

EMPOWERING ICT STUDENTS AS LIFE-LONG LEARNERS THROUGH AUTHENTIC PROJECTS

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ABSTRACT

The rapid evolution of technology demands that ICT graduates become lifelong learners who continuously update their skills. This paper reflects on how theFIRMA, a student-driven ICT project office at Turku University of Applied Sciences (TUAS) empowers students to develop a lifelong learning mindset through real-world project experiences. The concept and structure of theFIRMA are described, highlighting its operation as a project-based learning environment that functions like a small company within the university (Määttä et al., 2018; Säisä et al., 2018). Students participate in authentic ICT projects for actual clients, with roles ranging from novice developer to student CEO, and with experienced peers mentoring junior students (Säisä et al., 2020; Tiura & Säisä, 2018). These real-life projects provide continuous opportunities for skills development across technical and interpersonal domains, foster adaptability through diverse project challenges, and cultivate self-directed learning habits. Evidence from previous alumni surveys and feedback indicates that theFIRMA experience has a strong long-term impact on graduates' skills, confidence, and career development (Säisä et al., 2019, 2020). The results show that the top skills gained (e.g., teamwork, communication, problem-solving) closely match those valued by industry and have significantly aided alumni in employment (Määttä et al., 2018; Säisä et al., 2019). Through a reflective analysis of these outcomes, the paper demonstrates how theFIRMA's model of authentic, student-driven projects effectively nurtures continuous learning competencies and mindsets, thereby empowering students to become lifelong learners.

KEYWORDS

Lifelong learning, project-based learning, student-driven learning environment, professional development, ICT, Standards: 6, 7, 8

INTRODUCTION

Preparing ICT students to become lifelong learners is a central challenge in modern engineering education. Rapid advances in digital technologies and artificial intelligence are reshaping jobs and skill requirements, making continuous upskilling, adaptability, and self-directed learning increasingly important. In this context, the CDIO framework is especially relevant because it combines disciplinary knowledge with personal and interpersonal capabilities, while Standards 6–8 emphasize learning workspaces, integrated learning experiences, and active learning as foundations for professional growth and lifelong learning (Cedefop, 2024; Crawley et al., 2007; World Economic Forum, 2025).

At Turku University of Applied Sciences, these principles are enacted in theFIRMA, a student-driven ICT project office that serves as an authentic project-based learning environment. By working on real projects for external clients, students apply technical knowledge in practice while also developing communication, project work, responsibility, and adaptability in a real-world setting. As such, theFIRMA provides a concrete example of how CDIO-aligned learning can support the development of lifelong learning dispositions in authentic contexts (Määttä et al., 2018; Säisä et al., 2018).

This paper examines how theFIRMA's approach supports students in becoming self-directed lifelong learners. It first describes the concept and structure of theFIRMA and then analyzes how participation in real-life ICT projects promotes continuous skill development, mentorship, adaptability, and learner autonomy. Drawing on earlier studies, including alumni surveys and feedback, the paper finally discusses lessons learned and reflects on why this project-based model is effective in cultivating lifelong learning.

THEFIRMA: A STUDENT-DRIVEN PROJECT OFFICE FOR LEARNING

TheFIRMA is a student-driven ICT project office at TUAS that operates as a project-based learning environment resembling a small company. Students work on real-world ICT projects for external clients, primarily small and medium-sized enterprises, and are responsible for delivering usable outcomes within agreed constraints (Määttä et al., 2018). The learning environment is designed to expose students to authentic professional situations while allowing them to integrate project work into their degree studies.

These projects carried out in theFIRMA cover a wide range of ICT-related activities, including but not limited to web and application development, software testing such as accessibility and usability evaluation, user interface and service design, technical documentation, and teaching-oriented activities such as workshops and training sessions. This diversity exposes students to varying technical domains and working practices, making it unlikely that previously acquired knowledge alone is sufficient for project success.

A defining feature of theFIRMA is its operational model, which differs significantly from traditional course-based education. The project office operates continuously throughout the year, rather than following a fixed academic schedule. Students may join projects at different times, participate for varying durations, and work different numbers of hours depending on their individual study plans (Määttä et al., 2018). This flexibility enables students to tailor their learning experiences but also requires them to take responsibility for managing their own learning and workload.

Over the past decade, theFIRMA has continuously expanded its operations, growing in scale and complexity year by year in response to evolving technological demands. The project office now delivers tens of real customer projects annually, engaging over 200 ICT students across different study phases each year. At any given time, multiple project teams operate in parallel, supported by faculty members and more experienced students acting as mentors rather than traditional instructors. This sustained growth and continuous development highlights that the learning model is not only scalable but also adaptable, evolving alongside the rapidly changing ICT field.

MENTORING, ROLES, AND THE DEVELOPMENT OF PROFESSIONAL SKILLS

Peer mentoring and role progression are integral elements of theFIRMA learning environment. Students typically begin their participation as project members working on specific tasks and, as they gain experience, may progress to roles with greater responsibility, such as lead or mentor roles or even student CEO, as shown in Figure 1. This progression mirrors professional ICT organizations and provides students with opportunities to develop leadership and coordination skills in an authentic context (Määttä et al., 2018).

