2. PRoSPEro Overview

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The PRoSPEro Project: Building a multidisciplinary pedagogy for health and social care professionals co-providing care with social robots

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Abstract

Social robotics, autonomous technologies and AI are increasingly influencing the field of care for human beings. Health and social care professionals often lack the skills and pedagogical knowledge necessary to work alongside these emerging technologies or to critically engage with their development. The Pedagogy of Robotics in the Social Professions in Europe (PRoSPEro) project (2018-2022) aimed to address this gap by generating a new multidisciplinary pedagogy designed to meet the learning and upskilling needs of care professionals likely to co-provide care with social robots. By bringing together a consortium of experts and practitioners across five European countries, PRoSPEro produced a comprehensive suite of scoping papers, position papers, case studies, academic papers and a curriculum with module descriptors. This paper provides an account of the project's purpose, partners, activities, intellectual outputs, challenges and reflections. It offers a roadmap for future pedagogical approaches in the rapidly evolving field of social robotics.

Introduction

Digital technologies such as robotics, algorithms and artificial intelligence (AI) are having significant impacts across a range of industries and occupational sectors. The health and social care sectors are not immune to this trend, and are experiencing, to varying degrees, substantial transformation. Social robots that can engage and interact with humans are becoming increasingly feasible from technological and economic perspectives and, notwithstanding many social barriers (Wright 2023), are likely to become increasingly prevalent in care settings across Europe, to support care professionals in their work and to enhance service delivery. Their integration challenges traditional care models, compelling professionals, care institutions, regulators and educators to adapt. Notwithstanding this, limited consideration has been given to how the challenges posed by social robotics can be incorporated into the education and training of care professionals.

The Pedagogy of Robotics in the Social Professions in Europe (PRoSPEro) project was established in 2018 to bridge this gap. Funded under the Erasmus+ programme and coordinated by Atlantic Technological University Sligo, the project's main objective was to

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generate a new multidisciplinary pedagogy directed at the learning and upskilling needs of health and social care professionals increasingly likely to co-provide care with social robots. This Special Edition of the *Irish Journal of Applied Social Studies* is based on some of the outputs of the PRoSPEro project, together with some related material from the Irish context. Amongst the aims of PRoSPEro was to advance European policy debates on social robotics and to explore the learning needs of future care professionals. This article introduces the project and the Special Issue itself.

Background and rationale

Technological innovations - particularly social robots and AI - have the potential to significantly impact the health and social care sector. In this scenario, traditional human-centric models of care are challenged, compelling care professionals to redefine their roles and adapt to new technological realities. Social robots have proven valuable in various settings from dementia care to early childhood education. The integration of these technologies into care raises critical questions about professional identity, ethical responsibilities and practical applications.

The existing training and education systems for care professionals often overlook these challenges, leaving professionals ill-prepared to navigate the evolving landscape. Recognising this gap, the PRoSPEro project sought to develop a multidisciplinary pedagogy that could prepare health and social care professionals for this new reality. The project's purpose was to create intellectual outputs, events and partnerships that would inform curricula and guide the pedagogical strategies needed to empower the workforce of tomorrow.

Project partners and stakeholders

The PRoSPEro project brought together a diverse consortium of partners across five European countries:

- *Atlantic Technological University* (Higher Education Institution [HEI] Ireland). As Lead Partner oversaw the project's management and coordinated the production of academic and pedagogical outputs.
- *Holstebro Kommune* (Local Public Body, Denmark) provided insights into health and welfare technology and hosted the project's capstone symposium.
- *VIA University College* (HEI, Denmark) developed ethical frameworks and contributed to intellectual outputs on regulation and technology.

- *The Alzheimer Society of Ireland* (Non-Governmental Organisation, Ireland) co-hosted events on dementia care and supported the dissemination of project results.
- *University of Galway* (HEI, Ireland) contributed to ethical frameworks and academic outputs focused on dementia care.
- *University of Twente* (HEI, Netherlands) led technological development reviews and hosted design workshops.
- *Dolnośląska Szkoła Wyższa* (University of Lower Silesia) HEI, Poland) led pedagogical outputs and organised workshops on social robots and autism.
- *Universitat de València* (HEI, Spain) led statistical analysis and hosted interactive workshops.

