Pharmacy Education (2024) 24(1) 793 - 806
https://doi.org/10.46542/pe.2024.241.793806

RESEARCH ARTICLE

Exploring preceptor perceptions of interprofessional education during pharmacy professional practice internships in Indonesia

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Keywords
Indonesia
Internship
Interprofessional education
Pharmacist

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Abstract

Background: Integrating Interprofessional Education (IPE) into Pharmacy Professional Practice Internships (PPPI) in Indonesia is essential for fostering effective collaboration among healthcare professionals. This study investigates preceptors' perceptions about the integration and impact of IPE in PPPI, aiming to uncover the challenges and potential enhancements needed for effective implementation. **Methods:** A cross-sectional survey was conducted among preceptors from various West Java and Jakarta healthcare settings. A total of 61 institutions were invited, resulting in 60 usable responses. Respondents completed a questionnaire evaluating their perceptions across several domains related to IPE. Data analysis included descriptive statistics and correlation analysis using Spearman's test. **Results:** The survey revealed that preceptors generally recognise the urgency of integrating IPE into PPPI, with positive attitudes towards its importance and effectiveness shown in >80% of respondents. However, IPE participation and potential integration into the current PPPI structure were more likely to be perceived negatively (approximately 30% and 15%, respectively). Statistical analysis indicated a moderate correlation between preceptor experience and higher perception scores on participation in IPE ($r = 0.325$; $p < 0.05$). **Conclusion:** While preceptors acknowledge the value of IPE in enhancing interprofessional collaboration, there are evident challenges in its practical implementation during internships. This study highlights the need for increased support from educational institutions to improve IPE integration and effectiveness in Indonesia's pharmacy education.

Introduction

Pharmacy education has progressed beyond traditional models, highlighting the significance of real-world experiences in shaping skilled and adaptable pharmacists. The Professional Practice Internship, a pivotal phase of pharmacist professional education in Indonesia, serves as a bridge between academic knowledge and practical application (APTFI, 2022). Pharmacy Professional Practice Internship (PPPI) — or Praktik Kerja Profesi Apoteker (PKPA) in Indonesian, refers to the practical work experience or internship that a pharmacy student undergoes as part of their professional training (APTFI, 2022; Cokro *et al.,* 2021).

In the dynamic landscape of healthcare, the significance of interprofessional education (IPE) has gained increasing recognition as a catalyst for fostering collaboration and enhancing patient care outcomes (Oelke *et al.,* 2019; Spaulding *et al.,* 2021; Mattiazzi *et al.,* 2023). Although IPE is widely acknowledged as valuable on a global scale, there is still a need for in-depth research on how to effectively incorporate it into the pharmacy curriculum, especially during professional practice internships.

In Indonesia, integrating IPE into PPPI is increasingly important for several reasons. The pharmacy education system typically entails a four-year bachelor's program followed by a one-year pharmacist professional program, which includes approximately 1200 hours or 26 credits of PPPI in various settings (Cokro *et al.,* 2021; APTFI, 2022). Notably, Indonesian pharmacists are required to possess competencies across diverse settings such as community, clinical, industrial, distribution, and regulatory sectors (MoH, 2023). Moreover, some pharmacy faculties/schools in Indonesia are situated within universities without medical or nursing programs, posing a challenge to implementing the ideal form of interprofessional education as early as possible (i.e., during an undergraduate program). Therefore, it is vital to explore opportunities for exposing students to IPE during PPPI, as they will engage in interdisciplinary settings alongside medical, nursing, and other discipline interns under the guidance of their preceptors.

Preceptors, who serve as mentors and role models for aspiring pharmacists during their internship, played an important role in exposing the students to interprofessional collaboration (Kennie-Kaulbach *et al.,* 2024). Hence, there is a need for research that examines the views of preceptors on the incorporation and influence of Interprofessional Education (IPE) in the specific context of the PPPI in Indonesia.

