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Title **Educational Design Research on Person-Centred, Interprofessional Education for Collaborative Practice (IPECP) –Exploring Work Processes of Educators to Identify Design Principles and Develop Guiding Materials**

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Abstract Within the rehabilitation sector, students and professionals collaborate interprofessionally when focusing on the functioning of patients. Developing and implementing person-centred, interprofessional education in an institution requires coordinated implementation actions across multiple divisions. The objectives of this study were twofold: firstly, to explore the work processes of

educators who implement person-centred, interprofessional education for collaborative practice (IPECP) which, secondly, served to develop process guide materials for educators from various settings. Educational Design Research was conducted in the Erasmus+ project INPRO from 2021 to 2023. It followed an iterative, process-oriented approach that consisted of four complementary workstreams: 1) Literature, needs, and collection of approaches; 2) IPECP design thinking and piloting with project stakeholders; 3) Process guide development and usability testing; 4) Exchange and refinement. A synthesis from each workstream's findings served to explore the content and structure of process guide materials. Three design topics emerged: a) 'Facilitating Interprofessional Education in a Global Classroom Setting'; b) 'Interlinking Higher Education and Rehabilitation Practice'; c) 'Facilitating Interprofessional Collaborative Practice in Rehabilitation'. This developed theory shows that the needs of educators differed between higher education and rehabilitation settings. As a result, the process guide materials consist of context-specific content. The third topic showed links between the settings regarding the educators' work process. These findings determined the structure of the process guides. Interlinkages bear a potential for facilitating the transition of educators and students from theory to practice. Future studies may explore the applicability of the findings to other settings and to collaborative (online) learning in general.

Keywords Interprofessional Education and Collaborative Practice (IPECP), Design-Based Research (DBR), Guide, Interprofessional Relations, Patient-Centred Care

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Educational Design Research on Person-Centred, Interprofessional Education for Collaborative Practice (IPECP) – Exploring Work Processes of Educators to Identify Design Principles and Develop Guiding Materials

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1.0 Introduction

In Europe, the need for health and social care is increasing due to rising numbers of persons with chronic diseases and higher life expectancy (World Health Organization & World Bank, 2011). Empowering people and families in the process of rehabilitation requires service providers from different professions to share responsibilities and to make decisions collaboratively with patients in a person-centred approach (Castro et al., 2016; Health Foundation, 2016).

Person-centred care facilitates interprofessional collaboration and benefits from the use of a common interprofessional language. The International Classification of Functioning, Disability and Health (ICF) is the international standard for framing and describing functioning and disability (Fifty-Fourth World Health Assembly, 2001; World Health Organization, 2010). Congruent interprofessional oral and written interprofessional communication of a person's functioning and needs strengthens rehabilitation services and improves patient-reported health outcomes (Kaiser et al., 2022; Martin et al., 2010).

1.1 Initial problem

Interprofessional education and collaborative practice (IPECP) are recognised as essential factors for strengthening the future workforce in health and social care (Reid et al., 2018). There is a need to standardise education and healthcare systems in order to prepare graduates who are ready to work interprofessionally (O'Keefe et al., 2020). Education systems should take the lead in the early learning continuum, while the investment shifts to practice settings with more advanced trainees (Institute of Medicine, 2015). Thus, it is necessary to implement person-centred interprofessional collaboration activities in higher and continuing education (Bloomfield et al., 2020).

Lecturers and trainers in higher and continuing education are challenged to set up sound strategies and meaningful collaborative interprofessional learning opportunities which apply a person-centred approach (Kidritsch et al., 2023). Specifically designed tools and assignments, learning environments, and (simulated) patients facilitate student engagement and fluidity in interprofessional learning (Byerly et al., 2021; Rogers, 2011). Self-reflection and rich-narrative feedback, which replicate and resonate with practice (Bloomfield et al., 2020), enable learners to proceed from 'knowing' about interprofessionalism to 'being' interprofessional (Jarvis-Selinger et al., 2012; Lawn, 2016).

Organising innovative changes in curricula, internships, or continuing training measures and also developing educators who implement and evaluate IPECP in institutes is time-consuming (Evans et al., 2016; Handgraaf et al., 2016). It can be an overwhelming challenge for educators to coordinate the planning, effective communication, and efficient collaboration between multiple programmes, departments, or even institutions (Grymonpre, 2016; Health Professions Accreditors Collaborative, 2019). Therefore, materials are needed to inspire and guide educators who are in the process of developing or implementing person-centred interprofessional education for collaborative practice.

In order to develop process guide materials, this study explores and addresses the work of educators. The term 'educators' includes lecturers who apply interprofessional education in higher education institutions and professional trainers who implement continuing education for collaborative practice or who supervise interprofessional activities of trainee students.

1.2 Research background

This study was part of the European project "Interprofessionalism in action! Aligning interprofessional education and collaboration in practice, using promising regional experiences for international exchange" (INPRO). The overarching objective of the project was to align innovative IPECP approaches between seven project partners from higher education institutions and rehabilitation facilities in Belgium, Finland, the Netherlands, and Austria. The project contributes to transformative education (UNESCO, 2023) and has an emergent and explorative character (Alvesson & Sköldberg, 2009).

In terms of concept, this study was inspired by Educational Design Research (Bakker, 2018; McKenney & Reeves, 2019). Educational Design Research is driven by interaction, reasoning, and collaborative responsibility between practice and science (Mezirow, 1998), with the aim to sustain and fit developed interventions into their implemented settings (Kelly, 2004).

1.3 Research objectives

The objectives of this study were twofold: firstly, to explore the work processes of educators who implement person-centred, interprofessional education for collaborative practice which, secondly, served to identify design principles based on which process guide materials for educators from various health and social care settings were developed

2.0 Methods

A mixed-methods Educational Design Research study was conducted from 2021 to 2023. It followed an iterative and process-oriented approach (Bakker, 2018; Reeves et al., 2015) which involved four complementary workstreams. A synthesis from each workstream's findings served to explore the work processes of educators as a basis for developing the content and structure of a theory- and experience-based process guide. Figure 1 visualises how the workstreams interrelate with each other in iterative phases of empirical research and theory development (adapted from Bakker, 2018). Workflow analysis contributes to theory by enhancing an understanding of educators' work processes. This informs the educational design and implementation (Unertl et al., 2010).

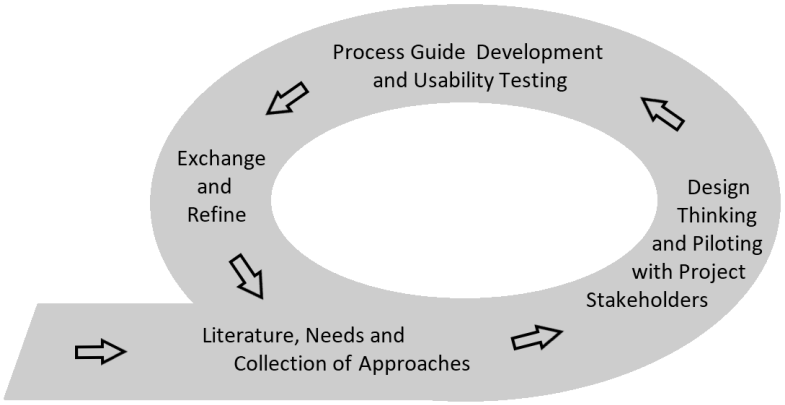

Figure 1*. Workstreams in the Context of the Design Research Cycle (adapted from Bakker, 2018)*

The workstreams follow the process of Educational Design Research as shown in Figure 2 (adapted from McKenney & Reeves, 2019). This study focuses on the work processes of educators regarding educational design and on the development of a process guide's contents and structure. It does not report on the learning effects of students who tested the developed materials or educational interventions (De Weerdt et al., 2024; Kolm et al., 2023; unpublished data).