The consortium's expertise enabled the project to generate significant intellectual outputs and to organise events to address diverse aspects of social robotics and care.

Activities and events

The PRoSPEro project staged six Multiplier Events to facilitate knowledge exchange and practical engagement. The first, held in Aarhus, Denmark, in May 2019, focused on the ethical, practical, and regulatory issues associated with deploying the "robot baby". This event included interactive workshops for students, professionals, and educators. The second event, organised in Valencia, Spain, in November 2019, expanded on the first by addressing ethical and practical considerations in deploying the robot baby in care settings. It brought together participants from education, social, and health professions.

The third event, *Social Robotics in Dementia Care - Challenges & Possibilities*, took place online (due to the COVID pandemic) in January 2021. It highlighted research-based presentations on technological approaches in dementia and aged care while engaging participants in ethical debates on robot-assisted care. In June 2021, the fourth event, also held online from Poland, focused on using social robots in autism care and attracted industry representatives, social professionals and policymakers. The fifth event, an interactive design workshop held online from the Netherlands in September 2021, featured a tinkering workshop on basic robot design principles and research-based scenarios on human-robot interaction.

The sixth and final event was the project's capstone symposium, held in person in Holstebro, Denmark, in November 2021. This symposium integrated insights from three years of collaborative work, disseminating project outcomes to practitioners, learners, policymakers along with members of the public.

In addition to these Multiplier Events, the project organised an interactive design workshop in Sligo in November 2021, offering a full-day session on social robotics, tinkering and user-centred design (ATU 2021). The PRoSPEro team also participated in the Engineering Fair at ATU Sligo in March 2020 featuring interactive exhibits with Nao and Cosmo robots.

Intellectual outputs

The intellectual outputs produced by the PRoSPEro project include scoping papers, position papers, case studies, academic papers, module descriptors and a curriculum document. All of these resources are available at the project's designated website at socialrobots.ie/about-us.

Scoping papers

The scoping papers provide foundational research in key areas of social robotics. *Statistics and trends in social robotics* (led by Universitat de València and the University of Twente) explores statistical trends and projections in social robotics, identifying key growth areas and challenges. The paper highlights that the adoption of social robots varies across Europe, influenced by national policies, economic conditions and cultural factors. It also classifies care-focused robots into three main types: Assistive Technologies (ATs), Assisted Living Technologies (ALTs), and Social Robots.

Technological Development (University of Twente) examines technological trends shaping the development of social robots, focusing on programming, algorithms and design. This comprehensive overview targets non-STEM learners interested in understanding the technology basics, emphasising the importance of human-robot interaction for effective robot programming.

Ethical and Social Issues (VIA University College) explores the ethical frameworks relevant to deploying social robots in care settings. The paper identifies key ethical challenges, including autonomy, privacy, and social relationships, and emphasises that ethical considerations should be incorporated into the design and deployment of social robots.

Principles of Regulation for AI and Social Robotics (Atlantic Technological University) reviews the challenges associated with regulating AI and social robotics in care settings. This paper proposes principles for regulation, including transparency, accountability and public

engagement while exploring challenges such as anthropomorphism, data collection and machine learning capabilities.

Finally, *Pedagogy for Technological* Change (Dolnośląska Szkoła Wyższa) discusses the paradigm shift from knowledge- to skills-based education. The paper proposes pedagogical strategies for integrating social robotics into health and social care curricula, emphasising the need for a constructivist approach that engages learners in active knowledge construction.

Position papers

The position papers produced through the PRoSPEro project offer structured frameworks and pedagogical approaches. VIA University College's *Facilitating reflection on social robots in care: ethics and pedagogy* provides a framework for ethical reflection in social robotics education. It recommends pedagogical approaches to engage learners in critical thinking about ethical issues.