This research aims to achieve an understanding of the awareness and attitudes of preceptors towards the concept of interprofessional education, the current level of integration of IPE into the PPPI in Indonesia, the perceived impact of IPE on the development of interprofessional collaboration skills among pharmacy students, and factors that influence the preceptors' perceptions.

Methods

Study design and respondents

A cross-sectional survey was conducted as part of this study. Invitations were sent to 61 institutions in diverse practice settings in West Java Province and the Special Region of Jakarta, Indonesia — these two provinces annually produce the highest number of pharmacist graduates (Farmasetika.com, 2023). These settings included community pharmacies (pharmacies, clinics, and public health centres), hospitals, pharmaceutical industries, regulatory bodies (such as the National Agency of Drug and Food Control National Food and Drug, or BPOM, and BBPOM in Indonesian), and the Ministry of Health, both at the national and regional level (Dinas Kesehatan and Kementerian Kesehatan in Indonesian). These institutions were invited because they serve as sites for the PPPI for pharmacy students from most higher education institutions in Java and Sumatra, including the School of Pharmacy at ITB.

The invitation was for participation in a workshop for preceptors, including the topic of IPE, scheduled for November 4, 2023, organised by the School of Pharmacy Institut Teknologi Bandung. The primary objectives of this workshop were as follows: 1) to standardise the understanding of the implementation of the PPPI; 2) to provide an overview of planned curriculum revisions and the implementation of IPE; and 3) to obtain feedback on the PPPI implementation as part of the continuous improvement of PPPI guidelines. The expected outcome of this workshop was the development of a unified perspective between the school and preceptors to ensure the effective implementation of PPPI. Furthermore, the workshop is intended to provide preceptors with comprehensive information on recent developments in pharmacist professional education. The workshop is also expected to deliver guidance on PPPI supervision, enabling preceptors to facilitate students' adaptation to professional environments, the integration of theoretical knowledge into pharmaceutical practice, the development of pharmacist competencies, confidence-building, and professional growth through the mutual exchange of knowledge and skills between preceptors and students.

The criteria for attending the workshop were as follows: 1) being a pharmacist, and 2) currently serving as an active preceptor. Each institution was requested to nominate one to two pharmacists who met the aforementioned criteria to attend the workshop and participate as respondents in the survey. Following a lecture on IPE, the preceptors were approached for their consent to become respondents to the questionnaire. The study's objectives and details concerning anonymity and confidentiality were clearly communicated to the participants. They were then provided with the questionnaire and instructed to independently read and respond to the items. It was emphasised that participants had the right to withdraw from the study at any point.

Although all preceptors from a broad range of institutions were invited to participate, and efforts were made to ensure a diverse sample, the sample may still reflect a more favourable view of IPE than the general population of preceptors. To address this, investigators ensured that the survey was distributed across various institutions with different levels of

exposure to IPE, aiming for a balanced representation of perspectives.

Regarding ethical clearance, the Secretariat of the Research Ethics Committee of the National Research and Innovation Agency, Republic of Indonesia, issued a notification letter stating that the research survey does not require ethical clearance.

Instruments

To explore preceptors' perceptions of Interprofessional Education (IPE), a review of relevant literature (Hinderer *et al.,* 2016; El-Awaisi *et al.,* 2019; Yune *et al.,* 2020) was conducted. Following the examination of content validity by a panel comprising seven lecturers, including members from the School of Pharmacy ITB IPE team, pharmacist study program coordinators, and the Quality Control Cycle team (Table I), a set of 15 items was formulated.

The naming strategy employed considered the central concept of all items under each domain. These domains included the urgency of IPE (three items), participation in IPE (three items), effectiveness of IPE (four items), support in IPE implementation (three items), and potential integration of IPE in the Pharmacy Professional Practice Internship (two items). Each item was evaluated using a 4-point Likert scale (4= strongly agree, 3 = somewhat agree, 2 = somewhat disagree, 1 = strongly disagree). The total score was calculated based on the selected Likert scale points. Accordingly, the maximum scores for each section are as follows: "*Urgency of IPE*" – 12, "*Participation in IPE*" – 12, "Effectiveness of IPE Implementation" – 16, "*Support in IPE Implementation*" – 12, and "*Potential Integration of IPE in Pharmacy Professional Practice Internship*" – 8. Thus, the total maximum score for the entire questionnaire is 60. Higher scores were indicative of elevated levels of perception.

