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Implementing an innovative interprofessional education curriculum – the need for evaluation, even beyond the project phase

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Abstract

A project to implement interprofessional education (IPE) started at University Medical Centre Mannheim in 2014. Until mid-2018, seven innovative IPE sessions were developed to form a longitudinal IPE curriculum. Different evaluations were performed during the project funding period. The IPE curriculum was reevaluated five years after funding had ended 1) to verify if the IPE curriculum had been successfully implemented in medical studies and perceived learning gains and overall satisfaction had remained stable, 2) to evaluate if the IPE concepts of the sessions were still in place and 3) to find out how the sessions could be improved. The derived measures are described and the overall evaluation processes regarding the IPE curriculum are discussed.

Keywords

Curriculum, interprofessional education, evaluation

Implementierung eines innovativen Curriculums für die interprofessionelle Ausbildung – die Notwendigkeit von Evaluationen, auch über die Projektphase hinaus

Zusammenfassung

In einem Lehrprojekt wurden seit 2014 sieben innovative Veranstaltungen für die interprofessionelle Ausbildung (IPE) an der Universitätsmedizin Mannheim entwickelt, die ein longitudinales IPE-Curriculum bilden. Während der Projektförderung bis Mitte 2018 fanden verschiedene Evaluationen statt. Das IPE-Curriculum wurde fünf Jahre nach Auslaufen der Förderung erneut evaluiert, um 1) zu überprüfen, ob das IPE-Curriculum fest ins Medizinstudium integriert worden war und der empfundene Lernzuwachs und die Zufriedenheit der Lernenden stabil geblieben waren, 2) zu bewerten, ob die Konzepte der IPE-Veranstaltungen noch galten und 3) Verbesserungspotenziale herauszufinden. Die abgeleiteten Maßnahmen werden beschrieben und die Evaluationsprozesse rund um das IPE-Curriculum werden diskutiert.

Schlagworte

Curriculum, interprofessionelle Ausbildung, Evaluation

1 Introduction

Since 2013, more and more projects have been realized to develop and implement interprofessional education (IPE) in German undergraduate health care education (Ehlers et al., 2017, p. 1; Klapper & Schirlo, 2016, p. 1). IPE, i.e. students of two or more health professions learning with, from and about each other to enable effective collaboration and improve health outcomes (WHO, 2010, p. 13), is to prepare students for successful teamwork and settings where collaboration is key for the patients, their care and safety (Cuff, 2013, p. 7).

Based on Robert Bosch Stiftung's call for proposals of innovative IPE projects at German medical schools, a needs assessment at Medical Faculty Mannheim, Heidelberg University was carried out in cooperation with the school of physiotherapy of the academy affiliated with the university hospital before applying for funding. The result of the needs assessment led to the concept of developing and integrating a mandatory longitudinal IPE curriculum into medical studies and physiotherapy traineeship at the University Medical Centre Mannheim (Figure 1). With funding, various classroom-based and hospital-based IPE sessions were developed (Mette et al., 2016) to initiate an interprofessional dialogue early during the studies to be deepened in the following years.

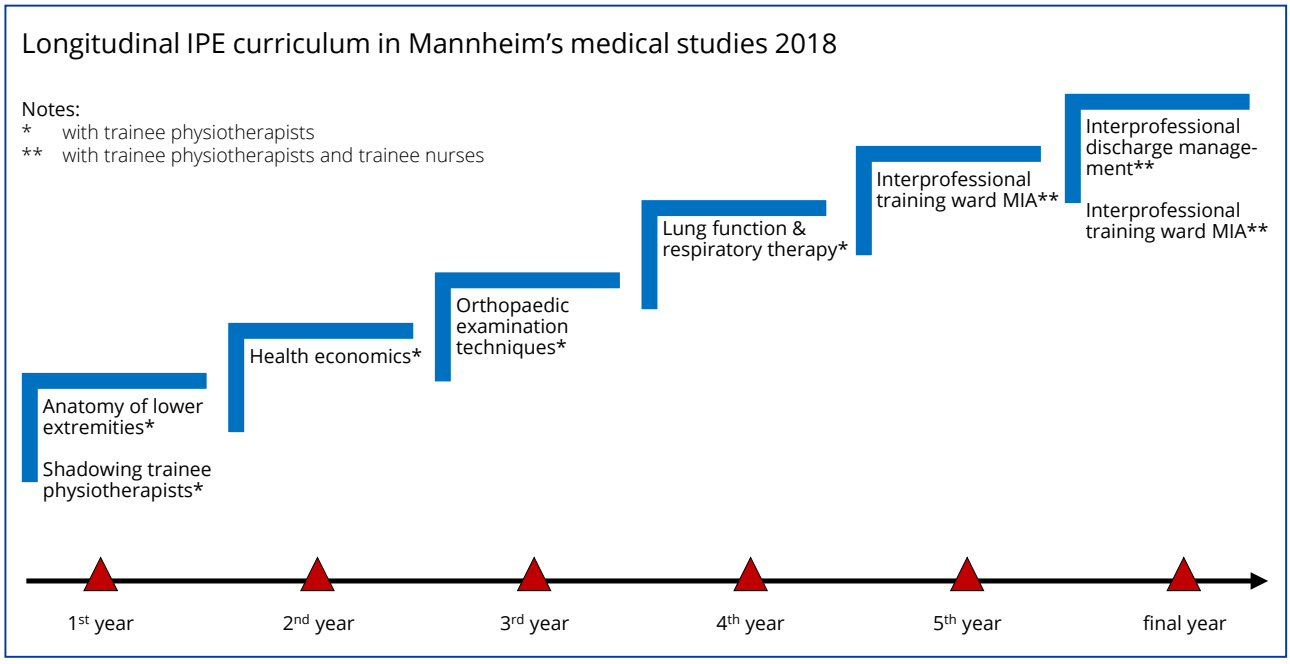

Figure 1: Longitudinal IPE curriculum in Mannheim's medical studies in 2018

The aims of IPE are

- to actively promote interprofessional communication and collaboration
- to develop interprofessional competencies
- to improve the working relationships between the professions
- to break down barriers in strictly uniprofessional edcuation