The Pedagogy of Social Robotics (University of Twente), explores multidisciplinary pedagogical approaches to teaching social robotics. Emphasising hands-on, reflective and problem-based learning, the paper highlights the importance of interdisciplinary approaches in teaching social robotics.

Case studies

The case studies present practical insights and lessons, often derived directly from the experiences of care professionals. The *Doing of social robotics amongst care professionals*, authored by VIA University College, shared insights from workshops and interviews with care professionals on the practical challenges of using social robots. The study highlights the need for interdisciplinary collaboration in technology adoption.

Similarly, *What Happens When social robots are introduced in dementia care? lessons from two Irish cases* (University of Galway) examines the impact of social robots in dementia care through the insights gleaned in two Irish case studies. The paper identifies key lessons on ethical considerations, staff training and user engagement.

Academic papers

The academic papers produced by PRoSPEro added theoretical and practical dimensions to the project's outputs. *Helping tomorrow's social professionals learn about social robotics* by Perry Share and John Pender (2021) highlights the interdisciplinary nature of social robotics education, involving technologists, educators, learners, practitioners and policymakers. The paper described the PRoSPEro project's goals of creating scoping reports, ethical frameworks, workshops and module descriptors. It also introduces a locally developed module at ATU Sligo, *Futures of Care, Society and Welfare*, that was redesigned to incorporate social robotics.

Robotic babies, data, didactics, and ethics in social work: a position paper (this issue of *IJASS*) explores the ethical and pedagogical implications of using robotic babies in social work education. It proposes a framework for ethical reflection and practice, providing insights into the challenges and opportunities of using robotic babies as a pedagogical tool.

Together, these diverse outputs present a comprehensive and multidisciplinary exploration of social robotics and pedagogy, laying the foundation for a new approach to care education. By combining theoretical frameworks with practical insights, the PRoSPEro project offers a roadmap for educators and practitioners to navigate the evolving landscape of social robotics in health and social care.

Curriculum document: pedagogical approaches to teaching about social robotics

The curriculum document is a cornerstone of the PRoSPEro project. It represents a comprehensive framework for teaching and learning at the intersection of conventional health and social care provision with advanced technology, social robotics and AI. This intersection necessitates a new roadmap that clearly signposts the types of knowledge and competencies required by non-STEM health and social care professionals. It also demonstrates how these competencies can be acquired.

The curriculum document innovatively integrates multidisciplinary pedagogical approaches to ensure that professionals are well-prepared to co-provide care with social robots. By offering a detailed series of module descriptors and aligning them with the European Qualifications Framework (EQF), the curriculum provides educators with a clear guide for developing these competencies while ensuring consistency and standardisation across Europe. It stands as a groundbreaking achievement, showcasing how diverse philosophies

and pedagogies can be adapted to empower non-STEM learners in comprehending, engaging with and critically evaluating social robotics in the evolving landscape of health and social care.

PRoSPEro's pedagogical framework is rooted in constructivism. It encourages learners to engage with social robotics and construct their knowledge through real-world applications. By linking module learning outcomes to the European Qualifications Framework (EQF) levels, the curriculum aligns with European standards and ensures consistency. The Den Ouden V-Shaped Model differentiates the skills needed by social professionals at various levels of technological proficiency. Dialogic education principles promote interaction among learners, educators, and stakeholders.

European policy documents like the Digital Education Action Plan (2018), A New Skills Agenda for Europe (2016) and the Blueprint Digital Transformation of Health and Care for the Ageing Society (2017) inform the curriculum's design, emphasising the need to address skills mismatches, foster innovation and encourage interdisciplinary approaches.

The PRoSPEro curriculum identifies several trends and challenges in social robotics, including their applications in autism education, dementia care and early childhood education. Technological challenges highlight the interdisciplinary cooperation required to design effective robots, while ethical challenges underscore the importance of Asimov's laws of robotics, healthcare ethics principles and care ethics frameworks. Robolaw, focusing on regulating social robots proactively, was also integrated into the curriculum.