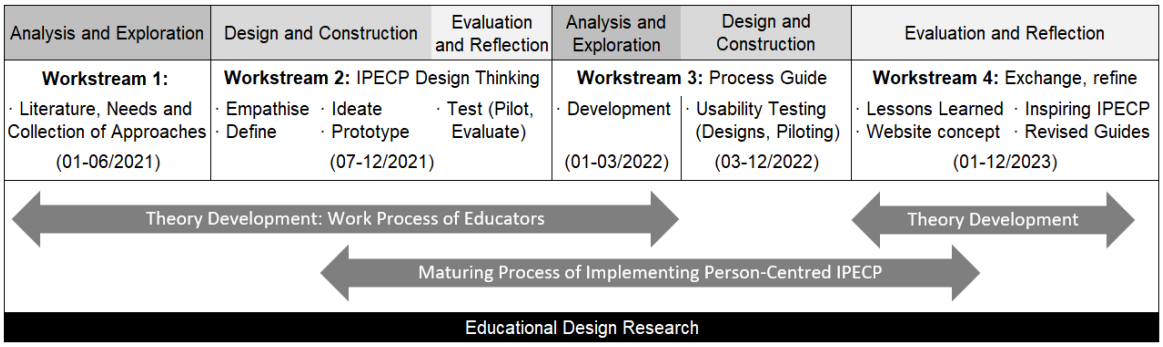

***Figure 2**. Educational Design Research Process (d.school, 2010; adapted from McKenney & Reeves, 2019, pp. 83–84)*

Data collection and analysis are elaborated by workstream in Sections 2.1 to 2.5. Details regarding data collection, participants, and findings that influenced or resulted from the design are summarised in Tables (see Table 1, Table 2, Table 3, and Table 4). Informed consent was obtained from the participants. The Ethics Committee of the Federal State of Lower Austria has stated that there is no obligation for this study to be submitted to an ethics committee (GS1-EK-4/776-2022).

2.1 Workstream 1: Literature, Needs, and Collection of Approaches

In spring 2021, the literature was reviewed narratively with the purpose of researching existing materials regarding IPECP guides, toolboxes, and didactic or curricular frameworks. In addition, various educational approaches towards person-centred, interprofessional learning and their effectiveness were identified.

Based on the literature (Barr, 1996; Reeves et al., 2011; Reeves et al., 2016; Rogers et al., 2017; Rosengren et al., 2018; Thistlethwaite & Moran, 2010), an online survey on existing practices of interprofessional education was developed by the authors UH, AK, IA, TD, SJL, JR, and CFT. This survey was distributed among representatives of higher education institutions in Austria, Belgium, Finland, and the Netherlands and was open from 16 March 2021 to 19 May 2021. In total, the team reached out to 55 persons via personal contacts. Descriptive statistical analysis and visualisations via the software 'Tableau' (Tableau, 2023) were used by TD to summarise the collected approaches for the project consortium and the public. Based on these, TD investigated how didactics could be visualised via a filter-based toolbox through the project website (Draxler, 2021).

In order to explore the needs and work processes of educators regarding the implementation of person-centred IPECP in contextual specifications, AK and UH led moderated group discussions with all stakeholders relevant to the work process, and TD held interviews with educators from higher education settings (see Table 1).

***Table 1.** Data Collection Details, Participants, Design Findings of Workstream 1*

Workstream	Data Collection Details	Participants	Design Findings
1: Literature, Needs and Collection of Approaches	**Narrative literature review on person-centred IPECP:** PubMed, Google Scholar	**32 sources selected:** 6 policies / overall guidance; 8 toolboxes and frameworks; 6 IPECP models; 12 design / evaluation guides	**Online survey** on practices of interprofessional education in the four project countries
	Needs, work process analysis: 26 moderated group discussions in MS Teams; 3 interviews in MS Teams; Wordcloud visualisation; reporting to INPRO project consortium members; English and German language	**83 Austrian, Belgian, Dutch, Finnish (7 partners):** 5 patient representatives; 12 professionals from rehabilitation practice; 35 health and social care students (last year); 18 higher education lecturers; 6 administrators; 7 people in leading and managing positions	Administrative timeframes; opportunities in curricula for implementing person-centred IPECP; ways of intensifying patient involvement; educator user persona; facilitators and barriers of educators' work; **design topics a), b) and c), shown in Figure 3**
	Online survey on existing interprofessional education: 57 questions in LimeSurvey; English language	**21 full responses:** 11 Austria; 3 Belgium; 3 Finland; 4 Netherlands	**21 collected approaches;** website visualisation

The findings from the literature, online survey, and needs analysis were reported to the INPRO project consortium in June 2021. The consortium members provided feedback and identified differences between the needs of the two project settings (higher education and rehabilitation practice). Additionally, the project members identified interlinkages in terms of how these settings and their stakeholders could learn with, from, and about each other. Out of the identified differences and links, the consortium members identified from their discussion a full consent to the following three design topics, which influenced the following workstreams (Figure 3):

a) 'Facilitating Interprofessional Education in a Global Classroom Setting' for lecturers and students from all four countries who co-designed and learned in an online environment;

b) 'Interlinking Higher Education and Rehabilitation Practice' for all lecturers and professionals who engaged in exchange on how they coach students towards patient encounters;

c) 'Facilitating Interprofessional Collaborative Practice in Rehabilitation' for professionals from Austria, Finland, and the Netherlands who exchanged their views on how they train professionals.

2.1 Workstream 2:

IPECP Design Thinking and Piloting with Project Stakeholders

Five Design Thinking workshops were conducted in July and September 2021. Patients, health and social care professionals, students, lecturers, and public health experts were purposefully recruited by the project consortium (see Table 1 below).

The moderators, AK and CFT, prepared and shared with the participants the agenda and materials based on findings from Workstream 1. Minutes were taken via Microsoft Teams video recording, transcripts were checked by the research team for accuracy, and entries were made in the work materials (Mural, Google Docs, and flipcharts).

From the first to the last consecutive workshops, four of the five stages of Design Thinking (empathise, define, ideate, prototype, test) were applied (d.school, 2010): To empathise with possible needs of a patient, a Database of Individual Patient Experiences (DIPex) case (Health Experiences Research Network, 2019) and role play were used. Competencies required to meet these needs were defined through the co-creation of user personas (of a patient, a learning professional, an educating professional, a student, and a lecturer). The participants worked in small groups to ideate educational scenarios for meeting these competencies. Their shared 'wildest dreams' served to brainstorm prototype designs and visualise them via the UCL Designer (UCL Knowledge Lab, 2021).