The IPE sessions allow the participants to gain different perspectives on various relevant topics, acquire and deepen practical skills and experience reflective practice in interprofessional groups and train collaborative practice in the authentic hospital context. The educational concept of the IPE sessions at Mannheim are based on the core elements interaction and reflection. *Interaction* is usually initiated through practical exercises to start communication and collaboration in interprofessional groups or through team teaching. *Reflection* and discussions with other professions at the end of the session are designed to make participants aware of knowledge, skills and perspectives relating to the own profession and other professions, and to show how the professions complement each other in patient care.

Evaluation processes regarding the new curriculum

As a new form of collaborative teaching and learning involving different health profession educational institutions, evaluation and reflection of IPE was an integral part of quality management from the start of the project. Each newly developed IPE session was evaluated by the participants using a self-developed IPE questionnaire. The project team reflected with IPE teachers on the survey results, identifying relevant aspects for improvement and adapting the concept of an IPE session accordingly. Additional controlled studies of two well-established IPE sessions, i.e. after multiple evaluations and conceptual revisions, were conducted to confirm their effectiveness (Mette, 2018; Mette et al. 2021).

Final reports of innovative educational projects often include evaluation results which also can be used to prove e.g. to funding bodies that the requirements were met and funding was used sensibly (Ditzel, 2022). These evaluation results of new approaches in teaching and learning are usually based on the conditions differing from teaching regular courses (e.g. promotion of innovative interventions, small and highly motivated groups of voluntary participants). To meet the requirements of the funding body, the final project report included a critical evaluation of the processes during the project, e.g. factors that facilitated the development and integration of the IPE curriculum and barriers to overcome. The retrospective analysis and reflection on the approach chosen in the project (sub)group played an essential part in establishing the longitudinal IPE curriculum.

Expectation vs reality

Evaluations are important not only to prove that projects have successfully developed innovative educational interventions but also to improve them further (Honebein & Reigeluth, 2021, p. 468). Beyond that, educational institutions need to assure that positively evaluated innovations are sustainably integrated into the syllabi to benefit all students (Alexander, 1999, p. 182). Unfortunately, educational projects often struggle to maintain sustainability which "ensures the lasting or ongoing impact of program activities when the grant period is over or the funds are spent" (NCHE, 2023, p. 2). Thus, the Medical Faculty Mannheim not only used regular evaluations to check, assure and improve the newly developed sessions and even did research on IPE, but also decided to reevaluate all sessions of the IPE curriculum five years after funding had ended. Table 1 summarizes the different evaluation processes during and beyond project funding.

	Focus	Areas	Purpose	Approach
2014-2018 realization of funded IPE project	quality of each newly developed IPE sessions	(multiple) assessment of • needs • concept • context • results	• control • development	• prospective • formative
2018 project report for funding body	quality of overall concept	assessment of • concept • context • results • process	• legitimacy • control	• summative
2015-2021 research on IPE	effectiveness of certain IPE sessions	proof of • results • effectiveness	• research	• prospective
2023-2024 reevaluation of IPE	changes in quality of established IPE sessions after 5 years of curricular integration	assessment of changes regarding • concept • context • results	• control • development	• prospective • formative

Table 1: Summary of the evaluation processes according to relevant aspects (Ditzel, 2022)

Structure of the paper

The newly developed IPE curriculum, the first evaluation results and measures of improvement are described in chapter 2. Chapter 3 describes the methods used to check if the IPE curriculum has been sustainably integrated into medical studies and physiotherapy traineeship even without further funding. The results of this follow-up study are presented in chapter 4, derived measures for improvement as well as an overall appreciation of the evaluation processes and limitations are given in chapter 5. Practical implications are offered in the conclusion.

2 Background for evaluating the IPE curriculum

With funding from Robert Bosch Stiftung (01/2014-06/2018), seven IPE sessions were gradually developed and tested. Information on all IPE sessions are given in Table 2.

Year of study: type	IPE sessions (method, content)	Students & trainees per session	Setting (duration, rotation, location, teachers)	Evaluation
Year 1: enhanced seminar	• *Interaction*: cooperative learning to explore **anatomy** with plastinated specimen and hands-on exercises • *Reflection*: similarities & differences between the professions	25 medicine 25 physio	• 90 min, annually • 4 anatomy rooms • 2 doctors, 2 physios	2015 2016
Year 1: shadowing	• *Interaction*: **shadowing** and peer teaching to observe trainee physiotherapists' role and responsibility when working with patients • *Reflection*: communication among the professions	50 medicine 35 physio	• 3 h, annually • various hospital wards • 1 physio (reflection)	2015 2016
Year 2: lecture	• *Interaction*: team teaching to show interprofessional collaboration in hospital including the perspective of **health economics** • *Reflection*: communication among the professions	150 medicine 25 physio	• 90 min, annually • lecture hall • 1 health economist, 1 doctor, 1 physio	2014 2015
Year 3: practical session	• *Interaction*: reciprocal peer teaching to practise **orthopaedic examination techniques** • *Reflection*: similarities & differences between the professions	55 medicine 25 physio	• 90 min, quarterly • 3 physio training rooms • 1 doctor, 2 physios	2014 2015 2016
Year 4: practical session	• *Interaction*: reciprocal peer teaching to assess **lung function** and how to improve it using respiratory therapy • *Reflection*: communication among the professions	120 medicine 25 physio	• 90 min, twice a year • 4 physio training rooms • 2 doctors, 2 physios	2017 2018
Year 5: clinical placement	• *Interaction*: supervised collaborative learning to practice interprofessional patient care on a **training ward** • *Reflection*: roles & responsibilities of the professions and interprofessional collaboration	12 medicine 6 nursing 2 physio	• 1-4 weeks, all year • training ward • 1 doctor, 2 nurses, 1 physio	since Sep 2017
Final year: seminar	• *Interaction*: team teaching and cooperative learning to acknowledge roles of other professions in **discharge management** • *Reflection*: communication among the professions	50 medicine 30 nursing 25 physio	• 90 min, annually • lecture hall • 1 doctor, 1 nurse, 1 physio	2015 2016

