT competences vary greatly due to their programs, the pedagogical choices must be regularly re-examined, especially with new offerings. This case study is based on the feedback and survey results from Laurea´s summer course: *"Accessibility and Usability of Digital Services (5 cr)".*

The standard pedagogical model at Laurea is Learning by Developing (LbD). In the LbD model, teachers, students and partners representing different organizations work together in a course or study unit to achieve the desired learning goals and skills [3]. The objective of the paper is to find out how students, teachers and organizational partners benefit from the LbD model when the model is used in a digital accessibility course, since the characteristic feature for integrating higher education teaching and R&D projects at Laurea is studying in multidisciplinary teams.

The LbD pedagogical model is based on John Dewey's philosophy on experience and education and his central concepts of experience, value, action and knowledge [4]. This pragmatic learning concept emphasizes the meaning of social relationships, experiences and interactions between human beings and their own environment. Learning means constructing and reorganizing one's own experiences, dealing with new situations and acting purposefully. Based on that, the typical characteristics of the LbD model include *authenticity, partnership, experiential nature, creativity* and a *research-oriented approach* [5,6].

In the context of this paper, *authenticity* refers to the real-life projects for S Group, which formed the learning environment. S Group is a customer-owned Finnish network of companies in the retail and

service sectors, with more than 1,800 outlets in Finland, offering many digital services to its clients. Deque Systems, the global leader [7] in accessibility tools and services, participated as a technical partner offering their professional tools [8] for students to use.

In this study, the term *partnership* refers to collaboration with Laurea, Deque and S Group. In practice, Laurea was responsible for the study materials, lectures and guidance for student groups, S Group for the project assignments and project feedback, Deque for providing the accessibility testing tools, a training session and instructions on how to use the tool. Among the project goals, the pedagogical goal was for the students and as well the organizational participants to gain new competences by sharing and learning together. In addition, later defining the *experiential nature, creativity* and *a research-oriented approach* of this LbD course experiment.

2 METHODOLOGY

The subject was studied by using two online surveys after the course. 22 out of 28 students and 8 representatives of S Group participated in the surveys. The survey aimed at the students contained 23 questions and the other, aimed at S Group representatives, contained 15 questions.

Table 1. Survey questions and types

Questions for students (n=22)	*Questions for S Group (n=8)*
Q1 What is your age? (Multiple choice)	Q1 Have you seen the results of the project Laurea´s students made for the S Group team? (Yes/No)
Q2 What degree are you studying? (Multiple choice)	Q2 What is your role in your S Group team? (Open-end)
Q3 Stage of your studies? (Multiple choice)	Q3 Have you worked with Laurea student teams earlier? (Yes/No)
Q4 What was the main reason you took the course "Usability and Accessibility of Digital Services"? (Open-end)	Q4 What was the main reason your team gave a project to the summer course "Usability and Accessibility of Digital Services"? (Open-end)
Q5 Have you taken any accessibility courses before? (Yes/No)	Q5 Do you have (web or mobile) UX design experience? (Multiple choice)
Q6 What is your profession? (Open-end)	Q6 Do you have (web or mobile) developer experience? ((Multiple choice)
Q7 Is your own work related to digital accessibility at all? (Yes/No)	Q7 Do you have experience in usability evaluations? (Multiple choice)
Q8 Do you have (web or mobile) development knowledge? (Multiple choice)	Q8 Do you have experience in accessibility audits? (Multiple choice)
Q9 Do you have experience in doing accessibility evaluations? (Multiple choice)	Q9 What was the main focus of your project assignment? (Multiple choice)
Q10 I found the axe Browser extension… (Rating scale)	Q10 The usability evaluation was done by students (Rating scale)
Q11 How much time did you spend on average performing a single Instructed Guided Test on a web page? (Multiple choice)	Q11 The accessibility audit was done by students… (Rating scale)
Q12 Do you know how to get same results in accessibility testing without using the axe browser extension? (Yes/No)	Q12 The project with Laurea will help us improve our service… (Rating scale)
Q13 Do you feel the axe Browser extension saves time when evaluating accessibility? (Yes/No)	Q13 Could you provide some feedback on what were the most important things your team got from the project? (Open-end)
Q14 How likely is it that you would recommend this product to a friend or colleague? (Rating scale)	Q14 How likely is it that you would recommend Laurea course projects to a friend or colleague? (Rating scale)
Q15 Could you provide some feedback on what change or addition in the axe DevTools would make the tool better or support you in the evaluation process? (Open-end)	Q15 Other comments about the course, co-operation and project (Open-end)
Q16 What was the main focus of your team project? (Multiple choice)	
Q17 What kind of accessibility tools did you use during the course and project? (Multiple choice)	
Q18 What was the most helpful tool for finding accessibility issues? (Multiple choice)	
Q19 I learned the basics of accessibility evaluation… (Multiple choice)	
Q20 I learned the basics of usability evaluation… (Multiple choice)	
Q21 Real working life project from S Group helped me learn better than a course without the project (Multiple choice)	
Q22 Could you provide some feedback on what were the most important things you learned from the S Group team project. (Open-end)	
Q23 Other comments about the course, tools and project (Open-end)	

The study had a research permission granted by Laurea. Two online surveys were carried out with the Survey Monkey tool and the results were coded and analyzed with the ATLAS.ti program [9]. The Surveys also included a standard NPS question. NPS stands for Net Promoter Score, which is a common metric used in customer experience programs. An NPS score measures customer loyalty by looking at their likelihood of recommending a given business [10].

