



Interprofessional development of virtual patient cases: experiences and lessons learned – a qualitative study

Entwicklung interprofessioneller virtueller Patient:innenfälle: Erfahrungen und lessons learned – eine qualitative Studie

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Abstract

Question/objective: Expertise from multiple professions is often required to solve complex problems in healthcare. This requires interprofessional clinical decision-making processes, which should be learned during training. Interprofessional digital patient cases offer the opportunity to train clinical reasoning.

As part of the HEDS project at Charité – Universitätsmedizin Berlin, interprofessional virtual patient cases were developed by interprofessional case development teams. The aim of the study was to document the findings and experiences of the case developers to inform future interprofessional case development.

Methods: Seven individual interviews with case developers from different professions were conducted and qualitatively analyzed (Kuckartz & Rädiker 2022). The case developers were asked about their experiences in interprofessional case development using a semi-structured interview guide.

Results: The findings offer insights into personal experiences as well as lessons learned regarding content, structure and collaboration during the development of interprofessional virtual patient cases. Although interprofessional case development is described as laborious and time-consuming, the overall conclusion is positive. The personal knowledge gain and added value in terms of content are summarized as worthwhile.

Discussion: Given the need to strengthen interprofessional education and digital transformation in healthcare, technology-supported learning in an interprofessional context is essential. Preparing students for collaborative and digital healthcare during their education is a crucial goal for the future. Recommendations from this study may support future developments of interprofessional virtual patient cases in interprofessional education.

Abstract

Fragestellung/Zielsetzung: Für die Lösung komplexer Probleme in der Gesundheitsversorgung ist häufig die Expertise mehrerer Professionen gefragt. Hierfür müssen interprofessionelle klinische Entscheidungsfindungsprozesse stattfinden, die schon in der Ausbildung erlernt werden sollten. Interprofessionelle digitale Patient:innenfälle bieten die Möglichkeit klinische Entscheidungsfindung zu trainieren. Im Rahmen des Projekts „HEDS“ an der Charité – Universitätsmedizin Berlin wurden interprofessionelle virtuelle Patient:innenfälle durch interprofessionelle Fallentwicklerteams entwickelt. Ziel der Studie ist es, die Erkenntnisse und Erfahrungen der Fallentwickler:innen zu erfassen, um für zukünftige interprofessionelle Fallentwicklungen zu lernen.

Methoden: Es wurden sieben Einzelinterviews mit Fallentwickler:innen aus verschiedenen Berufsgruppen durchgeführt und qualitativ analysiert (Kuckartz & Rädiker 2022). Die Fallentwickler:innen wurden mit einem semistrukturierten Interviewleitfaden zu ihren Erfahrungen bei der interprofessionellen Fallentwicklung befragt.

Ergebnisse: Die Ergebnisse geben sowohl Einblicke in das persönliche Erleben als auch lessons learned hinsichtlich Inhalt, Struktur und Zusammenarbeit während der Entwicklung interprofessioneller virtueller Patient:innenfälle. Obwohl die interprofessionelle Fallentwicklung als mühsam und zeitintensiv beschrieben wird, wird dennoch ein positives Fazit gezogen. Der persönliche Wissenszuwachs und ein inhaltlicher Mehrwert werden lohnenswert resümiert.

Diskussion: Angesichts der Notwendigkeit, die interprofessionelle Ausbildung und die digitale Transformation im Gesundheitswesen zu stärken, ist technologiegestütztes Lernen in einem interprofessionellen Kontext unerlässlich. Die Vorbereitung der Studierenden auf eine kollaborative und digitale Gesundheitsversorgung während ihrer Ausbildung ist ein entscheidendes Ziel für die Zukunft. Für zukünftige Entwicklungen interprofessioneller virtueller Patient:innenfälle im Rahmen der interprofessionellen Ausbildung können aus den Ergebnissen dieser Studie generierte Empfehlungen hilfreich sein.

Keywords

medical education – health professional education – interprofessional learning – virtual patient cases – interprofessional case development – qualitative content analysis

Keywords

Medizinische Ausbildung – Ausbildung Gesundheitsberufe – Interprofessionelles Lehren und Lernen – Virtuelle Patientenfälle – Interprofessionelle Fallentwicklung – Qualitative Inhaltsanalyse



INTRODUCTION

Relevance of Interprofessional Collaboration and Interprofessional Education

Interprofessional collaboration (IPC) is becoming increasingly important amid complex challenges in the healthcare sector, including demographic, economic, and technological changes (Deloitte, 2024; Frenk et al., 2010; Sturm et al., 2022). IPC aims to improve patient care and safety and to increase job satisfaction among health professionals, thereby helping counteract the shortage of skilled workers (Charité, 2018; Sottas, 2016; WR, 2012). The ability to engage in IPC is seen as a key competence for sustainable healthcare (Cichon & Nock, 2024). Moreover, there is international consensus that these skills should be taught early on in Interprofessional Education (IPE) in medicine and health care studies (Räbiger & Beck, 2017). IPE has been shown to positively affect students' knowledge, skills, and attitudes (Guraya & Barr, 2018), and it is widespread worldwide. The range of courses is also increasing in Germany (Ewers & Walkenhorst, 2019; Nock, 2020; Schmitz et al., 2020).