The fifth Design Thinking stage 'test' was continued with those educators (the authors AK, UH, CZ, IA, CDW, SJL, AMP, MN, JR, CFT, and others) who piloted the feasibility of their design prototypes: From September to December 2021, bi-weekly meetings were held to specify competencies into learning outcomes and to develop workbooks (detailed timetables, grouping, and assignments) for interprofessional, person-centred learning interventions based on the ICF framework. The designs were piloted from 1 to 4 December 2021.

In Table 2, the scope and participants are summarised, and developed designs are listed. AK, CFT, and students visualised via interactive H5P slides, Powtoon, and filmed interviews how stakeholders experience person-centred IPECP as a result of an educator's work. Qualitative data from educators' and students' diaries and the minutes of their reflective discussions were thematically summarised in Word by UH, AK, and CZ to inductively identify categories regarding the educators' work processes.

The research team maintained reflexivity by keeping reflexive diaries, discussing and challenging established assumptions. All data were organised in a repository maintained by AK. To increase trustworthiness, data were collected for an extended period of time, and data as well as investigator triangulation were used.

Table 2: *Data Collection Details, Participants, Design Findings of Workstream 2*

Workstream	Data Collection Details	Participants	Design Findings
2: IPECP Design Thinking and Piloting with Project Stakeholders	**Design Thinking topic a) and b):** 3 x 3 hours online workshops in MS Teams; English language	**18, Austrian, Belgian, Dutch, Finnish (4 partners):** 1 patient representative; 3 health care students; 13 higher education lecturers; 1 didactical expert; 1 public health expert	Competencies of co-created user personas (patient, student, lecturer); H5P interactive slides 'INPRO Journey of the Person in Interprofessional Education'; **educational designs**
	Design Thinking topic b) and c): 2 x 4.5 hours hybrid workshops in MS Teams and St. Pölten, Austria; German language	**12, Austrian (2 partners), Swiss guest:** 2 patient representatives; 3 professionals; 1 health care student; 4 higher education lecturers; 1 didactical expert; 1 public health expert	Competencies of co-created user personas (patient, learning professional, educating professional); **educational designs**
	Piloting design topic a): 2 ECTS international online setting in MS Teams; Wordcloud, Diaries in Microsoft Word; English language	**64, Austrian, Belgian, Dutch, Finnish (4 partners):** 50 health and social care students (second study half); 14 higher education lecturers	**Proof of feasibility;** Summary of educator and student diaries; Video 'INPRO Journey of the Student'; didactic approach 'INPRO International Online Learning'
	Piloting design topic b): 1 ECTS online setting in MS Teams and on-site rehabilitation / prevention in Moorbad Harbach / Drosendorf, Austria; Diaries in Microsoft Word; German language	**63, Austrian (2 project partners, guest partner):** 6 patient representatives; 6 professionals; 45 health care students; 5 higher education lecturers; 1 didactical expert	**Proof of feasibility;** Videos 'INPRO Journey of the Interprofessional Service Provider' and 'INPRO Journey of the Service User'; approaches 'Practice in rehabilitation'; 'Practice in Prevention, with children'
	Piloting design topic c): one-hour online setting in Zoom; Finnish language	**45, Finnish (1 partner):** 45 rehabilitation and healthcare professionals	**Proof of feasibility;** Approach 'Specialist hour'
	Reflective discussions: 10 online meetings in MS Teams; English and German language	**16, Austrian, Belgian, Dutch, Finnish (7 partners):** 10 higher education lecturers; 5 professionals; 1 patient representative	**Educators' work process:** Needs-based idea, planning, learning outcomes, content and methods, detailed strategy, evaluation

2.3 Workstream 3: Process Guide Development and Usability Testing

Based on the educators' work processes that had been explored in Workstreams 1 and 2, a process guide concept was designed by AK, UH, CZ, and CFT in early 2022 (Table 3). A storyboard for an introductory video emerged, which was implemented by using a Prezi to visualise the educators' work processes through person-centred IPECP (Prezi, 2023).

The process guide concept was realised in two setting-specific guide prototypes. The decision for setting-specific process guides was encouraged by the INPRO project's advisory board (consisting of policy makers, financing body, health research and patient representatives). Both guide prototypes were based on literature and described experienced approaches (findings from the previous workstreams) as examples. The process guides contained definitions, didactical planning details as well as written and linked examples, such as the role of a 'coach'.

The first guide prototype targeted educators who coordinate the training of professionals or students in rehabilitation practice. It was intended to be short and easy to read, also when printed on paper. The second guide prototype targeted educators of students in higher education settings. It aimed to provide an overview of the scientific background and the needs of the involved stakeholders as well as to guide towards competency-oriented methods in more detail.

In March 2022, the process guide prototypes were shared with the project consortium. INPRO project members evaluated the guides' usability. Until December 2022, the project members applied the guided process when updating or developing person-centred IPECP for their own settings. The System Usability Scale was provided as an online survey in Google Forms (Brooke, 1996). The questionnaire consists of 10 items and is scored from 0 (least) to 100% (best usability).

The process guide for higher education settings was evaluated by the four INPRO higher education project partners with a focus on design topic a) 'Facilitating Interprofessional Education in a Global Classroom Setting'. An 'international online learning' intervention that had been developed in Workstream 2 was further developed by UH, AK, IA, CDW, SJL, AMP, and JR. 109 students and 8 educators described their experiences with the process in an online survey using closed and open questions. 5 moderated group discussions were held with a total of 30 educators in order to collect narrative feedback or comments on the process and guide. The findings were thematically summarised in Word by CZ, and descriptive statistical analysis was applied by AK in Excel with the use of LimeSurvey (2022).

The process guide for rehabilitation practice was evaluated by the three INPRO rehabilitation partners. The design topics b) 'Interlinking Higher Education and Rehabilitation Practice' and c) 'Facilitating Interprofessional Collaborative Practice in Rehabilitation' were explored by the partners' educators LA, CH, CL, and LM. A face-to-face Design Thinking workshop and moderated group discussions focused on professionals in the early stages of their career and on how to 'train the trainer'. Minutes were collected and the findings were thematically summarised by CL and AK in a Word storyboard for a video-recorded group interview.

Table 3. *Data Collection Details, Participants, Design Findings of Workstream 3*

Workstream	Data Collection Details	Participants	Design Findings
3: IPECP Process Guide Development and Usability Testing	**Concept and process guide prototype development:** 1 meeting in St. Pölten, Austria; Microsoft Word, Prezi; English language	**4, Austrian (2 partners):** 2 higher education lecturers; 1 professional; 1 didactical expert	**2 setting-specific PDF process guide prototypes;** video 'INPRO Journey of the Educator'
	Usability higher education: System Usability Scale; 5 online moderated group discussions in MS Teams, Microsoft Word, Mural; Piloting design a), followed by an online survey via LimeSurvey; English and German language	**180, Austrian, Belgian, Dutch, Finnish (4 partners):** 30 higher education lecturers (24 facilitating lecturers); 150 health and social care students (second study half)	**Proof of guide usability:** further developed pilot a), thematic summary, statistics; 'train the trainer' materials, instructive and reflective meetings; administrative checklist
	Usability rehabilitation practice: System Usability Scale; 1 Design Thinking workshop in Jyväskylä, Finland; 1 online moderated group discussion in MS Teams; 3 moderated group discussions in Beetsterzwaag, the Netherlands; English and German language	**16, Austrian, Dutch, Finnish (3 partners):** 14 professionals; 2 higher education lecturers	**'Train the trainer' concept:** approach 'Role of the coach'; video 'Journey of the professional trainer'

2.4 Workstream 4: Exchange and Refinement

Once every month from January to May 2023, all INPRO project consortium partners engaged in exchange across all three design topics on their diverse person-centred IPECP approaches and lessons learned (Table 4). The consortium members (AK, UH, CZ, IA, CDW, SJL, CL, LM, JR, CFT, and others) developed a website concept and a template to share the identified approaches in an easy and inspiring format (Figure 3).