3 RESULTS

22 students answered the first survey. 10 students studied business and administration, 6 social and health, 5 hospitality management, and 1 a media related master´s degree. The main motivation for choosing the course was a general interest in digital accessibility and usability. However, only 3 students stated that the main motivation for signing up for this study unit was to learn how to use professional accessibility tools. For more than 70% of the students, this was the first accessibility related course in their curriculum. Most of the students also worked simultaneously as various expert professionals in different organizations in addition to their studies. Only 4 students worked as ICT professionals. However, more than half of the students stated that digital accessibility is more or less related to their work.

3.1 Key results - Students

Table 2. Student survey – important general findings related to the LbD model

n=22 (all answers)	
Students strongly agreed that a real working life project from S Group helped them learn better than a course without the project	17/22
Students found Deque's axe DevTools Pro browser extension and online introduction helpful in the accessibility assessment exercises and project	20/22

Table 3. Student survey – most important individual learning experiences

n=17 (open-end answers)	
Reaching the course objectives	5/17
Learning new methods and techniques 5/17	5/17
Learning in a real-life project 4/17	4/17
Learning new teamwork skills	3/17

3.2 Key results – Partners

3.2.1 S Group

S Group project assignments gave students 10 LbD projects: 5 usability projects and 5 accessibility projects. At the end of the course, a total of 8 S Group representatives responded to the feedback survey.

It is important to note, that in terms technical co-operation and partnership, Deque Systems offered professional programs only for the accessibility projects. All students were offered the axe DevTools Pro browser extension [8] for free and an online introduction on how to use it in their exercises, but only student teams working with accessibility assignments from S Group used the software in their project.

Since the free professional software and the training by partner was only available for the accessibility projects, we were able to compare the quality of the final outcome in these two different project types. Regarding the accessibility projects, the quality of the project work was rated a little higher (4.5/5) than in the usability projects (4/5). The difference is neither large nor statistically valid, but it supports the view of adding an outside partner for usability projects also in future course implementations.

Table 4. S General feedback from S Group

n=8 (all answers)	
Quality of the 5 usability projects in general, (1-5, 1=poor, 5=excellent)	4/5
Quality of the 5 accessibility projects in general (1-5, 1=poor, 5=excellent)	4,5/5
Net Promoter Score given to Laurea	75 NPS

Table 5. Most important reasons for S Group participation in the LbD project

- Quality of observations
- Quality of reports
- Quality of student representations
- Quality of co-operation with Laurea during the course

3.2.2 Deque Systems

The course was the first educational pilot in Finland for Deque Systems in an academic setting. The purpose of this pilot was to collect information on how the students who are relatively inexperienced in the field of digital accessibility utilize the professional test and support tool axe DevTools Pro at the appropriate level for finding accessibility issues and, secondly, to find out how effective the Guided tests in the tool are in an educational setting. Since Laurea´s LbD model-based course had a real-life customer with S Group, it also gave the student teams the possibility to learn more about using the tool in their project. The students evaluated and gave feedback to Deque about this pilot based on these experiences.

Table 5. Students feedback to Deque Systems

n=22 (all answers)	
Axe devtools Pro helped students find new accessibility issues	17/22
Axe devtools Pro saved time performing accessibility auditing exercises	20/22
Axe devtools Pro was the most helpful accessibility tool used in the course	16/22
Net promoter score given to axe devtools Pro by students	45 NPS

Table 6. Development ideas from Students – axe DevTools Pro

- More exporting options for reports (Word, PowerPoint)
- New language option (Finnish)
- New visual options (Graphs, etc.)
- Less technical UI

Deque takes their role as a leader in digital accessibility testing seriously. Feedback on students' user experience and the quality of the accessibility discoveries made by the students in an educational setting provides interesting data for future product development. Deque's products are generally utilized in agile software development and testing processes in large enterprises. Successful adoption of the tool in an academic Learning by Developing methodology is also an interesting finding from their point of view.

4 CONCLUSIONS

Laurea's LbD model is highly suitable for the digital accessibility courses. However, it is important to find motivated and committed working-life partners such as S Group and Deque. It is also important to note that the teacher´s role changed during the course from a traditional lecturer to a project facilitator and finally to a peer reviewer. As the projects progressed, students' expertise especially on the tool use, project details and content developed notably.

Based on the students' feedback, the LbD model offers more than traditional studying through theory and exercises alone. The students see the LbD project work more demanding, but also much more rewarding in terms of learning new competences. The survey results also support the idea of having multiple partners in the same course. For example, along with an accessibility project partner, adding a working-life partner for usability projects would most likely improve the quality of future courses.

S Group, as the client, considered the LbD model-based course to be very successful and expressed their desire to continue co-operation in the future. The feedback from the S Group designers and project owners, the quality and content of reports and presentations were highlighted as key reasons.

For Deque, the course offered information about the students' user experience and the learnability of the tools. It also provided proof that their advanced accessibility testing technology adds value for students in an educational setting; they learned about accessibility and - with little foreknowledge - could perform several valid accessibility tests. All useful information for future product development.

To conclude, in this case study the authentic partnership, experiential and creative projects and a research-oriented approach carried out together revealed the strengths of the LbD model. The LbD model tends to generate new partnerships and competences for the educational institution, which is much needed in order to reach our common goal – an accessible digital society.

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