Table 2: Overview of the IPE curriculum at the end of funding in mid-2018,
Notes: Medicine = medical students, physio = trainee physiotherapists, nursing = trainee nurses; for more information on IPE curriculum and IPE sessions see https://share.articulate.com/qXo8myPD2MU2VhNp-JtS1#/.

Evaluation of the sessions

All session were evaluated at least twice and modified as needed. The assessment of the concept, context and results of the IPE sessions were collected through paper-based questionnaires focusing on perceived learning gains, student satisfaction and open-ended questions (What did you particularly like about the session? What did you like less? What suggestions for improvement do you have?). In summary, the results confirmed that both core elements of the IPE sessions were particularly appreciated by the students and trainees. The participants liked learning with another profession (interaction) and discussing and gaining other perspectives on certain topics (reflection).

Medical students especially liked sessions which took place in the real hospital context (shadowing, training ward) that allow to realise the different professional roles making the relevance of interprofessional collaboration obvious (Klapper & Schirlo, 2016, p. 1). Trainee physiotherapists favoured the sessions in which they could demonstrate their knowledge and skills to other professions (shadowing, orthopaedic examination techniques, training ward) which may reflect the desire of each health profession to demonstrate their expertise, emphasizing the learning from each other (Dunleavy et al., 2017, p. 3).

Criticism was directed almost exclusively at general conditions regarding the educational context, e.g. locations/rooms, timeframes, scheduling shortly before exams or an imbalance regarding the reciprocity of peer teaching. Modifications included rescheduling IPE sessions, giving more information to the participants prior to the sessions, increasing interprofessional interaction through integrating more interdependency in the tasks given for group work. The evaluation results of the modified IPE sessions confirmed the improvements made. The participants reported high learning gains and satisfaction in general.

The aim of the project to make the IPE curriculum with seven successful IPE sessions a compulsory part of medical studies and physiotherapy traineeship was reached by the end of the funding period in mid-2018. All established IPE sessions have been offered since then.

The decision in 2018 to reevaluate all established IPE sessions in 2023 turned out to be particularly relevant as it coincided with the first year of "normal" study after the COVID-19 pandemic. The pandemic along with its regulations and restrictions imposed a heavy strain on the continuity of IPE. The sustainability of IPE was at risk because the success factors for IPE, i.e. face-to-face interactions, hands-on practice or clinical exposure, were reduced or lacking due to disruption of face-to-face education, transition to virtual learning and deprioritization of collaborative learning (Langlois et al., 2024, p. 3; Wang et al., 2024, p. 3; Xyrichis et al., 2023, p. 1037).

Research objectives

With the return to almost normal teaching and learning conditions in autumn 2022, the IPE sessions with direct contact and interaction were reactivated even though they were still affected by the aftermath of the pandemic (Wang et al., 2024, p. 1). Therefore, the reevaluation of IPE curriculum in 2023 was used

- to verify that the IPE curriculum has "survived" five years without funding and become a regular part in teaching,
- to evaluate if the IPE session with their core elements interaction and reflection were still appreciated by the students and trainees and if and how the sessions could be improved and
- to assess whether the participants' reports on learning gains and satisfaction with the IPE sessions had remained stable or even increased beyond the project funding period, even after temporal suspension during the pandemic.

3 Methods

For the reevaluation of the IPE curriculum, self-reported quantitative data of all sessions of the IPE curriculum established by mid-2018 (baseline) and five years after funding had ended (follow-up) were compared. Qualitative data were used to verify whether the IPE concept and context had been maintained and to derive further measures for improving the individual sessions.

3.1 Background

Between 2018 and 2023 some structural curriculum changes were required which also impacted on two IPE sessions. The shadowing of trainee physiotherapists was cancelled in the nursing placement in order to focus strictly on nursing. Moreover, the number of medical students in the lecture in health economics was reduced to only 22. The impact of the pandemic restrictions on Mannheim's IPE curriculum also required some permanent changes to the IPE sessions for hygiene reasons (e.g. no trials of respiratory trainers, change of training ward with less favourable conditions regarding e.g. the office/meeting room or IT). In 2020, the academy moved into new buildings bringing the different schools training future health professionals (nursing, physiotherapy …) together under one roof but away from the campus of the hospital and usual teaching facilities. This move to another part of town requires a transfer of about 30 min by public transport.

3.2 Data collection

Questionnaires

After each IPE session, all participants were invited to evaluate the session using one of the self-developed standard questionnaires (classroom-based IPE or interprofessional training ward placement). The training ward required a different questionnaire because the clinical placement took place on an authentic hospital ward. Both questionnaires included general items (profession, year of study/traineeship, type of IPE session etc.), ratings of their overall satisfaction and perceived learning gains. Open-ended questions for evaluating the educational concept and context of classroom-based IPE or a mix of closed-ended and open-ended questions in case of the training ward were used (Table 3).