Data and statistical analysis

The sample size for this study was determined based on the availability and willingness of preceptors from the invited institutions to participate. Due to the practical constraints of accessing a large, diverse pool of preceptors within the study timeframe and geographic focus, the final sample size was determined by the number of respondents who consented to join the workshop. While a formal sample size calculation was not feasible due to these constraints, the study aimed to include a representative sample by inviting a wide range of institutions with varying levels of IPE integration. The resulting sample, though limited, provides initial insights that can inform future, larger-scale studies.

Table I: List of questions

No.	Questions
Urgency of IPE	
1.	In general, I believe it is essential for IPE to be integrated into the implementation of Pharmacy Professional Practice Internship.
2.	I consider it important for IPE to be part of the Pharmacy Professional Practice Internship.
3.	The implementation of IPE will enhance the dignity and professional status of pharmacists in the eyes of other professionals as well as the community/patients.
Participation in IPE	
4.	Before today's workshop, I had already heard presentations about IPE.
5.	I possess the necessary capacity as a preceptor to guide students in conducting IPE during Pharmacy Professional Practice Internship.
6.	I have tried to implement/present IPE for pharmacy professional students at my practice location.
Effectiveness of IPE implementation	
7.	If I had received IPE presentations during my professional studies, I could collaborate more effectively with other healthcare professionals.
8.	If I implement IPE/After implementing IPE, both I and the institution where I practice will experience greater benefits.
9.	Implementing IPE during Pharmacy Professional Practice Internship will enhance the interprofessional collaboration abilities of students when they practice as pharmacists.
10.	IPE is necessary to optimise patient-centred care and/or consumer-centred care.
Support in IPE implementation	
11.	The implementation of IPE at the Pharmacy Professional Practice Internship location requires more support from the educational institution sending students.
12.	I am confident that IPE can be carried out during Pharmacy Professional Practice Internship at my practice location.
13.	I am confident that the implementation of IPE will receive support from healthcare professionals/other professionals at my practice location.
Potential integration of IPE in pharmacy professional practice internship	
14.	IPE can be integrated into the Pharmacy Professional Practice Internship conducted at my institution within the next year.
15.	Challenges and obstacles to implementing IPE during Pharmacy Professional Practice Internship at my practice location can be overcome, and solutions can be found.

The data was analysed to evaluate the general characteristics of the individuals. Descriptive statistics were used to analyse the preceptors' perceptions of each question in each category. The correlation between respondent characteristics and questionnaire scores was analysed to identify potential enablers and barriers affecting preceptors' attitudes towards IPE. The Spearman correlation test was used for this analysis. Finally, the total perception score based on categorical characteristics was compared using either the Mann-Whitney or Kruskal-Wallis test, depending on the data type. The analysis was conducted using Minitab v.20, with a *p*-value < 0.05 considered statistically significant.

Results

Respondent characteristics

As many as 60 out of the 61 targeted respondents were included in the study. One respondent was excluded due to their status as a non-preceptor and not being a pharmacist. Overall, diverse characteristics were observed among respondents, as indicated by a wide range of interquartile ranges (IQR) in age, experience as a pharmacist and preceptor, and the number of students supervised as a preceptor in the last year (Table II).