Teaching and learning scenarios for Interprofessional Education

Clear terminology and shared understanding of IPC and IPE goals are key to professional discourse and the development of interprofessional learning programs (Hollweg & Heinzelmänn, 2024). This includes clarifying how IPC is to be understood—for example, to optimize care, solve patient problems, or improve processes. The didactic design of interprofessional learning programs must be adapted depending on the context, target group, and objectives (Handgraaf et al., 2016). Practical, case-based, and problem-based patient learning formats have proven effective in implementing interprofessional education (Dieterich, 2023; Glässel, 2024; Thistlethwaite et al., 2012). When developing interprofessional case scenarios, it is important to define objectives and clinical issues relevant to all participating students from different professions. Learning objectives can include both profession-specific objectives and interprofessional competence development (Behrend et al., 2021). For the success of interprofessional case scenarios, didactic planning and implementation (Nock, 2020) and a common learning and working culture between teachers and students seem to be important (Behrend et al., 2019; Prescher et al., 2021). Logistical and time constraints pose a challenge to in-person attendance in IPE (Kramer-Jackman et al., 2017).

Online IPE

The use of online IPE is therefore appealing not only for overcoming logistical and temporal barriers but also for didactic reasons. In recent years, an increasing number of online IPE has been observed in Germany and internationally (Evans et al., 2019; Grosser et al., 2020; Simonsohn et al., 2024). Designing digital IPE learning (synchronous, asynchronous, or blended) requires considering diverse learners, prior experience, and cultural and specialized language differences. Didactic and methodological considerations are identical to face-to-face formats (Handgraaf, 2016) regarding the question of “What do I want to achieve with the individual interprofessional teaching unit within the existing framework conditions?” The resulting considerations are decisive for the success of IPE (Hollweg & Heinzelmänn, 2024).

Interprofessional Clinical Reasoning

Health professionals make numerous clinical decisions every day. This multidimensional process, also known as “clinical reasoning” (CR), encompasses the thinking and actions of health professionals in diagnostic (diagnostic reasoning) and management (management reasoning) processes in clinical situations, considering the specific circumstances and preferences of patients (Hege et al., 2023). In practice, various professional groups are often involved in both (Cook et al., 2023). Interprofessional perspectives are particularly necessary for solving complex clinical problems, as the expertise of a single profession is often insufficient (Kiesewetter et al., 2017). CR is considered a core competency that can help prevent diagnostic and treatment errors (Connor et al., 2020). Therefore, the importance of CR skills should be taught in medical education from the perspective of different professions (Gummerson et al., 2018). Learning CR in an interprofessional context requires a systematic structure that IPE developers from different professions must agree on (Kiesewetter et al., 2017; Packard et al., 2012). Case Based Learning (CBL) has proven to be particularly effective for training CR skills (Wagner et al., 2024). In particular, virtual patient (VP) cases are used to train clinical decision-making by working through a digital patient case (Faferek, 2024; Wagner et al., 2024). Interprofessional virtual case scenarios for training CR skills have rarely been addressed to date (ibid.). An interventional mixed-methods study with 476 students showed that online-based interprofessional CBL promotes joint knowledge increase (Lestari et al., 2023).



Designing interprofessional virtual cases to promote clinical reasoning

Developing interprofessional VP (IP VP) cases requires a shared understanding of CR, though CR varies by profession (Hege et al., 2023). Teams must therefore understand other professions' CR concepts, identify overlaps and differences, and make joint media-didactic decisions.

A threefold challenge was to develop interprofessional case scenarios that train CR skills and leverage the potential of digital learning scenarios (see figure 1). To date, little research has examined how different professional perspectives can be integrated into virtual case examples (Huesmann et al., 2023).

AIM OF THE STUDY

This article focuses on the experiences of developers of IP VP cases from various professions, as it is assumed that effective interprofessional learning does not occur solely in students' minds but begins in educators' and curriculum developers' mindsets (Boettcher et al., 2016). The study presented here brings together the

- personal experiences of creators involved in IP VP case development
- lessons learned for future IP VP case development

The study aims to make the results usable for future developments of IP VP cases.

METHODS

Study setting

This study was conducted within the framework of the project "Strengthening Digital Action and Decision-Making Skills" (HEDS) at Charité – Universitätsmedizin Berlin (2021–2025). HEDS is part of Charité's overarching digitalization strategy, which aims to promote digital competencies through a comprehensive blended learning concept for healthcare education. The project focuses on strengthening students' digital, action-oriented, and decision-making skills in healthcare professions through digital learning formats (Charité, 2024).

One component of HEDS addresses virtual interprofessional teaching and learning for students in health-related study programs. Within this component, VP cases were developed between 2022 and 2024, including both profession-specific and interprofessional cases for the study programs Dentistry, Medicine, Midwifery, and Nursing at Charité.

The IP VP cases were designed collaboratively by project staff from five professional backgrounds—medicine, midwifery, nursing, psychology, and speech therapy—in

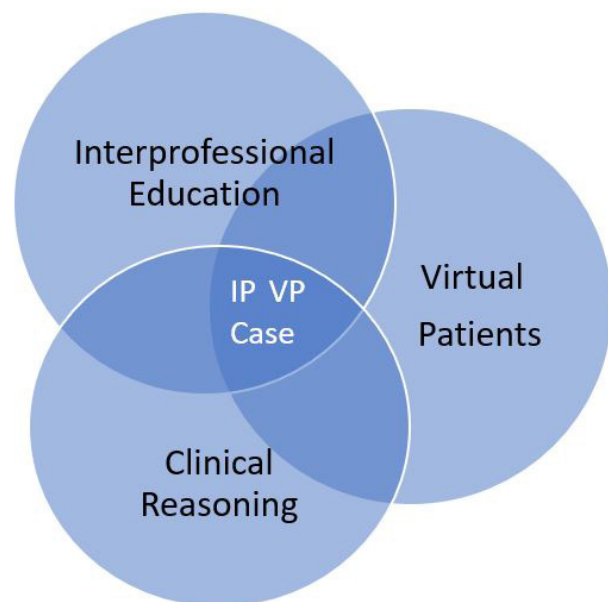


Figure 1: Interprofessional virtual patient cases (IP VP cases) for CR training in IPE

various interdisciplinary combinations. The development process was supported by the eLearning team, using the VP case creation tool *Campus Casus*. Depending on the clinical context of each case, additional professions such as physiotherapy and emergency paramedicine were represented.