The syllabus is structured into a cohesive series of 5 ECTS modules across four areas, followed by a 30 ECTS capstone project. This structure provides flexibility for learners and educators to tailor learning paths that meet their specific interests and needs. The entire suite of modules including multiple possible delivery methods and mechanisms) offers the potential for learners to customise their learning needs up to and including master's degree programmes in care and welfare technologies.

Module descriptors

Introduction to Social Robotics in the Social Professions (5 ECTS) introduces social robotics for learners new to the field. It explores the concept of social robotics, its historical and contemporary context, and potential applications in social professions.

Technology: Programming and Algorithms for Non-STEM Learners (5 ECTS) introduces the basics of programming and computational thinking using robots. It focuses on behaviour control, task structure, and modifying existing programs.

Design, Tinkering, and UX Design for Social Robots (5 ECTS) demystifies the design process and encourages learners to actively engage in design activities, emphasising reasoning about user needs and translating insights into innovative robot concepts.

Use: Activity Design for Social Robotics (5 ECTS) facilitates an understanding of the non-technological aspects of social robot use and encourages creativity in designing new activities for robots across diverse care settings.

Ethics and Social Robotics (5 ECTS) introduces ethical issues in the use of social robots through guided reflection and workshops. It addresses ethical challenges in companion robots, telepresence robots, assistive robots, and the robot baby.

Policy, Regulation, and Professional Identities (5 ECTS) investigates regulatory frameworks and institutional settings related to social robotics and explores historical and contemporary innovations in technology regulation.

Research Methods and Social Robotics (5 ECTS) provides learners with skills and best practices for conducting Human-Robot Interaction (HRI) research. It emphasises a range of social scientific methodologies for care professionals working with robots.

Capstone Project (30 ECTS) is a research-based or research-informed project where learners explore a chosen topic that culminates their study of social robotics. It allows learners to demonstrate acquired knowledge and skills and communicate findings to a broader audience.

Suggested assessment strategies included active participation in workshops and discussions, simulations, design projects, and a comprehensive research or design capstone project.

To provide learners with flexible routes through the curriculum, several pathways were offered. The introduction route provides a basic introduction to social robotics, while the design and application route focuses on designing and applying social robots in care settings. The design and application with capstone route culminates in a capstone project. The

reflection route is tailored for learners focused on policy, ethics, and management. The Research route offers research-based applications through a combination of modules.

Challenges and outcomes

The PRoSPEro project faced significant challenges during its implementation, particularly due to the COVID-19 pandemic. The global health crisis severely impacted the delivery and attendance of Multiplier Events, necessitating a transition of several workshops to online formats. This shift posed logistical and engagement challenges, yet the project adapted effectively by leveraging digital platforms for collaboration and knowledge sharing.

Another significant challenge stemmed from the inherently multidisciplinary and collaborative nature of social robotics. Ethical considerations such as autonomy, privacy and the appropriate use of data required nuanced approaches that balanced technological possibilities with human-centred care principles. Practical challenges also emerged such as designing educational materials for non-STEM learners and fostering interdisciplinary understanding among care professionals. Addressing these issues necessitated the collective expertise of the diverse consortium of partners who brought together insights from engineering, social sciences, healthcare, policy and philosophy, psychology and pedagogy.

Despite these hurdles, the PRoSPEro project successfully produced a suite of high-quality scoping papers, position papers, case studies, and academic articles. The development of module descriptors denominated in ECTS credits provides educators across Europe with a tangible resource that could be seamlessly integrated into existing curricula. Additionally, this Special Edition of the *Irish Journal of Applied Social Studies* represents a further contribution to the field, offering critical insights into social robotics in care and increasing awareness among professionals, learners, and policymakers.

Reflection and future directions

The PRoSPEro project has provided several important lessons for the field of social robotics in care. A multidisciplinary approach is crucial to effectively address the challenges of social robotics and non-STEM health and social care learners and practitioners as it brings together diverse perspectives and expertise that are essential for creating comprehensive solutions. The involvement of partners from healthcare, technology, social sciences and policy

enriched the project's outputs and enabled the development of innovative and creative new pedagogies.