Table II: Respondent characteristics

Characteristics (n = 60)	Median	N (%)
Age (median, years (IQR))	33 (11.8)	
Sex (female, n (%))		45 (75)
Degree of education		
Pharmacist		52 (86.7)
Masters		8 (13.3)
Experience as a pharmacist (median, years (IQR))	9.5 (10.8)	
Practice setting		
Community (pharamacies, clinics, public heath centres)		20 (33.3)
Hospital		13 (21.7)
Pharmaceutical industries		13 (21.7)
Regulator (NAGDC, Ministry of Health)		8 (13.3)
Pharmaceutical and medical devices distribution		8 (13.3)
Experience as a perceptor (median, years (IQR))	3 (7)	
The number of students supervised as a preceptor in the last year (median, years, (IQR))	10 (12)	
Characteristics of the practice location		
A work environment consisting of various professionals from different disciplines, even though they are not non-pharmacy healthcare personnel.		38 (63.3)
A work environment consisting of various types of non-pharmacy healthcare professionals.		22 (36.7)

The median age of the respondents is 33 years (IQR 11.75 years), with the majority being female (75%). Most preceptors held a pharmacist degree (86.7%) and approximately 9.5 years of experience (IQR 10.75 years). The majority of respondents worked in a community setting (33.3%). Interestingly, the median experience as a preceptor is just three years (IQR 7 years), but with a median number of approximately ten students supervised as a preceptor in the last year (IQR 12 students). Most preceptors worked in an environment comprising various professionals from different disciplines, even though they were not non-pharmacy healthcare personnel (63.3%).

Preceptors' perception of IPE during PPPI

A significant proportion of respondents expressed a positive perception of the urgency of IPE. The majority strongly agreed with statements affirming the importance of integrating IPE into the implementation of PPPI. Specifically, 61.7% strongly agreed that IPE is essential for integration, 58.3% considered it important for IPE to be part of the PPPI implementation, and 70% believed that the implementation of IPE would enhance the dignity and professional status of pharmacists in the eyes of other professionals as well as the community/patients (Figure 1).

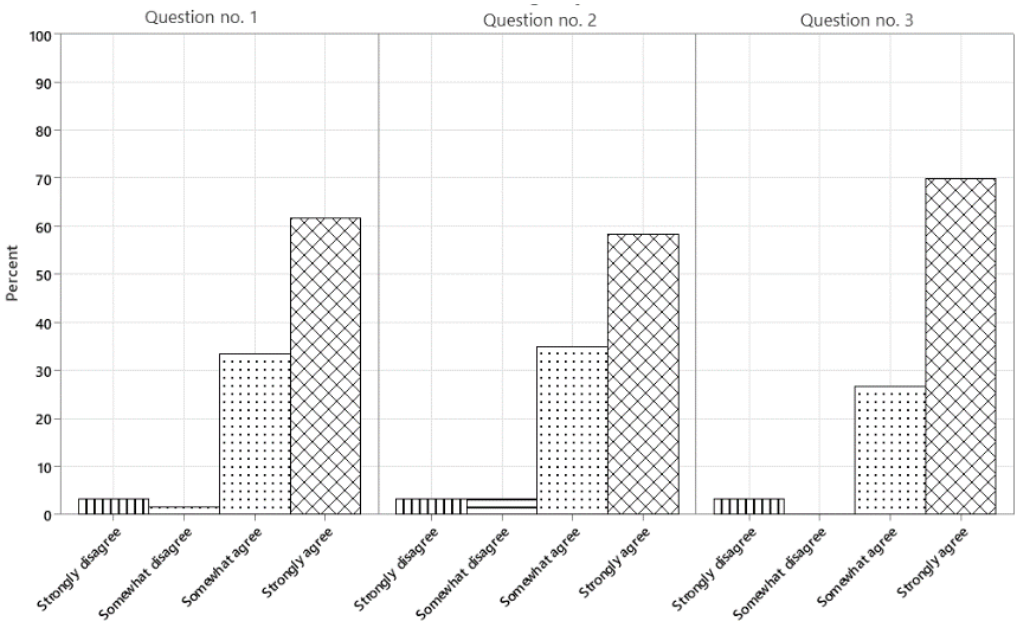

Figure 1: Perception of preceptors on urgency of IPE during pharmacy professional practice internship

Prior to the lecture, a majority of respondents either somewhat agreed or somewhat disagreed that they had been exposed to presentations regarding IPE (41.7% and 35%, respectively). Additionally, a significant portion of respondents somewhat agreed that they possess the required capacity as preceptors to guide students in conducting IPE during PPPI (63.3%). Furthermore, a majority of preceptors somewhat agreed that they had attempted to implement/present IPE for pharmacy professional students at their practice locations (51.7%), although 31.7% of respondents somewhat disagreed with this statement (Figure 2).