The interprofessional case development was initiated by the HEDS subproject "Interprofessionality", with one team member responsible for moderation and documentation of the development process.

Study participants

Members of the project team who developed IP VP cases during the project period were invited to an online interview via Microsoft Teams ($n = 7$). The participating health professions included (emergency) medicine, nursing, midwifery, and psychology. The individual group combinations for the VP cases varied, resulting in several teams with different time resources.

Data collection

The interviews were conducted by a team of interviewers from the quality assurance in teaching (CK, HT, and MP) via *Microsoft Teams*. The interviewers were not involved in developing the VP cases and therefore had a neutral position towards the participants. The interviews were conducted using a semi-structured interview guide developed by the authors in accordance with Kruse (2015) (see Table 1).

Table 1: Excerpt from the semi-structured interview guide

Block 1: Personal understanding of interprofessional virtual cases <i>Prompt: What do you personally think constitutes an interprofessional case?</i>
Block 2: Personal experience of collaboration in interprofessional case development <i>Prompt: How did you personally experience the collaboration during interprofessional case development?</i>
Block 3: Changes over time <i>Prompt: When thinking about the case development(s), did anything change over time? If so, how?</i>
Block 4: Insights for future case developments <i>Prompt: What would you keep the same or do differently in future interprofessional case developments?</i>
Block 5: Other <i>Prompt: Is there anything you would like to add that we haven't talked about yet?</i>
Block 6: Sociodemographic data <i>Final Questions: I have a few questions about your teaching and case development experience.</i>

Follow-Up Questions for every block depending on the answers: Are there any other aspects? Can you specify that further?

The interviews were recorded in Microsoft Teams and then transcribed verbatim in f4x (Dr. Dresing & Pehl, GmbH) by FW. Speech contributions by the interviewee were marked with the assigned pseudo-anonymized number, and any information that could lead to conclusions about the interviewee or others was anonymized. All data was stored in compliance with the data protection regulations of the Charité and Germany.

Data analysis

The transcribed content was analyzed using the qualitative content analysis method outlined by Kuckartz & Rädiker (2022). The method consists of seven consecutive steps. (see Figure 2).

The categories were initially derived from the research questions and the interview structure. Key questions included the interviewees' personal understanding of interprofessional case development, their subjective experience of collaboration, changes during the work process, and insights for future interprofessional case development. Further inductive categories and subcategories were added based on the material. Coding rules were developed based on three interviews (WH, CK, RB). Subsequently, we created a coding guide with a category tree and anchor examples (CK, WH), which was used to code all materials (WH, CK, FW, RB) (see figure 3 and table 2). All authors coded at least one interview according to the coding guidelines. Two interviews were intercoded. Initially, the intercoder agreement was 55.17% and 51.35% respectively. After discussing ambiguous contents and adapting by consensus, the agreement

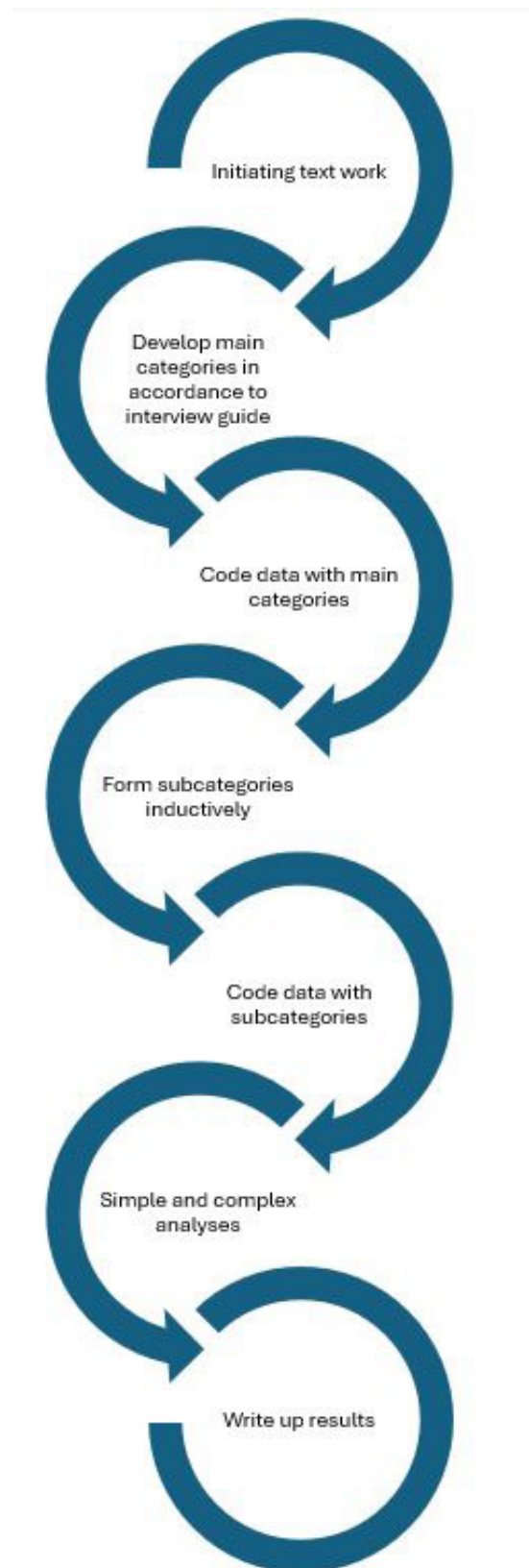


Figure 2: Seven steps of qualitative content analysis (own representation after Kuckartz & Rädiker, 2022)