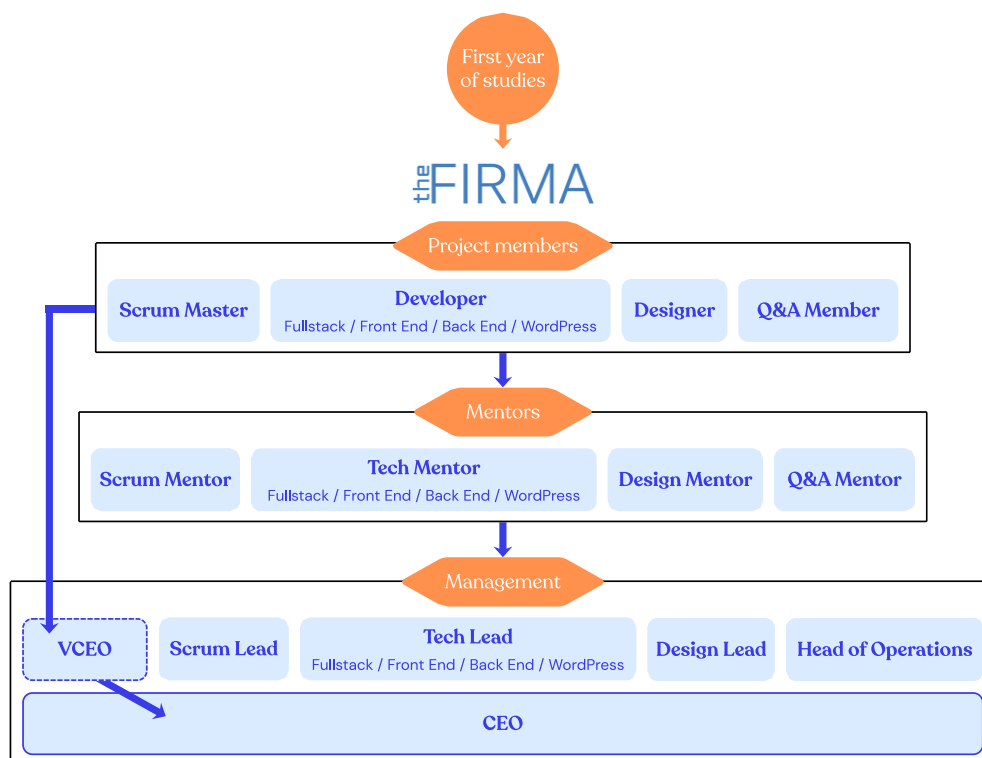


Figure 1. Progression of student roles in theFIRMA

Because projects are continuously starting and ending, onboarding and knowledge transfer are recurring activities within theFIRMA. More experienced students routinely introduce new members to tools, practices, and project contexts, while simultaneously reflecting on their own understanding. This recurring peer learning cycle reinforces the ability to explain, adapt, and evaluate knowledge, skills that are essential for continuous professional learning.

Mentoring occurs naturally through collaboration among students at different stages of their studies. More experienced students support newcomers by sharing technical knowledge,

explaining project practices, and guiding them in client communication and teamwork. This peer mentoring supports the learning of junior students while simultaneously strengthening the mentoring, communication, and leadership skills of senior students (Säisä et al., 2020). Faculty members complement this process by acting as coaches and advisors, offering guidance when needed but allowing students to retain ownership of project decisions and outcomes (Määttä et al., 2018).

For example, a senior student acting as a scrum master may guide a new project member in implementing a web application feature, while simultaneously explaining design decisions and client requirements. This interaction not only supports the junior student's technical learning but also develops the senior student's mentoring and communication skills.

Through progression from project member to leadership roles, students develop a wide range of professional skills, including teamwork, communication, problem-solving, and leadership. Previous studies conducted by surveys have shown that these skills are among the most significant learning outcomes reported by students and alumni who have worked in theFIRMA and its predecessor environments (Säisä et al., 2019). In addition to acquiring these skills, students learn how to support the learning of others, reinforcing reflective practice, and the ability to articulate knowledge, both of which are essential for continuous professional development.

FOSTERING SELF-DIRECTED LEARNING AND A LIFELONG LEARNING MINDSET

Perhaps the most distinctive aspect of theFIRMA is the degree of responsibility placed on students for directing their own learning. Unlike traditional courses with fixed schedules, predefined assignments, and teacher-led instruction, learning in theFIRMA is driven by project needs, which reinforce the idea that learning is continuous rather than episodic. Students must identify what knowledge and skills are required to complete project tasks and seek out relevant resources independently (Määttä et al., 2018).

A formal mechanism for reinforcing self-directed learning is the practice of setting project-specific learning goals. At the beginning of each project, students define learning objectives related to both technical and professional development, and they assess their achievement at the end of the project (Määttä et al., 2018). This process encourages students to reflect on their learning, evaluate their progress, and identify areas for further development. Such reflective practices align closely with the behaviors required for learning in professional contexts.