The evaluation was paper-based using a 6-point rating scale for closed items at baseline (up till 2018 due to successive implementation of the IPE sessions) and online with a 5-point rating scale in the follow-up (in 2023). The questionnaire for the interprofessional training ward was shortened in 2020 for more focus. However, the items for the reevaluation remained the same.

Variable	Items for classroom-based IPE sessions[1]	Items for the interprofessional training ward
perceived learning gains	• My learning gain in this IPE session is high overall. (closed-ended, Likert scale)	Global mean value from a scale[2] (all closed-ended, Likert scale): • I have learned a great deal about internal medicine. • I have learned a great deal about diagnostic and therapeutic approaches. • I have learned a great deal about clinical practical skills. • I was able to expand my knowledge of ward organization and procedures. • I was able to expand my knowledge of the professional field of doctors and the different requirements of this profession in everyday ward life. • I was able to expand my knowledge of the professional field of nursing and the different requirements of this profession in everyday ward life. • I was able to expand my knowledge of the professional field of physiotherapists and the different requirements of this profession in everyday ward life.
participant satisfaction	• What school grade would you give the IPE session overall? (closed-ended, rating scale 1-5)	• What school grade would you give the IPE session overall? (closed-ended, rating scale)
educational concept & context	• What did you particularly like about the IPE session (open-ended, textbox) • Critical comments and suggestions for improvement (open-ended, textbox)	• There was frequent contact with the other professions during my placement. (closed-ended, Likert scale) • I appreciated the interprofessional collaboration during my assignment. (closed-ended, Likert scale) • Critical comments and suggestions for improvement (open-ended, textbox)

Table 3: Overview of the items used in the two questionnaires to evaluate the sessions of the IPE curriculum, Notes: [1] anatomy, shadowing, orthopaedic techniques, lung function, discharge management; [2] Cronbach's α = .84 (good reliability).

3.3 Data analysis

Since the numbers of participants of each profession often differed considerably in each session, quantitative data were analysed for each profession separately. However, university regulations only allowed to analyse data if a minimum of five participants was reached. Standardised z-scores were calculated to account for the different scales (6-point vs 5-point items) in the baseline and follow-up questionnaires. The data required to use non-parametric Mann-Whitney U tests for comparison with p-values set at .05. Effect sizes were calculated using r (Cohen, 1988). SPSS®, version 29 was used for statistical calculations.

The results from open-ended data were analysed using a deductive and inductive approach of content analysis including frequency count with each comment of a student or trainee being the unit of analysis. To evaluate the educational concept and context, participant responses were assigned to one – or more if applicable – of the four categories: interaction (concept), reflection (concept), administration (context), setting (context). Other comments not directly relating to the IPE session in question were ignored for further analysis. Both authors coded the data individually. After determining the interrater reliability Cohen's Kappa (Landis & Koch, 1977, p. 165), the inconsistencies were compared and discussed before taking a shared decision. After screening the comments, subcategories were inductively derived in unison. Only aspects criticised by at least three participants were taken into account for a possible revision of this IPE session.

Definition of successful reevaluation

The sustainable curricular integration of IPE into Mannheim's regular medical education and physiotherapy traineeship was regarded as successful if in the follow-up evaluation

- the longitudinal IPE curriculum was confirmed with at least one session per year of study and
- the educational concept (interaction, reflection) of the classroom-based IPE sessions were particularly appreciated or, in case of the training ward, frequent contact with the other professions and good interprofessional collaboration was confirmed by approval ratings "I somewhat agree" and "I strongly agree" and
- ratings of perceived learning gains and overall satisfaction were equally good or better than the respective baseline data.

3.4 Ethical considerations

Data were collected voluntarily and anonymously and followed the ethical principles of the Declaration of Helsinki. As data collection was part of the regular course evaluation of Medical Faculty Mannheim, no ethics approval for non-interventional studies was required.

4 Results

At baseline, 872 students and trainees participated in IPE sessions, in the follow-up 683. Response rates were 78% at baseline and 41% in the follow-up. Response rates varied depending on the survey period, IPE session and profession (Table 4). Due to university regulations and very low response rates, evaluation data from the lecture in health economics could not be analysed. Responses given by trainee nurses participating in the training ward could not be taken into account either. For the seminar on discharge management, only data from medical students were available.

IPE session	Medical students (baseline / follow-up)	Trainee physiotherapists (baseline / follow-up)	Trainee nurses (baseline / follow-up)	Sum
anatomy	28 / 18	24 / 6	X	76
shadowing[1]	41 / –	34 / –	X	75
health economics	73 / –	6 / –	X	79
orthopaedic techniques	136 / 99	68 / 15	X	318
lung function	102 / 55	21 / 14	X	192
training ward	57 / 48	6 / 5	2 / 2	120
discharge management	28 / 14	26 / 3	29 / 3	103
sum	465 / 234	185 / 43	31 / 5	963

Table 4: Valid collected evaluation data depending on survey period, IPE session and profession,
Notes: baseline = last paper-based surveys by the end of the funding period in 2018, follow-up = online survey in 2023,
X = IPE sessions designed only for medical students and trainee physiotherapists but not trainee nurses;
– = no responses available from participants; [1] shadowing was cancelled in 2021.