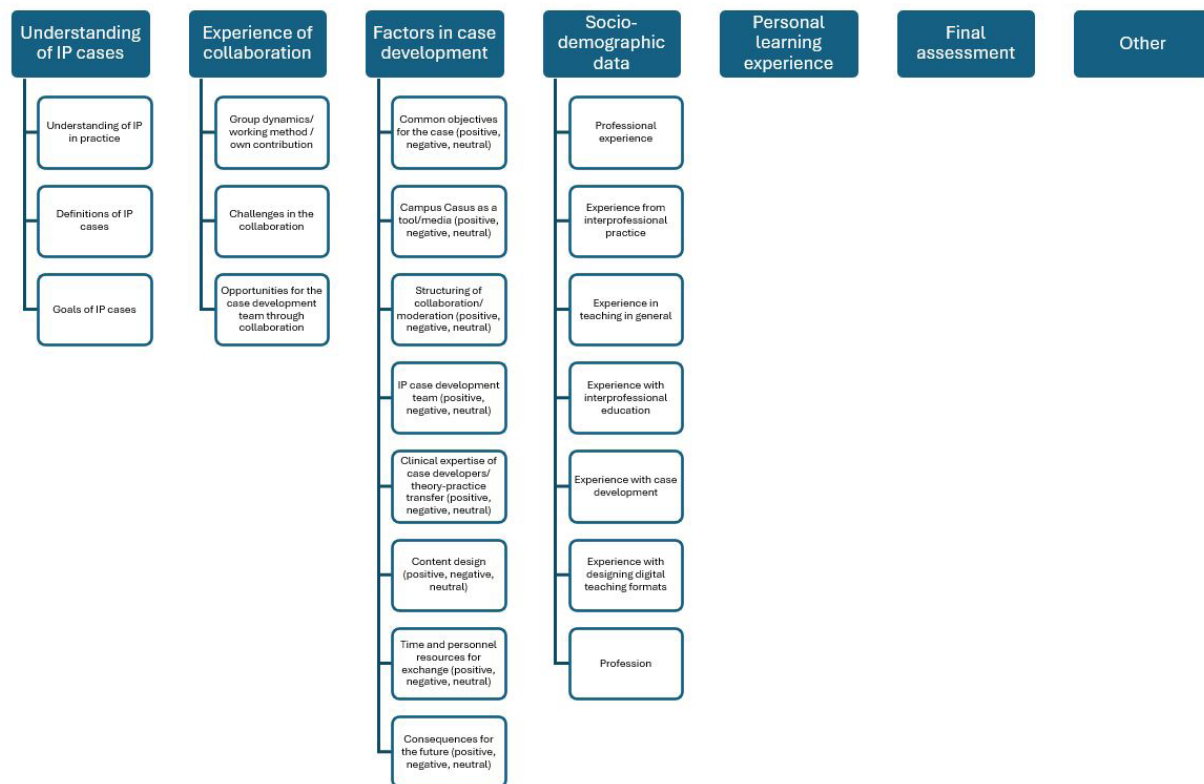


Figure 3: Category tree with main categories and subcategories

increased to 93.83% and 97.44%, respectively. After reviewing the material, the results from the individual categories were then summarized to their core statements and sorted (WH, CK, FW, RB).

RESULTS

A total of $n = 7$ people were interviewed (see Table 3). From several steps in the analysis of the categories, we derived two main themes from the interviewees' statements: "Personal experience of the IP VP conception" and "Lessons learned for future IP VP development". A compilation of quotations for all relevant categories can be found in the appendix ([see Appendix 1](#)).

Personal experience of the interprofessional virtual patient cases conception

Learning with, from, and about each other

Interviewees reported various aspects of personal learning experiences gained during the collaboration on IP VP case development.

Firstly, they taught each other about their own professions, particularly regarding the concept of CR.

"...the biggest realization was this clinical reasoning, which we also want to promote at the institute: that this concept also exists in other professions, which is different, but that it also exists. [...]" IP_7 :13

Interviewees not only learned from and about each other but also gained new concepts. At the outset, the teams had to work together on media didactics. Here, they were partly advised by the eLearning department. They also used the Campus Casus software to produce and integrate the case content.

„...that was also just an incredible learning process with regards to media design that we simply had to acquire." IP_3: 25

The project team also looked at how the IP VP cases can achieve the goal of promoting CR work, how best to structure the units, and how to integrate the interprofessional elements so that students from several professions can benefit from them. The challenge of designing content at a level that is equally relevant and demanding for all participating professions became apparent, so a balanced mix had to be found.