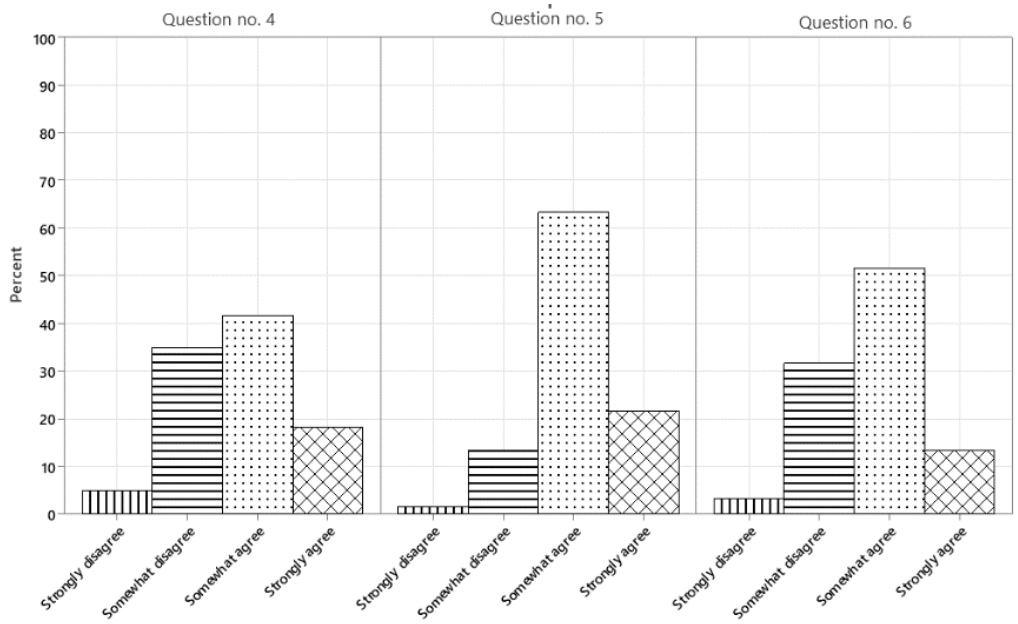

Figure 2: Perception of preceptors on participation of IPE during pharmacy professional practice internship

The majority of preceptors exhibited a positive perception regarding the effectiveness of IPE implementation during PPPI (approximately 90% for each question; Figure 3).