4.1 Results of quantitative data analysis

Learning gains and participant satisfaction

Comparisons showed that five years after the funding of the project had ended, the IPE curriculum was still a regular part in teaching although it was reduced to only six sessions as the shadowing session was no longer available anymore. However, the longitudinal character, i.e. one IPE session per year of study, had remained. Comparisons of each IPE session between baseline and follow-up regarding perceived learning gains and overall satisfaction identified only few significant differences, all of which concerned medical students:

- Learning gains in the practical session on lung function & respiratory therapy were reported higher in the follow-up ($U = 3316.000$, $z = 2.117$, $p = .034$, $r = .17$), but lower in the discharge management seminar ($U = 281.000$, $z = 2.291$, $p = .023$, $r = .35$).

- Overall satisfaction was rated higher in the practice session on orthopaedic examination techniques in the follow-up ($U = 4568.000$, $z = -3.688$, $p < .001$, $r = -.32$), but lower in the placements on the training ward ($U = 1014.000$, $z = -2.340$, $p = .019$, $r = .23$).

Analysis of the data for the training ward showed no significant difference between 2018 and 2023 for trainee physiotherapists regarding the frequency of contact with other professions ($U = 7.500$, $z = -1.429$, $p = .18$) and the perceived good interprofessional collaboration ($U = 11.000$, $z = -,856$, $p = .54$) in the follow-up. Medical students, too, showed no significant difference in their ratings of the frequency of interprofessional contact between 2018 and 2023 ($U = 1188.500$, $z = -1.272$, $p = .20$), but they rated the collaboration with other professions significantly lower in 2023 than in 2018 ($U = 878.000$, $z = -3.293$, $p < .001$, $r = .32$).

4.2 Results of qualitative data analysis

Coding scheme

The content analysis of the participants' comments by both authors showed an almost perfect interrater reliability (Cohen's kappa = .93). The coding process including a deductive and inductive approach is given in Figure 2. Deductive categories were used to verify the educational concept and context of the IPE sessions in 2023. The subcategories regarding administration and setting were inductively derived from the critical comments and suggestions for improvement.

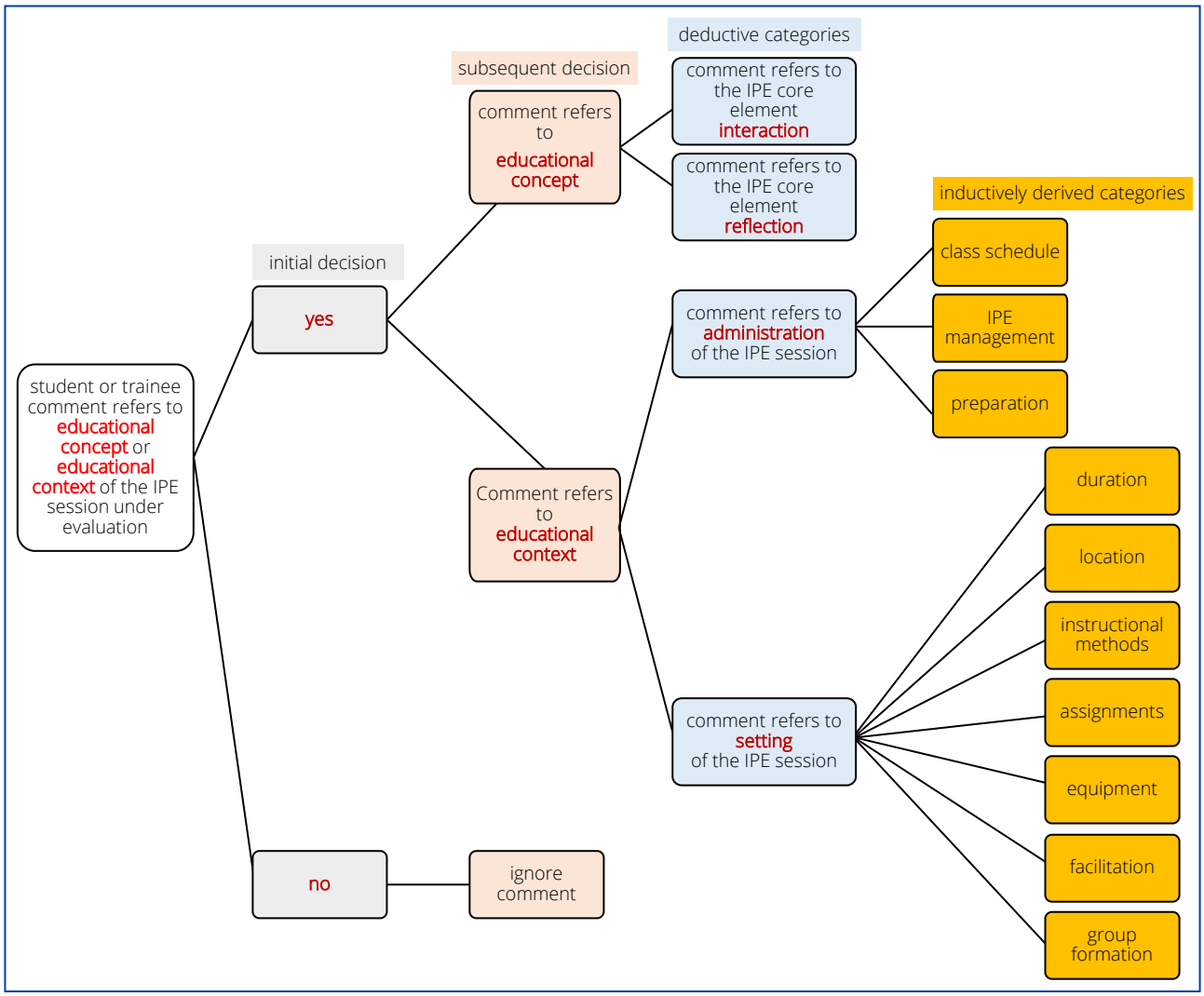

Figure 2: Overview of coding process of the content analysis

The deductive categories subsumed responses to the following topics:

- *Interaction*: cooperative learning, learning together, from or with each other, peer teaching etc.
- *Reflection*: interprofessional discussions, gaining insights and new perspectives by communicating with other professions etc.
- *Administration*: class schedules, information management regarding students and trainees prior to the session, faculty and teacher management etc.
- *Setting*: teaching methods such as learning in small groups, peer teaching, hands-on topics, use of specialised equipment, assignments etc.