Table 2: Excerpt from the revised coding guidelines with anchor examples

Name of the Category	Definition	Application of the category. Category is coded if the following aspects are mentioned:	Category is not coded if the following aspects are mentioned	Anchor examples
Main category: Experience of collaboration not coded deductive	Personal subjective experience of collaboration in IP case development	Based on own experience of collaboration	Is not coded if it concerns findings on factors for case development. If so, then use subcategories under findings on factors for case development	
Sub category: Group dynamics/ working methods/ own contribution coded deductive / inductive	Personal subjective experience of working in a group with other case developers. Also with a focus on changes over time, as well as own role in the group	- Own impressions/ subjective component - Reflection on your own actions - Perceptions of the group dynamics - Reference to the current case development - Changes in group dynamics over time	Is not coded if it concerns findings on factors for case development. If so, then use subcategories under findings on factors for case development	„Es gab keine feste Rolle, außer dass die Rolle war dann immer, die Perspektive von der eigenen Profession zu vermitteln, den anderen. Das war so die Rolle, aber bei der Fallerstellung selbst so was die Fallentwicklung, die Fallgeschichtenentwicklung und die Fragenstellung und so, das war ein Gemeinschaftsprojekt sozusagen. Also da hat jeder was gemacht und ich glaube, da haben wir uns auch gegenseitig so ein bisschen inspiriert.“ Interview_IP_Fallkonzeption_07: 23 - 23 (0) „Und wie wurde bei der Fallentwicklung eine gemeinsame Arbeitsweise gefunden? - Ich glaube, wir haben uns erstmal so auf die Grundthematik geeinigt, worum es gehen soll und dann so ein bisschen wie der Fall, ganz grob, wie der Fall entwickelt werden soll. Und dann hat jeder das so von seiner Perspektive aus gesehen. Und dann wurde das versucht zusammen zu bringen.“ Interview_IP_Fallkonzeption_07: 26 - 27 (0)
Sub category: Challenges in interpersonal cooperation coded deductive	Subjective experience of what was challenging in the collaboration	Challenging assessed aspects of collaboration with the case development team	Challenges of IP cases in general. Then coding under "Definitions/Main characteristics of IP case"	„Ich hätte jetzt vielleicht nicht die Formulierung ‚nicht so zielführend‘ verwendet, aber ich würde sagen natürlich, dass es auch Probleme gab oder Schwierigkeiten, Abstriche, die man machen muss. Die lagen in der Regel im Bereich der Kompromisse. [...]“ Interview_IP_Fallkonzeption_04: 29 - 29 (0)
Sub category: Opportunities for the case development team through collaboration coded inductive	Positive experiences in the collaboration with the other people in the team	Positive experiences through interaction with the other case developers = psycho-emotional component of the work	- General opportunities of IP - Differentiation between inter-/ mono-professional in general - Findings of the case development team	„Gab es positive Erfahrungen während der interprofessionellen Fallentwicklung? Im Zusammenhang mit der Zusammenarbeit. - Positiv im Sinne von, ich habe mich mit den Kollegen sehr gut verstanden, vertragen (lacht). Und es war jedenfalls in den meisten Fällen ein sehr schönes und harmonisches Miteinander. [...]“ Interview_IP_Fallkonzeption_07 #00:18:02-6#

„Can we keep it at a level that is interesting for both professions?“ IP_1: 25

„It is hard to develop a case with a focus on interprofessionality where both are connected in parallel, receive the same input, and produce the same outcome. [...]. Perhaps other professions will gain a

better understanding of: What drives each of the other professions? I believe that was also one of the goals we pursued.“ IP_3:13



Table 3: Professional experiences of the interviewees

Interviewees	Experience in IP Practice	Experience in Teaching or Curriculum Development	Experience in IPE	Experience in Case Development	Experience in Designing Digital Teaching Formats
IP_01	extensive	15 years	extensive	extensive	moderate
IP_02	moderate	< 5 years	extensive	extensive	-
IP_03	-	15	10 years	-	10 years
IP_04	>10	10 years	< 1 year	moderate	little experience
IP_05	very extensive	5-15 years	extensive	moderate	moderate
IP_06	moderate	5- 15 years	very extensive	very extensive	very extensive
IP_07	10 years	extensive	very extensive	very extensive	very extensive

Personal experience of the planning process and group dynamics

Participants' impressions of working methods and group dynamics varied widely, with some reporting positive and others challenging experiences. The groups differed in expectations, time resources, etc. The group's heterogeneity posed greater challenges for collaboration. The heterogeneity went hand in hand with increased complexity in collaboration. Five of the seven interviewees found interprofessional case development to be more complex and time-consuming than monoprofessional case development, due to the heterogeneity of the IP VP development groups.

„The challenge, also for my colleagues at the clinic, is that we simply don't have the time that others involved in the project may have, and we have to make sure that this doesn't cause any hard feelings among those participating [...].“ IP_5: 9

„Compared to a single-profession case, it was more time-consuming. Clearly, because you not only had to coordinate with each other at every stage. Meetings or sitting down together, constantly having to readjust the joint schedule, including the time frame, with all the adversities that everyday life brings with it. I would say that in particular it was time-consuming often having to go through the other professions' content as well“. IP_0: 53

To structure workflows, a neutral person in a moderating role proved very helpful.

„[...] So, as you said, I think that, on the one hand, a moderator is extremely important. Someone to moderate the discussion, someone who perhaps plays a more neutral role and does not belong to any particular profession, you need that [...].“ IP_3: 17

During the planning process, the groups had to negotiate and agree on the objectives of the cases, including both content-related and interprofessional learning objectives.

„I think we first agreed on the basic theme, what it should be about, and then, roughly speaking, how the case should be developed. And then everyone looked at it from their own perspective. Afterwards we tried to bring it all together.“ IP_7: 26

Particularly, it was motivating for members when they noticed that others were gaining learning experiences from the group and developing further. One interviewee reported that group collaboration exposed them to new perspectives on the shared topic. In addition, recognizing the work already done by the other professional group was motivating.