Figure 3. *Inspiring Approaches Template*

The templates were filled in by the project members and cooperation partners to describe the developed pilots as well as additional inspiring approaches that had not yet been collected through the survey in 2021. The toolbox filter idea that had been investigated in Workstream 1 was refined and implemented on the project website in order to guide the visitors through the diverse range of materials and approaches.

The process guides and the categories identified in Workstream 2 were evaluated and revised for 'goodness-of-fit' by UH and AK with consideration for the findings from Workstream 3, the educators' lessons learned, and recent literature. The guides were linked to the developed videos and inspiring approaches. All materials were implemented on the project website, led by SJL. The project results were shared and discussed within regional networks and at international conferences with the aim of facilitating the further context-specific implementation of person-centred IPECP.

Table 4. *Data Collection Details, Participants, Design Findings of Workstream 4*

Workstream	Data Collection Details	Participants	Design Findings
4: Exchange and Refine	**Open exchange forum:** 5 moderated group discussions in MS Teams; English language	**14, Austrian, Belgian, Dutch, Finnish (7 partners):** 7 professionals; 7 higher education lecturers	**Didactics template;** educators' lessons learned; website concept;
	Sharing approaches: Template to share inspiring, newly developed or identified didactics; English language	**22 identified didactics:** 9 Austria; 5 Finland; 3 the Netherlands; 4 two or all project countries	**Inspiring didactics;** Toolbox filter; project website
	Refined process guides: PubMed, Google scholar; English language	**2, Austrian (1 partner):** 2 higher education lecturers	**Final guide versions;** Interlinkage of materials

3.0 Key findings

This study explored the work processes of educators who implement person-centred, interprofessional education for collaborative practice. Design principles were identified as three topics, based on which materials were developed to guide educators from various health and social care settings in their work processes. Below, based on the four workstreams, those findings and insights are reported which relate to educators' work and were thus considered regarding their relevance for process guide materials.

3.1 Literature identified and approaches collected in Workstream 1

The literature provided evidence regarding the effectiveness of interprofessional education for collaborative practice (Guraya & Barr, 2018). Several existing policies and materials guiding IPECP, related learning theories, and a consensus on IPECP terminology were identified (Ford & Gray, 2021; Health Professions Accreditors Collaborative,

2019; Khalili et al., 2021; National League for Nursing, 2022; World Health Organization, 2010).

No consensus existed regarding the concepts of person-centred or patient-centred care (Health Foundation, 2016), although this was essential terminology for this study. In addition, teaching person-centred care (regarding patients) had to be distinguished from person-centred practice in education (regarding students, didactic design, or teaching). Finally, concepts related to collaborative online international learning (COIL) were also relevant to the study (Rubin & Guth, 2015).

Several toolboxes and frameworks were identified. Relevant for this study were TeamSTEPPS (Agency for Healthcare Research and Quality, 2023), the IPE Course Adaptor Toolkit (University of Michigan, 2017), and the IPE Training Toolkit (University of Washington, 2023), approaches regarding curriculum development (Kern, 2022; Dunston et al., 2016) as well as the principles of the InterProfessional Community of Practice (Eijgenraam & van Dijk, 2018). Relevant identified case-based IPECP activity models were IPCIHC (Tsakitzidis et al., 2015) and MAGPIE (Cahill et al., 2013), interprofessional team reasoning (Packard et al., 2012), or interprofessional shared decision making (Légaré et al., 2011) as well as PEEER (Conigliaro et al., 2015) and the EFECT framework (Bitton et al., 2013). Approaches towards evaluation were identified from the National Center for Interprofessional Practice and Education (2023), measures regarding the empowerment of patients, guidelines (Smeets et al., 2022) as well as general frameworks (Baranowski & Stables, 2000; Kirkpatrick & Kayser Kirkpatrick, 2016; Phillips et al., 2016).

Further frameworks were described by the online survey participants, of which the 'meta-model' of Reinders et al. (2020) was considered and described in the process guide materials regarding the evaluation of professional identity development. In the process guide for higher education settings, it was described that approaches towards interprofessional education took place most frequently with advanced pregraduate students. In these approaches, activity-, practice-, and exchange-based learning were applied as a combination of online and face-to-face settings.

3.2 Needs identified in Workstream 1

The following needs were identified for the project's stakeholders: For educators from any setting, it is relevant to show learners the perspective of patients. In this regard, patients expressed the need for a 'mindful rooming-in'. Patients who enter a room or institution are faced with several impressions. They depend on a welcoming atmosphere and prefer sharing details on their health need(s) with only one professional instead of several. They feel treated like a person (and not like a patient "number") if professionals collaborate as a team when exchanging patient information. Data protection needs to be ensured,

and staff members responsible for improving the patient's care should be identified.

Professionals from rehabilitation practice consider the value of investing 'in-between times' in IPECP activities. They have narrow time slots in which they need to consider whether to use their time to focus on IPECP or on the patient. Both may be combined as person-centred IPECP, e.g., when meeting to discuss a patient's case or when documenting. The ICF framework and electronic documentation systems support them in sharing patient information interprofessionally. Professionals who are new to a team need to overcome barriers to ask their colleagues questions and to develop an awareness for their own competences, habits, or unwritten rules. Prerequisites for successfully implementing person-centred IPECP are time and space to communicate with colleagues and patients and a common basis, such as a common aim or task.

Students are aware of the need to gain competence in communicating eye to eye with the person and the interprofessional team. They want to experience positive examples of interprofessional interaction where everybody has the chance to contribute something and to give feedback. Students wish to learn in 'adoptable', 'physical rooms' and 'all together' (with a patient and different professionals), while being supported individually.

Higher education lecturers expressed the need to be well prepared and to actively facilitate person-centred IPECP learning experiences, e.g., by providing examples and encouraging students' preparation and evidence-based practice. Identified prerequisites for implementing and coordinating person-centred IPECP were didactical knowledge, enthusiasm to participate, communication and partnership, time, and infrastructure.

This is where the administrators come in: The more learners, educators, patients, divisions, or collaborating partners are involved, the stronger the need for administrative staff to take care of or support grouping, organising rooms or online meeting links. The resources needed for administrators increase with the degree of complexity, afforded communication, and later changes. Therefore, coordinating educators (ideally no more than one or a few) should provide the needed information timely, definitively, and in line with existing logistical procedures and structures.