Results on educational concept and context

The educational concept and context of the classroom-based IPE sessions were reconfirmed in 2023. Table 5 shows the frequency of responses of what the participants really appreciated about each classroom-based IPE session, with comments on the educational context referring only to the setting and not to administration matters.

	Anatomy (23 comments)	Orthopaedic techniques (80 comments)	Lung function (75 comments)	Discharge management (13 comments)
interaction	9	47	23	5
reflection	10	39	29	7
setting	9	15	22	5

Table 5: Results of content analysis of "What did you particularly like about the classroom-based IPE session", Note: Parts of a participant's comment could be assigned to different categories or none at all if it was not directly related to the IPE session in question.

Interprofessional exchange as reciprocal learning

Across all evaluated classroom-based sessions, the participants appreciated the core elements interaction and reflection as they particularly liked …

> *"practicing and exchanging professional knowledge with other professions, both learning and explaining" (lung function)*
>
> *"interprofessional teamwork" (discharge management)*
>
> *"exchange, different perspectives on examinations and illnesses" (orthopaedic techniques)*
>
> *"the exchange with the trainee physiotherapists and also seeing how we can learn from them and they from us because we focus on different areas" (anatomy)*

Practice-oriented learning environment

The educational context was also mentioned positively although the comments exclusively referred to the setting of the IPE sessions. The participants liked …

> *"the practical exercises with the trainee physiotherapists with assistance from the teacher who was able to clarify questions" (orthopaedic techniques)*
>
> *"the practical case studies" (discharge management)*
>
> *"the mixing of professions with their respective different perspectives on patient care was very interesting" (lung function)*
>
> *"small group instruction" (anatomy)*

Critical comments and suggestions for improvement

The critical comments and suggestions for improvement of all IPE sessions, i.e. including the training ward, only related to administration matters or the setting. Ten subcategories were inductively derived from the comments subsuming responses to the following topics:

- *class schedule*: scheduling IPE sessions with too little time for transfer to a different campus etc.
- *IPE management*: teaching staff, student and trainee management for and quality management of IPE on the training ward etc.
- *preparation*: information management of students and trainees
- *duration*: length of IPE session
- *location*: classrooms, lecture halls, campus etc.

- *instructional method*: lecturing, peer teaching, group learning, facilitation etc.
- *assignments*: adequacy or scope of tasks in IPE sessions
- *equipment*: equipment such as respiratory trainers, handouts, PCs etc.
- *facilitation*: scope or helpfulness of facilitation
- *group formation*: ways of forming groups, interprofessional group ratio, group size etc.

Table 6 shows the frequency of responses of what the participants did not like or would like to see as improvement about each IPE session in 2023.

	Anatomy (19 comments)	Orthopaedic techniques (74 comments)	Lung function (77 comments)	Discharge management (12 comments)	Training ward (121 comments)
class schedule		3			4
IPE management					4
preparation		25	18		38
duration	6	8	19		15
location		8	11	3	
instructional method			9		
assignments	5	21	22	5	
equipment	3		5		10
facilitation					37
group formation			7	5	9

Table 6: Results of content analysis of participants' critical comments and suggestions about all IPE sessions, Note: Parts of a participant's comment could be assigned to different categories or none at all if it was not directly related to the IPE session in question.

Preparation

Similar issues were criticized or mentioned as improvements across the evaluated sessions. The participants often criticised that medical students were not informed or prepared enough about what to expect in the classroom-based IPE sessions:

> *"Little information in advance for preparation" (orthopaedic techniques)*

> *"We, as medical students, knew absolutely nothing about what content we should teach the trainee physiotherapists" (lung function)*

Location/class schedule

The relatively distant location of school of physiotherapy was criticised by medical students as they needed a 30-minute transfer by public transport from the usual teaching facilities on the hospital campus to attend the two IPE sessions. Issues of class schedule referred to this relatively long transfer to the school of physiotherapy after lectures or – in case of the training ward – splitting the week-long placement to make up a shift cancelled due to a public holiday at the end of the teaching period:

"Our schedule was very tight, so we had to run to the train after the lecture and still arrived a little late for the interprofessional session at the school of physiotherapy" (orthodpaedic techniques)

"The extra shift due to the holiday was completely pointless; by the time you've settled back in, your shift was already over" (training ward)

Duration

Regarding the setting, participants often regretted the duration of most IPE sessions and even proposed to extend the placement on the training ward by another week:

"Two weeks would be better, as the first week is almost entirely spent with familiarizing oneself with the routine and tasks" (training ward)

Instructional method

Some participants did not like the medical educator's lengthy lecture instead of working on the practical assignments in the interprofessional groups:

"the lecturer spoke for 25 minutes before we were allowed to begin" (lung function).