The environment also fosters a mindset of continuous improvement. Because projects differ in technologies, roles, customers, and problem contexts, students repeatedly encounter unfamiliar situations that require experimentation, collaboration, and adaptation. This orientation is strengthened by theFIRMA's continuous improvement culture: Tiura and Säisä (2018) describe a student-driven environment in which faculty members act in a coaching role and students are encouraged to participate in improving practices. Over time, this repeated exposure to new situations helps students internalize learning as an ongoing process rather than a one-time achievement.

For instance, when encountering unfamiliar technologies in a customer project, students often independently search for documentation, tutorials, or peer support to complete their tasks. This process mirrors real-world professional learning situations where formal instruction is not available.

In recent years, theFIRMA has largely adopted Scrum as its default project management approach. Scrum structures project work into short iterations with regular planning, review, and retrospective activities. From a learning perspective, these practices support continuous reflection, feedback, and adaptation, reinforcing habits that are central to lifelong learning.

These habits are further strengthened by the authentic nature of theFIRMA's customer projects. Real clients, evolving requirements, and consequences beyond course assessment mean that students cannot rely only on previously learned solutions; instead, they must continuously identify new learning needs and adjust their approach as projects develop. Research on project-based learning similarly shows that authentic contexts and real-world clients can increase engagement, strengthen collaboration, and deepen understanding. For this reason, theFIRMA does not merely provide opportunities to learn new skills; it socializes students into seeing learning itself as an ongoing, career-long responsibility. (Guo et al., 2020; Chang et al., 2024.)

OUTCOMES AND LONG-TERM IMPACT

After a decade of operation, there is tangible evidence that participation in theFIRMA has a long-term impact on students' professional development. Alumni feedback and previous survey results indicate that students perceive significant gains in both technical and interpersonal skills as a result of working in real customer projects (Säisä et al., 2019). Many alumni report that the skills developed in theFIRMA closely match those valued by industry, thereby smoothing the transition from studies to working life.

The alumni survey also sheds light on the career trajectories of former participants. Respondents report that theFIRMA experience contributed to increased confidence, improved employability, and, in some cases, accelerated progression into positions of greater responsibility (Säisä et al., 2019). These outcomes suggest that the learning environment not only supports immediate learning goals but also equips students with behaviors and attitudes that continue to benefit them throughout their careers.

For example, alumni surveys indicate that communication and teamwork were among the most frequently reported skills gained, and these were also identified as having the strongest impact on employability. These attributes are closely associated with lifelong learning and professional growth, reinforcing the idea that authentic project environments can effectively prepare students for evolving work demands.

Taken together, alumni feedback and reported career outcomes can be interpreted in light of the authentic nature of the project work. It is also noteworthy that theFIRMA's approach contributes to students' understanding of learning as a continuous process. By repeatedly engaging in reflection, self-evaluation, and skill development within real projects, students develop habits that support ongoing learning beyond formal education. In this way, theFIRMA environment can be seen as genuinely empowering students to become lifelong learners.

CONCLUSION

Empowering students to become lifelong learners requires learning environments that go beyond the transmission of disciplinary knowledge and instead engage students in authentic professional practices. This paper examined theFIRMA, a student-driven ICT project office at TUAS, as a case of how real-life project work can foster lifelong learning behaviors within ICT education. By participating in diverse customer projects, assuming increasing responsibility,

and engaging in reflective learning practices, students are repeatedly required to identify learning needs, seek new knowledge, and evaluate their own development.

From a CDIO perspective, theFIRMA demonstrates how Standards 6 (Engineering Workspaces), 7 (Integrated Learning Experiences), and 8 (Active Learning) can operate together to support professional development. TheFIRMA functions as an authentic engineering workspace in which learning is embedded in real work activities. Technical problem-solving is integrated with interpersonal and self-directed learning, and students are actively engaged in planning, implementing, and reflecting on their work rather than following predefined instructional paths. These characteristics create conditions in which lifelong learning emerges as a natural outcome of participation rather than as an explicit instructional objective.

The findings suggest that lifelong learning can be effectively cultivated through project-based learning environments that combine authenticity, responsibility, and reflection. Rather than teaching it as an abstract concept, theFIRMA requires students to practice it repeatedly in realistic contexts. This case contributes to the CDIO Implementation track by illustrating how existing project-based learning environments can support lifelong learning through embedded assessment and feedback practices. The insights from theFIRMA may be transferable to other institutions seeking to enhance student professional development and prepare graduates for continuous learning in rapidly evolving engineering fields.

While this paper is reflective in nature and does not present new empirical data, it is grounded in previous studies and long-term implementation experience of theFIRMA. The findings should therefore be interpreted within this specific educational context. Factors such as institutional support, integration into curriculum, and access to real customer projects may influence how transferable the model is to other settings.

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BIOGRAPHICAL INFORMATION

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