Seven study programme and rehabilitation personnel leaders prioritised their needs regarding quality improvement (adapted from Unertl et al., 2010). They ranked working in a 'person-centred', 'efficient', and 'effective' manner higher than working 'securely' or 'timely', while 'equitably' was rated lowest.

From the identified differences and links in the literature, approaches collected from the online survey, and the needs analysis, three topics emerged and informed the design process (Figure 4).

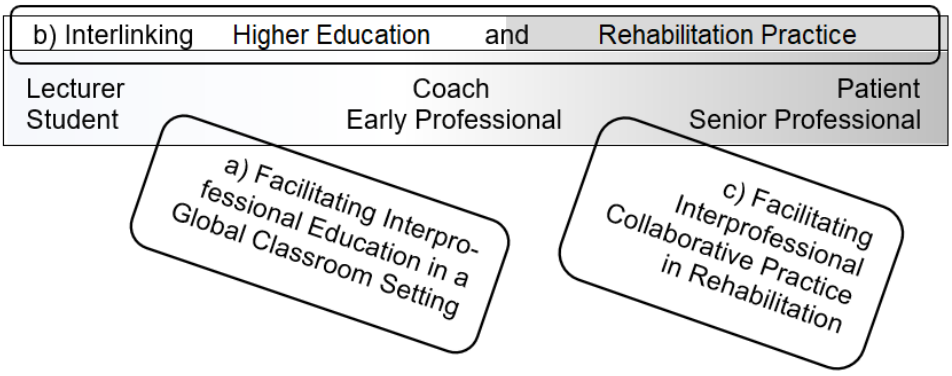

Figure 4*. Design Topics in Interprofessional Education for Collaborative Practice*

3.3 Work processes of educators identified in Workstream 2

The following key findings from Design Thinking and Piloting with Project Stakeholders were influenced by Workstream 1. The findings on educators' work processes applied to higher education as well as rehabilitation practice settings and are connected with each other (as visualised in Figure 5).

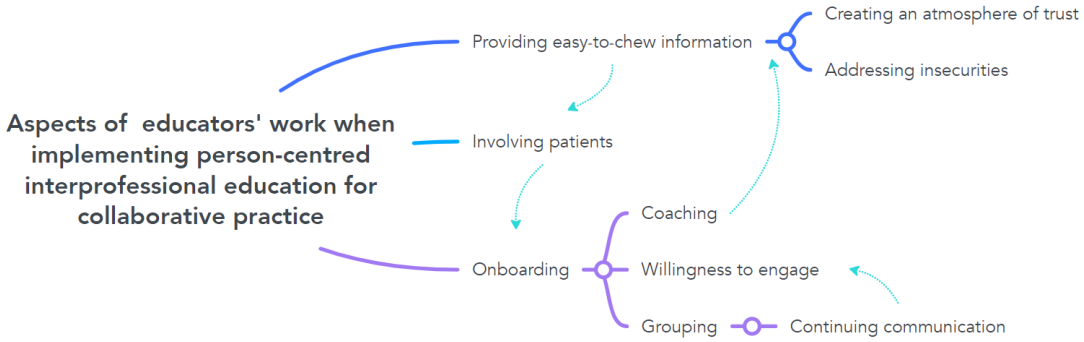

Figure 5. *Aspects of Educators' Work when Implementing Person-Centred IPECP*

Providing 'easy-to-chew' information was an aspect that applied to all stakeholders involved. It includes breaking down information into little pieces which are easy to access, read, and understand. Person-centred IPECP always requires the collaboration of different divisions and professions. Whether it came to learning activities, trainings for new person-centred IPECP educators, or logistic information, materials had to be easy to read and the essential information had to be summarised according to the addressed stakeholder's professional interest.

In connection with the previous aspect, creating an atmosphere of trust by addressing insecurities was relevant for educators in all settings. Insecurities about collaborating with strangers from different professions, countries, or universities were expressed and increased when working in an online setting, a foreign language, or with real patients. Educators or learners were able to reduce their insecurities by

preparing with adequate and 'easy-to-chew' information provided for their task. Sharing insecurities with others and raising an awareness of 'treasures' (such as previous IPECP experiences or existing person-centred IPECP structures) helped to create an atmosphere of trust.

Educators identified coaching as needed to facilitate interaction. In the 'role of the coach', educators ask for and give feedback in order to support learners' progress. Educators who coach professionals or students need the ability to adapt to the coachee and to show an open, self-reflected attitude.

The 'role of the coach' related to the onboarding process. New educators experienced a certain level of uncertainty regarding individual group dynamics or solutions that a group may come up with. Coaching interprofessional groups, especially in an international and/or online setting, was not a desirable task for all educators at the involved institutions.

Finding new educators and grouping them with interprofessional learners requires collaboration and alignment across divisions or departments. In this planning process, educational coordinators, leaders and administrators, or other services were involved. Educators expressed a higher willingness to engage in person-centred IPECP than in organising it. Risks for misunderstanding or conflict were reduced by continuing communication, namely sharing information continuously with all involved stakeholders in the way that they needed it.

Continuing communication supported a willingness to engage in all stakeholders when their expectations were identified and met (e.g., during mentoring, conversation with or development of employees). Specific preparation and co-work enabled stakeholders to know when and how to act as well as to become aware of boundaries such as professional competencies.

Involving patients in the Design Thinking workshops served to meet specific patient needs by educators and learners. Patients recommended the use of lay-language communication, simplifying examples, humour, or movement activities to ease communication. Case discussions, case-based role play, and real encounters were piloted in the feasibility tests (see Table 2) to explore the onboarding of patients and students. It was found that the preparation of interprofessional patient encounters could be supported by providing 'easy-to-chew' information.

In all three designs of person-centred IPECP (see Figure 3), it was explored how patients could be involved. Under design topic a), previously prepared paper and video patient cases were used for the assignment in a global classroom setting ('International online learning'). After the intervention, several students expressed their wish to have the chance to ask the patient questions, while others were fine with the written description. This was explored under design topic b) via case-based role play and real encounters ('Practice in rehabilitation'

and ‘Practice in prevention, with children’). Students’ insecurities regarding real encounters were offset by preparational information, exemplary user personas, and advice regarding the communication needed by patients as well as role play and the use of the ICF framework. Under design topic c), professionals identified benefits resulting from integrating real encounters into their interprofessional case discussions. For example, such discussions took place in interprofessional one-hour webinars which were recorded and made available for asynchronous learning (‘Specialist hour’).

3.4 Process guides developed and usability-tested in Workstream 3

The key findings from Workstreams 1 and 2 influenced the development of two setting-specific process guides. The literature, needs, and design approaches of educators were considered to create the content. As an example, continuing communication with stakeholders was emphasised by guiding the formation of a planning group. While the intensity and number of persons involved in such a group varied between settings, group formation itself was identified as a common work process for implementing interprofessional education in an institution. Further common work processes and interlinkages between the settings determined the structure of the process guide concept (as shown in Figure 6).