“[...] „Seeing how much they have already accomplished and how much groundwork they have laid was also motivating.“ IP_7: 50

The perspective of others who did not belong to their profession was perceived as particularly valuable. Case creators who had been working on VP cases for a long time became 'blinded' by their familiarity - content that felt self-evident to them appeared unclear to others. The involvement of heterogeneous members in the VP case development proved helpful, providing important information and new insights through their fresh perspectives. Bringing it together, confronting different opinions, and learning about each other increased motivation and played a central role in the planning process.

Another important topic was the experience of equality and hierarchies within the group. Respectful interaction and a feeling of equality were seen as helpful for successful collaboration. Hierarchies were seen as a hindrance to IPC in case development.



„In terms of dynamics, it is really important that there is always a respectful approach, without hierarchies; because as soon as a hierarchy comes into play, interprofessionality no longer works. [...]“ IP_2: 54

Trust also played a central role. Interviewees reported feeling unsure about how much they should reveal about themselves and how authentically they communicated their attitudes and opinions to one another. A high level of trust promoted effective collaboration, as members opened up more.

Although often perceived as tedious, the process was nevertheless described as rewarding. It was particularly challenging to take a step back during the process of finding a compromise and to question one's own needs in favor of the group.

“I learned a lot. All the pitfalls, and how complicated it actually is—I didn't really realize that beforehand. And that's why I found it so enriching. [...] It was hard work, sometimes really hard work, but enriching.“ IP_1: 95

The interprofessional project members had to deal with various complex issues, gain trust, and deal with the different expectations, but working together led to valuable insights and progress. Although the collaboration was sometimes perceived as laborious, lengthy, and challenging, the conclusion was that it was worth the effort.

Lessons learned for future interprofessional VP case development

In addition to their subjective perceptions of the collaboration, the interviewees identified several noteworthy findings and learning experiences that they felt would be valuable for future case development. These are structured according to three steps: preparation, case development, and reflection.

Step 1 - Preparation

Before developing a VP case in an interprofessional team, several points must be jointly clarified to ensure a shared approach.

A common understanding of key concepts such as IPC and CR must first be established among the case developers. This includes a dialogue or discussions on how members understand IPC and CR.

„In any case, I think it is very important to have a common understanding from the very beginning of

what interprofessionality actually means for us. [...]“ IP_4: 58

The case development team should consist of specialists from different professional groups (e.g., medicine and nursing), with no profession being overrepresented. When forming groups, equal cooperation without hierarchies should be ensured.

„Well, for one thing, the fact that there were different professions meant that no group was overrepresented. So that kept things somewhat balanced [...].“ IP_7: 25

It is crucial to clarify the competencies of team members from professional, didactic, and interprofessional perspectives, as well as their practical experience. For a successful collaboration, everyone should know the roles and competencies of the other professions. A willingness to be honest and authentic among team members must also be considered, as well as a clear allocation of roles and a common appreciative attitude towards one another. In addition, the time budget and the case objective should be discussed in advance to avoid misunderstandings about working methods and the schedule.

„[...] So I think you have to find a mutual commitment in terms of mindfulness and trust, where you say: Okay, you have the expertise, you take on that role, and you also have an eye on how, let's say, the professions interact with each other.“ IP_5: 11

„So, I think that's why it's so important to know your own role. To question the motivation behind it and be very clear about: What is the goal of this interprofessional case? [...] You have to be very clear in advance: What do you want to achieve with the case? [...]“ IP_5: 23

To ensure successful integration into specific existing modules, the following aspects are relevant: Already in the preparation phase, the team members should agree on common objectives. This includes defining basic objectives, such as promoting interprofessional competencies, developing case-specific learning objectives (both interprofessional and discipline-specific), and considering the different levels of interprofessionalism. It is important to clarify the coordination of objectives, such as solving the patient's problem, joint treatment planning, or promoting an understanding of the perspectives and needs of other professions.



A common didactic concept must be developed, and the target group clearly defined, considering students' previous experience and skill level to avoid over- or underchallenging them.

„What do we actually want to include, what are the important aspects? We also tried to anticipate who we might be overburdening or possibly underchallenging [...]“ IP_6: 11

Step 2 – Case development

During the development of the case in the digital tool, it is important to design it so that all professional groups involved gain additional value and that different perspectives are visible. A narrative structure for the case (storytelling), avoiding overly long cases, and creating realistic and motivating scenarios are central. The moderation of the development process should be professionally neutral. Also, structured documentation is important.

During media production, clichés and stereotypes in case storytelling should be avoided.

“[...] So that was also the case for us during the process, where we often had to take a good look at ourselves, where we started to develop cases, where we automatically developed cases based on our own experience, but where we then also said that we wanted to deliberately take a step back and develop the cases and present them in a completely different way. And precisely from a different perspective, because we definitely didn't want to reinforce any clichés or stereotypes. [...]“ IP_3: 43

Individual interviewees reported that the case development process itself increased knowledge and motivated the team, which led to improved methodology and a more efficient process.

Throughout the case creation process, it is essential to regularly review the aspects already considered in Step 1: Are all the necessary professions involved in the collaboration? Are the case's learning objectives clear? Is the time budget still on track, or does this vary between members? Is there a risk that the process will get bogged down in meetings that are too long? Being mindful of group dynamics and the possibility of hierarchies is also crucial to retaining trust in the process.