Flexibility in pedagogy and curriculum design emerged as another key takeaway ensuring the effective incorporation of technological advances while meeting the diverse learning needs of professionals in the sector. The curriculum document's modular structure provides educators with the flexibility to tailor learning paths to the specific interests and backgrounds of learners.

Collaborative workshops and interactive events proved to be vital to engage diverse stakeholders. These foster knowledge exchange and cultivate an interdisciplinary understanding of social robotics. Use of online formats, though challenging, demonstrate the value of digital platforms in facilitating global collaboration.

Recommendations for future research and practice

The PRoSPEro project illuminates the need to continue developing multidisciplinary curricula that cater to the diverse learning needs of social professionals. Given the rapid evolution of technology in care settings, it is essential to emphasise techno-ethical considerations at all levels of training. A multidisciplinary approach can help to ensure that care professionals are equipped with the skills necessary to navigate the technological landscape while remaining attuned to the ethical implications of social robotics. Curricula should integrate not only technical and practical knowledge but also a strong foundation in ethics, policy and regulation awareness while hands-on 'tinkering' allows learners to critically evaluate the impact of these technologies on individuals and communities.

Fostering partnerships between care professionals, educators, and technologists is crucial for keeping training programmes relevant and up to date with the latest technological advances. Such partnerships encourage cross-pollination of ideas and ensure that the curriculum remains responsive to emerging trends. By engaging technologists in the education process, care professionals can gain a deeper understanding of the potential and limitations of social robotics leading to more effective collaboration in care settings.

Expanding research on the ethical implications of social robotics is also a priority. Areas like autonomy, privacy and data governance (such as the new EU AI Act) need thorough

exploration to inform policy and regulatory frameworks. Understanding how these issues intersect with the design and deployment of social robots will enable policymakers to craft regulations that protect users while encouraging innovation. Moreover, addressing these ethical implications within the curriculum will empower future care professionals to advocate for responsible technology use in their practices.

Promoting interdisciplinary research and practice that integrates insights from engineering, social sciences and healthcare is vital for creating holistic solutions in care. This approach allows researchers and practitioners to address complex challenges through diverse perspectives leading to innovations that are both technologically sophisticated and socially responsible. For example, combining engineering knowledge with social science insights can help design robots that are not only technically advanced but also culturally sensitive and ethically aligned with care practices.

Opportunities for collaboration

The PRoSPEro project highlights the pressing need to establish a network of practitioners, educators and researchers focused on social robotics in health and social care. Such a network would facilitate knowledge sharing and best practices contributing to the development of Continuous Professional Development (CPD) programmes involving health and social care organisations at the EU level. This collaborative effort could support the dissemination and adoption of the PRoSPEro curriculum across Europe helping to standardise social robotics education and upskilling efforts.

By bringing together stakeholders from different sectors, the network could also act as a platform for identifying emerging challenges and opportunities in the field. For instance, regular workshops and conferences could help uncover new ethical dilemmas posed by advancements in AI and robotics while fostering the development of innovative solutions. Moreover, collaboration with policymakers would ensure that regulatory frameworks keep pace with technological advancements, ultimately benefiting both practitioners and the individuals they care for.

In conclusion, establishing a collaborative network and refining multidisciplinary curricula will be key to ensuring that Europe's future health and social care workforce is well-prepared for the challenges and opportunities posed by social robotics. By embracing an

interdisciplinary approach that blends ethics, technology and practical skills, the PRoSPEro project has laid a strong foundation for future educational and research initiatives in this rapidly evolving field.

References

ATU. (2021). Tinkering: Social robotics with Edwin Dierten [YouTube video]. YouTube. https://youtu.be/vcELt3aOHj4?si=lFJonYW8qsqyNXuE

Share, P., & Pender, J. (2020). Helping tomorrow's social professionals learn about social robotics. 6th International Conference on Higher Education Advances (HEAd'20), Universitat Politècnica de València, València. http://dx.doi.org/10.4995/HEAd20.2020.11205

Wright, J. (2023). *Robots won't save Japan*. Ithaca: Cornell University Press.