The participants also commented on the practical assignments, often stating that they did not promote balanced reciprocal peer teaching:

"We as trainee physiotherapists were always able to show the medical students a lot (which is great), but I would prefer it if the practical topics were divided equally – in other words, if we showed each other the same amount" (orthopaedic techniques)

Group formation

Sometimes participants suggested other, revised, more or new equipment, e.g. using different plastinated material (anatomy), changing the assignments to focus on more relevant topics and providing hand-outs (lung function), providing more computers and an instruction manual (training ward). Regarding the formation of interprofessional groups in the IPE sessions, participants were not satisfied with the unbalanced interprofessional ratio (lung function), the absence of trainee nurses or physiotherapists in some weeks (training ward) or the difficulties to form small interprofessional groups out of approximately 100 people in a lecture hall (discharge management).

Facilitation

A lot of participants criticised after their placement on the training ward that there was not enough facilitation by the doctors/medical educators (subcategory facilitation) and, in connection with this, the ratio of medical students to medical educators/doctors and the facilitators' scope of responsibility for patient care on the ward (subcategory IPE management).

4.3 Summary of results

The results of the reevaluation after five years without project funding show that

- six out of seven sessions of the IPE curriculum had "survived", still offering one IPE session in each year of study,
- the participants' self-reports on learning gains and overall satisfaction with an IPE session had largely remained stable, even after temporal suspension during the pandemic and
- the educational concept with its core elements interaction and reflection was reconfirmed.

However, some criticism about matters of educational context and suggestions call for further measures to improve individual IPE sessions and thus the entire IPE curriculum.

5 Discussion

Organising, coordinating and assuring the quality of IPE sessions requires time and effort. The reevaluation of the IPE curriculum inviting all participants to evaluate the individual IPE sessions five years after funding had ended (and after teaching was resumed as usual following the pandemic) was to verify the sustainability of the IPE curriculum. For that, results from the different approaches were carefully considered and measures to stabilize or improve the sessions of the IPE curriculum were derived.

Learning gains and participant satisfaction

By looking at the sessions offered, the longitudinal IPE curriculum was still in place. The shadowing session had to be cancelled due to structural requirements and unfortunately there were no options to transfer this popular learning experience to another part of the medical curriculum. Comparisons with baseline data confirm that learning gains and satisfaction reported by the participants largely remained stable or increased. Two exceptions apply to medical students. They reported less learning gains in the discharge management seminar which might be caused by unmet expectations on the interprofessional interaction, e.g. classroom-based interprofessional discussions about patient cases. More surprisingly, the students were significantly less satisfied with the placements on the training ward in the authentic hospital setting in 2023 after hardly no IPE session taking place during the pandemic. A reason could be that the training ward experience fell short of the students' expectations, awaiting more instructions and feedback by the facilitators instead of showing the proactive behaviour expected by the students in the placement. This could be an aftereffect of the shift to online learning during the pandemic causing poorer skills acquisition due to less hands-on learning. This in turn possibly may have resulted in less confidence, lower motivation and/or a more passive learning attitude, which made the student preparation for team-based practice difficult and less adequate (Langlois et al., 2024, p. 2; Wang et al., 2024, p. 4).

Confirmation of the educational concept

The qualitative data from the participants on the IPE sessions was used to examine whether the educational concept and context of the IPE sessions

were reconfirmed by the participants. Positive comments on the IPE sessions, particularly emphasizing the appreciation of the core elements interaction and reflection, indicated that the overall educational concept developed in 2014 had remained unchanged over the years.

Measures derived for improving the setting

The results of the participants' critical comments and suggestions, however, highlighted areas for further improvement. Interestingly, the participants reported almost the same issues as in 2018. Apparently, the measures taken back then had not completely improved the conditions as expected. The project team discussed (again) the issues and, if considered feasible, derived and implemented several measures. Regarding administrative matters, it was relatively easy to postpone or bring forward the start time of a classroom-based session after checking the timetables in medical studies and physiotherapy traineeship, allowing more time for transfer to different campuses or avoiding overtime. Unfavourable dates for making up missed shifts on the training ward, which only affected medical students, were replaced by submitting an assignment as compensation instead. Frequent criticism by medical students of not being informed in advance about what to prepare for the IPE sessions was addressed by adding information to the electronic timetable tool, publishing announcements indicating the content of an upcoming IPE session via the learning management system. Even a virtual training ward, an online course with interactive exercises in 360° learning scenarios of the training ward, has been developed for all professions to inform the students and trainees about what to expect in their placements and what is expected from them on the real training ward. Another measure to improve the highly complex teaching format of the training ward requiring coordination of three and more educational institutions and departments was to establish a steering group recently. Its tasks include e.g. assuring and improving the quality of the educational concept, organising interprofessional shift planning or training of new facilitators.

As response to comments relating to the setting of the training ward, specifically the scope of facilitation which medical students reported as not enough, it was arranged that doctors acting as facilitators and medical educators were only responsible for the training ward and largely relieved of other tasks in patient care on the rest of the ward. Other comments concerned the location and duration of the IPE sessions. Changes to the location of IPE sessions taking place at the school of physiotherapy (off the hospital campus) were not possible because the required equipment is only available there. Longer IPE sessions could not be organised either as the maximum time frame, specified by the regulations of physiotherapy traineeship and medical studies and timetable restrictions, has already been used. The feedback of medical students often mentioned over the years requesting to extend the placement on the training ward by another week was not granted as previously proposed options for two-week placements were not approved by the students. Other issues of the setting mentioned by the participants were discussed with the teachers of the IPE sessions in question, e.g. explaining their role as facilitators instead of lecturers, requesting revisions of the assignments to achieve even more balanced reciprocal peer teaching and using or providing suitable equipment. While group formation could not be changed in all IPE sessions due to structural restrictions, at least the method

of forming balanced interprofessional groups in the discharge management seminar was improved based on suggestions reported by participants.