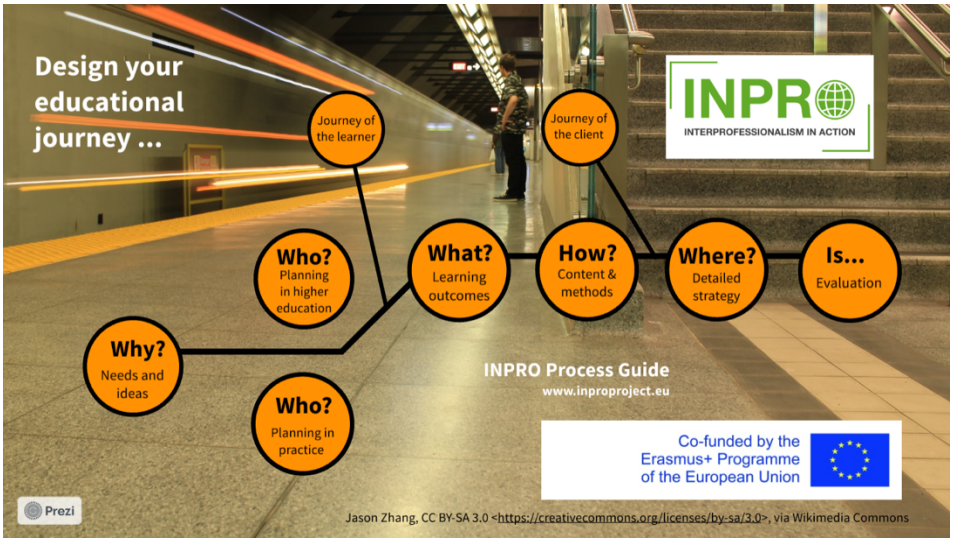

Figure 6. *Process Guide Concept (adapted from Zhang, 2019*

Providing ‘easy-to-chew’ information was taken into account for the first draft of the process guides. However, its importance became even more evident in usability testing when the ‘international online learning’ intervention was repeated with more students and more lecturers involved. It was identified that the structure of the process guides should allow educators to look directly for the information that they needed, without having to read the whole guide (see Figure 7). The guide for rehabilitation practice focused on reflective tasks for educators, while the guide for higher education settings provided both detailed and summarised information. The easiest possible wording was used for the context and practical examples, or methodological suggestions were provided for the purpose of inspiration (see Figure 7).

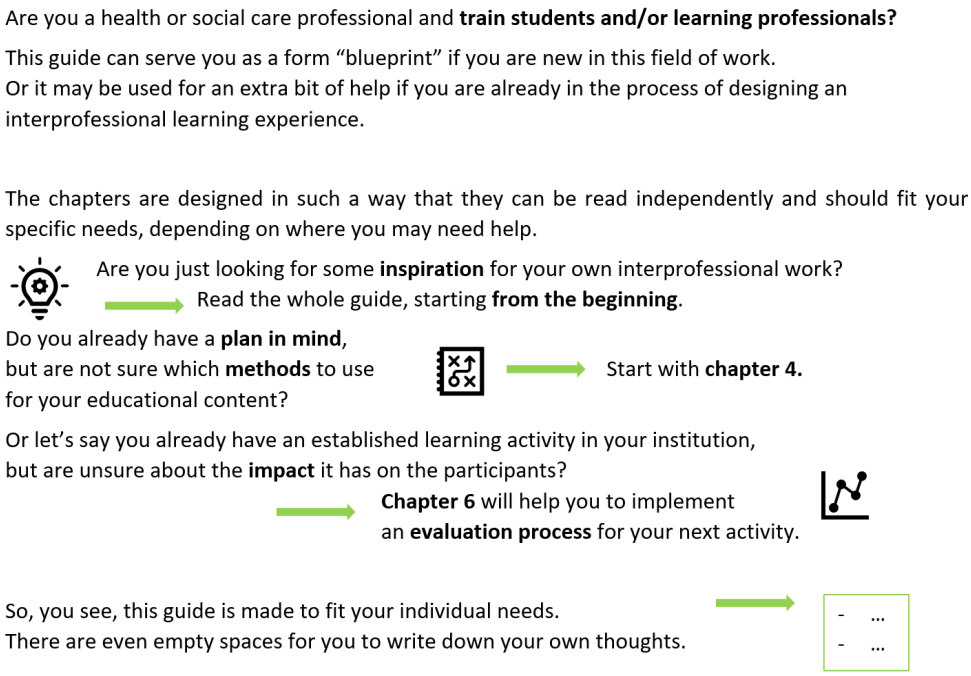

Figure 7. *Developed Process Guide for Rehabilitation Practice*

With the purpose of addressing insecurities, examples for the implementation of Design Thinking workshops or the onboarding of new educators were provided. To support the onboarding of students, an alignment of timetables and the design of their learning path were explored. Didactic suggestions on coaching, how tasks could be prepared, and how to communicate with learners shall contribute to creating an atmosphere of trust. It was emphasised that learners collaborate, bring in ideas, and reflect on their experience because this contributes to the achievement of learning outcomes (see Figure 8).

7.4. Facilitating Interprofessional Collaboration

IPE activities can directly or indirectly impact on all of the following factors:

- **Shared language, common understanding:** Make students are aware that professional wording might not be understandable to everybody in the group.
  Give examples and encourage students to ask if something is unclear to them.
- **Person-centeredness:** Let the students focus on the given case and the person's needs.
  - What are the overall needs of the person?
  - How will they find out?
  - Which profession of the team is most likely to find out?
  - What type of assessment/anamnesis is needed?
  - How do I prepare the case examples?
- **Interprofessionalism vs. multiprofessionalism:** Interprofessional collaborative practice does not simply happen, but depends on internal and external factors such as
  - the active role of the client in the healthcare team,
  - individual competences and motivation of the healthcare professionals,
  - as well as interpersonal interaction, trust, and respect.
  - Working hours/employment policies, structures, administrative support etc.

Figure 8. *Developed Process Guide for Higher Education Settings*

Recommendations on the involvement of stakeholders address the aspects of willingness to engage and continuing communication. A key finding regarding grouping in higher education settings was the importance of considering the administration timeline. In any setting, stakeholders involved in room logistics or IT systems may be needed. Involving patients was addressed in both process guides. The frequent use of case examples in the collected approaches was described and the usability of role play with patient actors was explored.

7 participants rated the usability of the process guide for higher education settings with a mean score of 61.07 (SD = 14.99), while 3 participants rated the usability of the process guide for rehabilitation practice with a mean score of 63.33 (SD = 5.14), which is slightly below the average of 68% and can therefore be labelled with the adjective 'OK' (Brooke, 1996). Most participants indicated that the guide drafts provided overview information, for which they had needed an average of 2 hours for reading.

3.5 Lessons learnt and refinement of process guide materials identified in Workstream 4

Consortium members who engaged in exchange regarding their lessons learnt from the project identified that introducing person-centred IPECP to stakeholders could start with an easy introduction to raise interest, followed by examples and benefits to create enthusiasm, and conclude with a complex concept only in the end. For learning ICF, this would start with the bio-psycho-social-spiritual model (Snyman et al., 2015), followed by practical use in person-centred IPECP, and would end with mentioning that the applied framework had been ICF. This was an example of providing 'easy-to-chew' information parts that are important for the current setting and stakeholder(s).