Step 3 – Reflection

After the case development, broad reflection is necessary to assess what worked well and what could be improved. Team members should also reflect individually on

what personal learning processes have taken place and how these can be transferred into further practice, for example, through the further development of CR at their respective institutes. Collaboration can be promoted through positive gains in knowledge and contributes to better IPC. It became apparent that the positive exchange between the professional groups is seen as particularly valuable. It is not only those formally responsible for IPC, such as moderators, who contribute ideas; the individual professional groups also play a key role by identifying cases where joint engagement adds value. This open, cooperative approach made many cases possible in the first place, as the need for involving other specialties often became apparent only during the development process.

DISCUSSION

The key findings are critically reviewed and classified in the context of the existing scientific literature and theoretical concepts. Finally, based on the findings discussed, practice-oriented recommendations for the design of IP VP case development processes are derived. **The results regarding personal experiences in the development of IP VP cases** are heterogeneous. Given that the case developers came from four different professions and had different experiences (Table 3), this is not surprising. The finding that all interviewees described the process of developing IP VP cases as complex and time-consuming is consistent with the literature, which indicates that developing interprofessional teaching programs is generally challenging and requires significant time and human resources (Bogossian et al., 2022; Buring et al., 2009). At the same time, however, the process of developing VP cases, described as “laborious” (IP1, IP2), is also rated by all interviewees as a particularly rewarding experience, as the teaching developers learned from, with, and about each other. This was not an explicit goal of the collaboration, as it is in IPE for students, but proved to be one of the most important achievements in terms of faculty development. In particular, the exchange of understanding CR from different professional perspectives was found to be beneficial. This result confirms the findings of Huesmann et al. (2023), who identified exchange as a key factor in the success of IP CR teaching. The individual knowledge gain resulting from the professional and media-didactic exchange led to increased motivation, enjoyment, and new ideas (IP1, IP2, IP3, IP4, IP7). Studies support this finding, indicating that joint course planning can foster positive experiences, particularly through mutual learning and reduced prejudice (Behrend et al., 2019; Weber & Hoffmann, 2016).

However, good interprofessional cooperation, including between developers, does not happen automatically

but depends on a variety of proven factors (Boettcher et al., 2016; Djaharuddin et al., 2023). These factors include institutional support, time and room resources, group composition, group processes, working methods, communication, and, last but not least, individual factors relating to the group participants. The HEDS project provided institutional support for IP VP development, and the sub-project “Interprofessionality” took over the initiative and organization of the IP VP case development. Room resources were provided via digital conference rooms to overcome barriers between institutes (Kramer-Jackman et al., 2016). Varying time resources available to case developers and their initial lack of transparency (IP5) indicate a need for optimization in the organization of work. Clarifying the time resources of all group members at an early stage is a key success factor for effective collaboration, enabling realistic planning and preventing conflicts and delays (West, 2012). One interviewee considered it important to have a balanced representation of the professions involved in the respective case design (IP7). The importance of respectful interaction and non-hierarchical structures during interprofessional case development, as emphasized by four interviewees (IP2, IP4, IP5, IP7), is confirmed in the literature on IPC (Bernhard-Banza, 2024; Walkenhorst & Hollweg, 2022). Trust also plays an essential role in IPC (IP5), both in healthcare practice (Layland, 2018) and between learners and teachers (Reeves et al., 2018). A lack of trust, unresolved conflicts, and interpersonal tensions can negatively influence the group process and collaboration if they are not openly addressed (Glasl, 2013). The degree to which team members trust each other significantly shapes their social behavior (Layland, 2018). The concept of “psychological safety,” coined by Edmondson (2004), is also important in this context and has been researched for IPC and identified as a core concept (Braun, 2024). “Psychological safety describes the conviction of individuals that they can be themselves in a team – open, authentic and direct, without fear of negative consequences” (Edmondson, 1999). The question posed by one interviewee (IP2) about how honest and authentic people should communicate with each other during the development of VP confirms that psychological safety cannot simply be assumed but must be explicitly promoted (Braun, 2024).

Divergent perceptions of group processes among interviewees may be attributed to factors such as team size, heterogeneity in prior experience and expectations, and varying individual conceptions of group success – whether defined by efficiency, process dynamics, or outcomes (Salas et al., 2005). Some interviewees described the control of group processes with the help of a moderator as effective and helpful, especially by pre-structuring and organizing the collaboration (IP2, IP3,

IP4, IP7). Van Digelle et al. (2020) describe relevant points for planning and implementing interprofessional teaching. Moderation can facilitate communication and work processes and strengthen mutual motivation in interprofessional groups (ibid.). The results also show that developing IP VP cases in interprofessional groups was experienced as challenging even for experienced teachers, cases, and curriculum developers. Nevertheless, case development was seen by all interviewees as a truly educational personal learning experience.

The lessons learned for future IP VP developments are reported below, and recommendations are derived (see Table 4). The findings are categorized into three phases of case development. In addition, the recommendations for each phase are divided into “content and structural aspects” and “working methods and group processes”.

In terms of content, **the preparatory phase (Phase 1)** presented a threefold challenge (Fig. 1) of developing a common theme for CBL (Glässel, 2024), formulating profession-specific goals for CR, and, at the same time, formulating overarching interprofessional learning goals (Kiesewetter et al., 2017). The results of the study suggest that a group of different professions needs to agree first on what exactly is meant by an IP VP case and which interprofessional learning objectives should be addressed. The literature offers several competence-oriented frameworks for this purpose (Thistlethwaite et al., 2014). Furthermore, it is essential that a common theme for an interprofessional case be identified, one relevant to students from different professions (IP7). However, interview partners also point out that case developers’ real-life experience with IPC problems is very helpful in building realistic IP VP Cases (IP1, IP2, IP4, IP6). It is understandable that taking the patient’s perspective and drawing on practitioners’ expertise are useful for developing cases with a high degree of practical relevance (Glässel, 2024; Hollweg & Heinzelmann, 2024).