Limitations

Some limitations of the reevaluation must be mentioned, such as the self-reported data of single items and changes in the survey method (questionnaire design, mode of distribution). Due to the varying number of participants, university regulations on low response rates and the influence of pandemic and non-pandemic factors, bias cannot be excluded. Using data from only one German university medical centre limits the generalizability of the results.

Overall appreciation of the evaluation processes

All in all, the IPE project was successful in sustainably transferring innovative sessions into regular medical education and physiotherapy traineeship at University Medical Centre Mannheim to form an IPE curriculum which benefits all medical students and trainee physiotherapists (Alexander, 1999, p. 182). Evaluations played a very important part in achieving this. The first evaluations after developing and testing the IPE sessions were to assess whether the educational concept and context turned out to be appropriate. Project reports to the funding body required the project team to reflect and assess the processes of jointly developing the IPE curriculum as well as learning lessons for future collaboration. Controlled studies to check for an IPE session's effectiveness contributed to advance IPE at Mannheim. But it was the reevaluation of the IPE curriculum five years after funding had ended that really proved that the IPE project had reached its goal. It was an advantage that the main project members have accompanied the development and revisions of IPE over the years and were able to reflect and understand the connections and conditions in retrospect. As IPE constantly was further developed, so did quality management, e.g. revising questionnaires (wording and number of items or scales, answering formats) or changing modes from paper-based surveys to online surveys. These changes needed to be taken into account when comparing data from different evaluation periods.

It takes time and constant effort to maintain or improve the quality of the IPE sessions and match students' and teachers' expectations (Bogossian, 2023, p. 265). The measures derived from the last evaluation results need to be reevaluated in a few years' time to assess their impact. In addition, the IPE curriculum has constantly evolved since funding had ended (Figure 3) and, thus, the new IPE sessions need to be included in the evaluation plan. Further research could contribute to yield even deeper insights into IPE and help to revise existing or develop new sessions in order to achieve high-quality IPE.

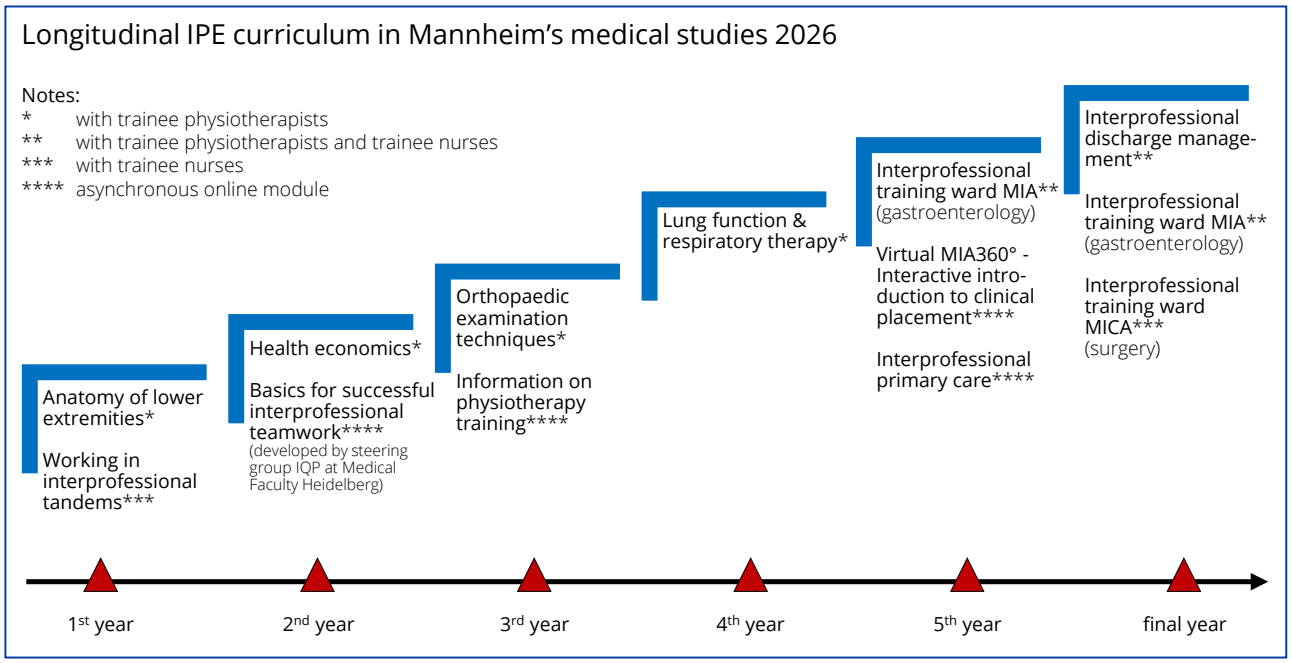

Figure 3. Longitudinal IPE curriculum in Mannheim's medical studies in 2026

6 Conclusion

Practical implications

The reevaluation of the mandatory IPE curriculum proves that the innovative IPE sessions were successfully and sustainably implemented at University Medical Centre Mannheim. This shows how important evaluations at various stages and especially beyond the project funding period are. It is advisable for educational projects to systematically establish an evaluation plan. Such a plan should not only include the aspects of evaluation such as milestones, focus, areas, purpose and approach (Ditzel, 2022) during the project phase but also sensible intervals or events in the future that may require reevaluation, e.g. when an educational program or syllabus is greatly modified or fundamental teaching and learning conditions have substantially changed. Receiving positive evaluation results on once innovative educational approaches years after funding has ended is rewarding for the institutions as well as the funding body that made the development and curricular integration of IPE possible.

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