Such lessons learnt and aspects of findings influenced the development of a website concept regarding presenting the process guide materials to the public. The project consortium considered a differentiation of materials between 'getting inspired' and 'understand' as well as scientific background. Therefore, an 'easy-to-chew' template was developed based on aspects which had also been considered in the process guides, such as frameworks and evaluation models. Finally, 22 inspiring approaches in addition to those identified under Workstream 1 were visualised (see an example in Figure 9).

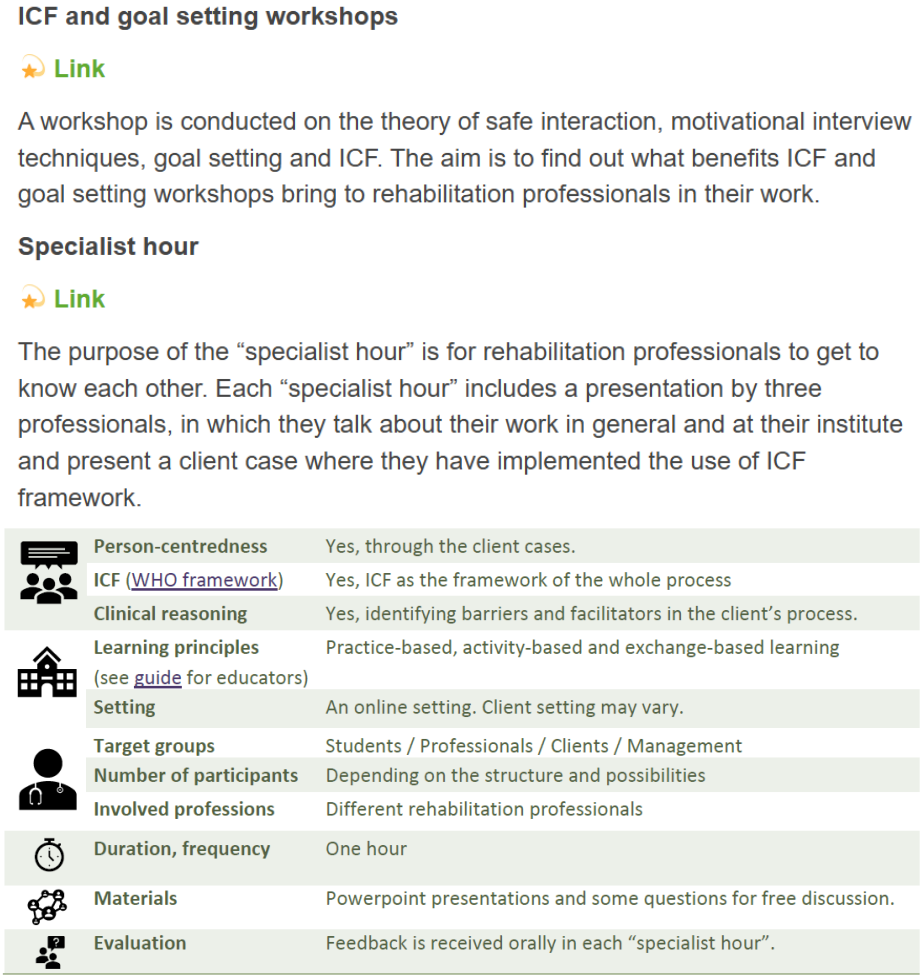

Figure 9. *Example of the Website and the Linked Inspiring Approach*

In total, 43 inspiring approaches were presented on the project website (INPRO, 2024), 18 of which could be implemented in rehabilitation practice settings and 10 would involve real patients. A filter option for settings and search keywords was implemented on the website to 'guide' visitors through the diverse and interlinked range of materials and approaches.

Both process guides were revised in consideration of the provided comments and minutes of reflections from Workstreams 3 and 4. Improvements included

- adding links to inspiring approaches and videos as well as to explanatory examples on how to involve stakeholders, planning, grouping or coaching

- introducing the use of the process guide from an educator's perspective

- addressing the 'journeys' (perspectives and needs) of students and patients

- and providing easy step-by-step guidance, especially for lecturers regarding the alignment of learning outcomes with methods and assignments.

Interested stakeholders from networks or conferences reacted with positive feedback regarding the relevance and validity of the developed materials. They differentiated between coordinating and facilitating person-centred IPECP and highlighted the importance of willingness to engage, of grouping, and of providing 'easy-to-chew' information. From their point of view, future design research could focus on involving patients or addressing insecurities. There was strong interest not only from educators but also from leaders in getting inspired by the collected approaches and in investing time in person-centred IPECP. Decision-makers considered the diversity of settings, stakeholders, and individuals and how not only patients or students, but most of all professionals and lecturers could be empowered in their work.

4.0 Discussion

In this study, an iterative and process-oriented approach was pursued in order to explore the work processes of educators in various person-centred IPECP approaches. Based on this, design principles were identified which served to develop process guide materials for educators in various health and social care settings. Three design topics resulted from the initial knowledge generation phase. The theory was developed that needs of educators differ between settings. This proved useful when developing extensive guiding materials and presenting them to educators by using supportive filters. The developed theory showed further interlinkages regarding the work processes of educators between their settings. By considering such links in the structure of guiding materials, the design can fit the work processes of all educators.

Considering these findings from the current Educational Design Research study, educators' knowledge transfer between theory and practice can be strengthened and, through this, the competencies of students and of the workforce in health and social care be enhanced (Reid et al., 2018).

Educators should be supported in evolving their planning and putting person-centred IPECP into action. Sensations of being overwhelmed may challenge educators who implement person-centred IPECP in higher or continuing education (Grymonpre, 2016; Reid et al., 2018). Therefore, sharing notions on how approaches could be implemented

in practice is crucial for better support. The identified design topics led to the design of process guide materials for two specific settings, thereby considering how the settings influence educators' needs regarding contents (Workstream 1). Interlinkages between educators' work processes in higher education and rehabilitation practice were identified and considered structurally. Interestingly, all key findings from Workstreams 2 and 3 were valid for higher education and rehabilitation practice.

The findings from Workstreams 2, 3, and 4 showed the potential for educators to exchange between settings and thereby bridge the gap between the competency levels of pre-graduate students and the levels needed in rehabilitation practice (World Health Organization, 2010). Educators were inspired by their peers' similar work processes and adapted the content of the process guide materials to their context-specific needs.

Several materials were developed: two setting-specific process guides and a collection of 43 inspiring approaches (an example is shown in Figure 9). The work of educators includes the familiarisation with other stakeholders' processes and needs which were visualised by using various media. Materials that describe the processes of educators and related stakeholders involved in IPECP are important because workflow analyses and an understanding of work processes inform effective design and implementation (Unertl et al., 2010).

Practical insights were provided by the emerging design topics (Workstream 1, Figure 3) and the explored work process variations, especially during piloting (Workstream 2, Table 2) and usability testing (Workstream 3, Table 3). The needs of lecturers in higher education and trainers of the professional workforce may differ regarding mission and structures: A student's career is planned by higher education, while continuing education is planned by the professionals in exchange with their employer. In addition, each institution has its individual history, culture, and structures and, as a consequence, possibly differing barriers or facilitators on the organisational, team, and individual levels (Wei et al., 2022). Therefore, the need for various approaches to person-centred IPECP was identified and explored through three design topics (Figure 3). Future studies could explore country-specific needs of policy makers and leaders and how they could be empowered in their willingness to engage.