In terms of structure, a common media didactic concept is recommended for the preparatory phase (van Digelle et al., 2020). Heterogeneity of students from different professions should be considered in the didactic analysis (IP4, IP3, P6). This corresponds to the approach recommended in the literature (Walkenhorst & Hollweg, 2022).

The results suggest that, in addition to content and structural aspects, particular focus should be placed on working methods and group processes. It can be recommended that sufficient time should be allowed for getting to know each other, exchanging ideas, and reflecting on the group processes. The results show that clarification of roles, responsibilities, and a working method with shared tasks is necessary to work efficiently (IP1, IP2, IP4, IP5, IP7). There is substantial evidence in



Table 4: Recommendations for IP VP case development

	Step 1: Preparation	Step 2: Case development and production	Step 3: Follow-up/reflection
Content aspects	• Reaching a common understanding of IP and CR • Agree on case topics relevant to all professions • Formulate common learning objectives • Consider patient orientation	• Storytelling • Avoid stereotypes • Consider the patient's perspective • Consider the perspectives of all professions • Negotiate compromises	• Obtain feedback from students and subject matter experts • Review learning outcomes
Structural aspects	• Define target groups for the IP VP (previous experience, level of requirements) • Agree on a common didactic concept	• Allow sufficient time for production and searching for audio and video files • Ensure user orientation (media, scope, and processing time of the VP)	• Evaluate usability
Working methods/ group processes	• Get to know the case development team • Clarify moderation • Clarify roles and responsibilities • Clarify time resources • Establish a work rhythm • Exchange expertise on the case topic • If necessary, consult case developers with expertise in the subject area • Observe group dynamics (e.g., hierarchies, trust, shared responsibility)	• Continuously adapt working methods • Continuously observe group dynamics, shared responsibility and motivation of participants • Make decisions on an equal footing	• Reflection and feedback: What worked well? Where is room for improvement? What was the personal learning gain?

the literature regarding IPE for role clarification (Behrend et al., 2021).

In the case development and production phase (Phase 2), storytelling as a method is a creative process in which case developers compile realistic cases from professional healthcare in an interprofessional setting with challenges, conflicts and problems from their different perspectives (IP1, IP3, IP4, IP7). Storytelling as a method for interprofessional collaborative work is described in the literature as suitable because it can enrich interprofessional exchange and promote each profession's perspective (Hafford-Lechtfield et al., 2017). When developing cases, care should generally be taken to avoid reinforcing stereotypes (Foronda et al., 2016). This is also emphasized by one interviewee in this study (IP3). The inclusion of the patient perspective is also emphasized as particularly important in the literature (Glässel & Hippold, 2024). This aspect is only marginally reflected in the results of the interview study. Two interviewees report on high time expenditure for media production and technical implementation (IP1, IP2). It is recommended to allow sufficient time for media production, as media-based learning can strongly influence student motivation (Schley & Buchwald, 2022). Usability should be a central consideration in the design of VP cases. The use of video,

audio, and carefully selected images can enhance learner engagement. Moreover, the duration of a VP case should be limited to maintain attention and usability. Group dynamics, joint decisions, shared responsibility for the result, and appreciative interaction should be continuously observed during the development and production phase, and problems should be addressed if necessary.

In the **reflection phase (Phase 3)**, the results lead to a recommendation to reflect on which factors contributed to the IP VP's success and what could be improved. There is consensus that reflection and feedback are particularly important in IPE (Wagner-Menghin, 2024). This certainly applies not only to IPE but also to teaching development processes in interprofessional groups. One interviewee (IP04) summarized that the view of another profession sometimes helped to improve the IP VP cases. The option to design further cases in an interprofessional manner and initiate this proactively was only initiated by the joint case development of IP VP cases. The recommendations are summarized in Table 4.

LIMITATIONS

The study is based on a small, non-representative sample of seven interviewees, which limits the transferability of

the results. In addition, the subjective nature of qualitative data analysis can lead to different interpretations. The risk of socially desirable responses from the interviewees was reduced by ensuring that the interviewers were independent of the IP VP development. Nevertheless, it cannot be ruled out that social desirability influenced the responses. The results should be understood as context-specific insights rather than generalizable statements. It cannot be ruled out that further interviews would have revealed new aspects. The interpretation of the results is theory-driven, scientifically analyzed, and agreed upon by four researchers.

CONCLUSION

Many findings on IPE student group composition and cooperation are already known and applicable to case development groups. The assumption that CBL implemented in IP VP cases enables complex clinical situations to be understood from the perspectives of different health professions and patients is based on the literature.

The development of IP VP cases in the HEDS project was complex and resource-intensive, but also highly instructive and beneficial. It highlighted the importance of mutual learning, clear communication, and structured collaboration within interprofessional development teams. Overall, the project offers valuable insights for future IP VP case development. Future research should explore which teaching formats — such as self-study, blended learning, or small-group work — are most effective for using VP cases (Kong et al., 2025).

The project is also significant for faculty development. A major success of the project lies in the people who, through their participation in case development, have gained valuable experience in interprofessional education, interprofessional collaboration, clinical reasoning, and working with virtual patients. They remain a lasting resource for the university and continue to strengthen IPE development and digital transformation. The case developers can encourage students and teachers to engage in more interprofessional collaboration and to use digital teaching materials.

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ETHICAL CONSIDERATION, REGISTRATION

The Ethics Board of the Charité approved this study in accordance with the German data protection guidelines (No. EA2/129/23).

CONFLICT OF INTEREST

None.

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