Theoretical knowledge regarding the work processes of educators who engage in person-centred IPECP emerged from the literature study and explored iterations of needs, designs, reactions, or discussions. The identified policies, guidelines, and frameworks were inspired by the process guide concept and content. The scientific exchange between universities of applied sciences and rehabilitation centres from different countries led to deepened knowledge, which facilitated the implementation of educational designs (Reeves et al., 2015). Knowledge interests lay in developing process guide materials and

contributing to workflow theory (Unertl et al., 2010) which reflect principles of educators' practice, are based on theory (definitions, evidence), and share experiences from various person-centred IPECP approaches (Cambridge Dictionary, 2023). The identification of repetitions and similarities in the identified approaches and their underlying argumentation contributed to abductive reasoning and transformative education, which means that educators were empowered in modifying their approaches based on previous experiences (Schnepfleitner & Ferreira, 2021; Thagard & Shelley, 1997).

Empirical insights benefited from the implementation of Educational Design Research. The iterative, process-oriented approach served well to explore the work processes of educators in various person-centred IPECP approaches. The developed process guide materials provided educators with an insight into other educators' and related stakeholders' experiences, which in turn supported their work processes. This approach, co-creation and Design Thinking, allowed for a scientific exploration of principles and decisions in educators' work (Jenert, 2019). Diverse discussions or responses from diaries or surveys were also embraced. Regarding the usability of the developed process guide materials, reflective comments and discussions revealed far more precise criticism and recommendations than the quantitative usability measure.

The concepts which underlay the identified aspects matched not only between the iterated work processes, but further with already existing approaches and findings from the literature. First, the importance of involving patients was not only evident from 10 identified design approaches (Chapter 3.4), but is also described by Coleman et al. (2023) and Spencer et al. (2018). Second, the impact of logistics on grouping, which was explored by educators in this study, was also described in the literature (Baker et al., 2008; Robertson et al., 2010). Third, the willingness to engage on the part of students has already been described (D'amour & Oandasan, 2005; Hind et al., 2003). This is in line with the developed video 'Journey of the student' (Table 2). This video had been developed by a student to share experiences and to engage willingness of new students to participate in future 'international online learning' interventions.

Future Educational Design Research may also involve patients in curricular development (Towle et al., 2010), explore the use of digital methods to solve logistical challenges, and evaluate the effectiveness of onboarding measures, such as 'train the trainer' activities or the impact of information given to students prior to a learning intervention. Interlinkages between identified aspects and settings were explored in Workstream 4 but could be investigated in further research with a focus on the transition between interprofessional education and collaborative practice. For example, it could be explored how educational design overcomes barriers or embraces facilitating aspects in person-centred IPECP approaches. Additional settings that provide health and

social care could be considered, such as hospitals, nursing homes, ambulatory or primary care.

4.1 Limitations

There are certain weaknesses in the study design and generalisability of the findings. First of all, selection bias may have resulted from the purposeful recruitment of participants within the INPRO project. Therefore, the findings are shaped by the contributions and perspectives of the involved project members, their cooperation partners, and the individual settings. Nevertheless, this study was not only limited but also enhanced by being part of a project.

Observer bias may have occurred, since two authors (AK and CFT) were the moderators of the Design Thinking workshops in Workstream 2. This might have influenced the behaviour of the participants and therefore biased the findings. Everything possible was done to prevent this bias, e.g., the use of two moderators, the co-creation by all participants, and the involvement of various and external stakeholders. The formation of three design topics served to involve various educators from all project partners to explore their work processes and the usability of the process guide materials in Workstreams 2 and 3 independently.

Complex concepts might have been oversimplified, which could have been prevented by merging the empirical and practical findings with existing theories. Emphasising the importance of "easy-to-chew" information might have led to a situation where a practical need was elevated to the level of a design principle without first reflecting on it on the basis of theory. Nevertheless, this aspect was identified from various settings and all stakeholders. Therefore, its consideration in the design of guiding materials and their presentation on the project website was crucial.

Participants came only from a few European institutions, which means that generalisation of the results is not guaranteed. More Educational Design Research and analyses of work process in various person-centred IPECP approaches could help to validate the results and advance the process guide materials. For example, in each of the four involved countries and even more worldwide, several institutions applied person-centred IPECP already. Thus, not all existing knowledge regarding work processes, effects, barriers, or facilitators was identified in Workstreams 1 or 4 and could be explored in future studies.

For the survey and the interviews in Workstream 1, recruitment was conducted only among higher education institutions. It was easier for higher education institutions to provide staff resources for Educational Design Research. This was counterbalanced by the formation of design topics and contributing staff members. There were more activities in Austria than in the other three countries because the project consortium had planned the most time resources for the two Austrian partners. Partners from the other countries had resources for additional

activities which were not part of this study but can be followed on the project website. In addition, not all activities were conducted in the English language to reduce language barriers for the involved participants.

The following ethical considerations regarding the participation of the stakeholders in this study have to be discussed: Firstly, not all stakeholders were involved in the planning of the study, which not only aimed to benefit students and patients but also depended highly on administrators' work and IT support. Secondly, only staff employed at the participating institutions was funded. Resources for involving and valuing the work of patients or students are needed, and opportunities to engage decision-makers depend on networks. Thirdly, due to the process-oriented approach of co-creation and collaborative learning, anonymity was not given between the involved participants or for referenced authors or co-authors. Fourthly, the work processes of educators (and any other stakeholder) could have affected voluntariness, even if diaries, surveys, and participation in Design Thinking or reflective discussions were communicated as being voluntary, and non-responders existed. But everything was done to overcome these flaws, for example by involving all stakeholders in the needs assessment, informing them about the context of the study, asking for consent and emphasising voluntariness, valuing contributions verbally, and treating data confidentially.

4.2 Conclusions

The work processes of educators who implement person-centred, interprofessional education for collaborative practice were explored. Design principles were identified as three topics on which the development of process guide materials was based. The materials inspire and guide educators who implement person-centred IPECP. The structure of the developed process guides followed a work process that was common for all educators. The needs regarding the content varied between settings, which is why various approaches were established. To practically support educators who were new to person-centred IPECP, process visualisations and inspiring short summaries of existing approaches were developed.

The findings imply that the process guide materials should be utilised at the level of departments and institutes rather than just being available to educators who are already committed to person-centred IPECP. Particularly at the institutional level, person-centred IPECP-friendly framework conditions have to be established. Educators who enter necessary steps into the implementation work process (e.g., grouping logistics or the coaching of students) depend on low-barrier access to information that is currently relevant to them.

Overall, Educational Design Research is suitable for exploring the work of educators in various person-centred IPECP approaches and for generating theoretical knowledge. The findings may not depend on person-centred IPECP frameworks or settings related to this study, in

other words, be generic for any educational content. For example, needs and requirements for collaborative learning as well as international online collaboration competencies may apply to any interdisciplinary or international cooperation. In addition, a person-centred approach and considerations of users' needs could also be applied to content other than interprofessional education or collaborative practice in health or social care. Future studies may explore the applicability of the findings to other settings, educational content, or collaborative (online) learning in general.

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