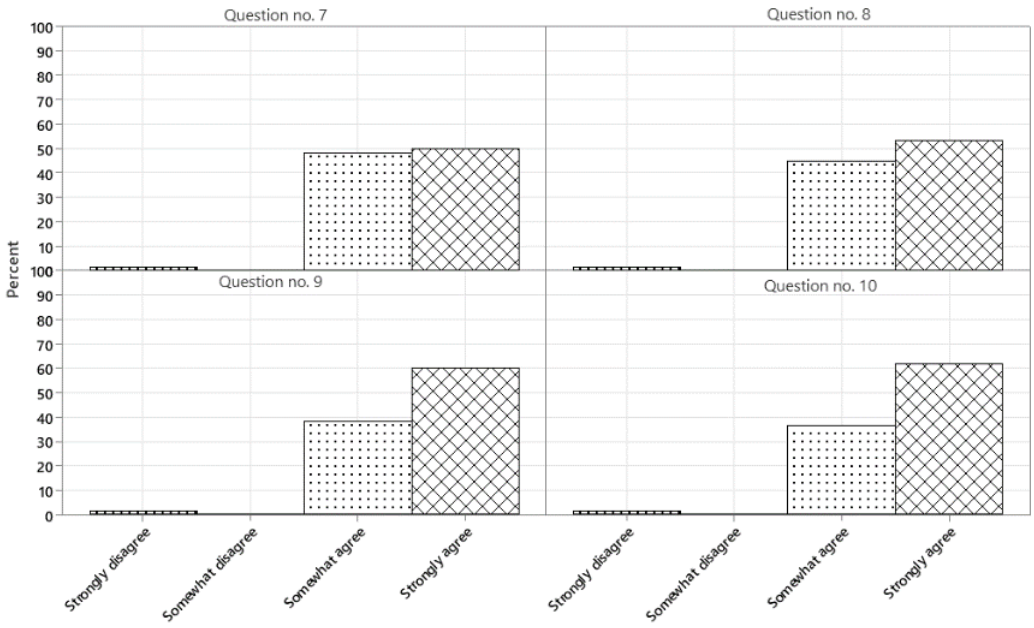

Figure 3: Perception of preceptors on effectiveness of IPE implementation during pharmacy professional practice internship

A significant number agreed that if they had received IPE presentations during their professional studies, they could collaborate more effectively with other healthcare professionals. Similarly, they concurred that implementing IPE, or after its implementation, both they and the institution where they practice would experience greater benefits. Furthermore, they agreed that implementing IPE during PPPI would enhance the interprofessional collaboration abilities of students when they practice as pharmacists. Additionally, most respondents acknowledged the necessity of IPE to optimise patient-centred care and/or consumer-centred care for each of the mentioned questions.

In general, most preceptors exhibited a positive perception regarding the support in IPE implementation during PPPI (approximately more than 80% for each question; Figure 4).

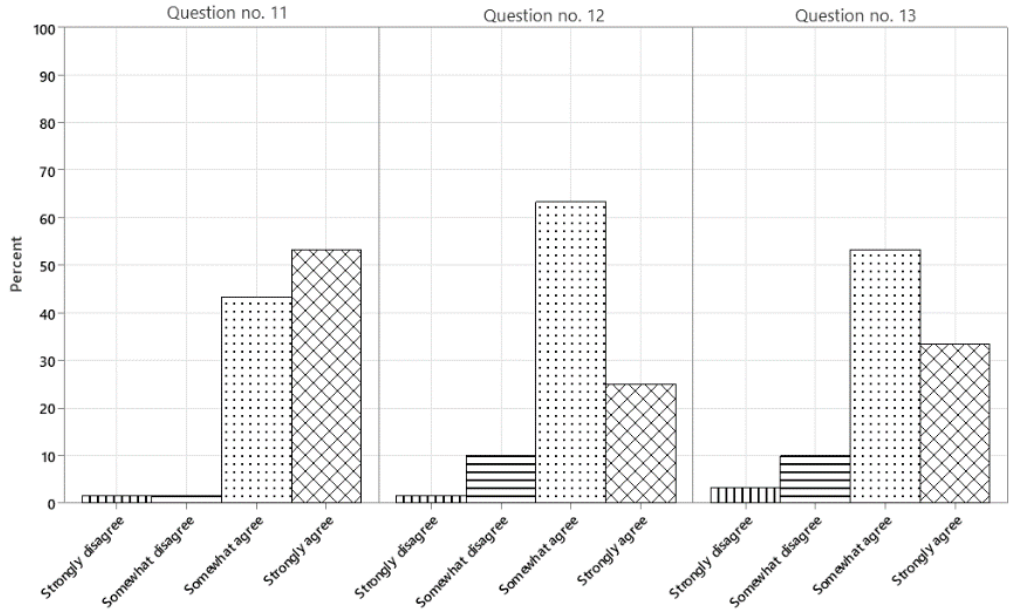

Figure 4: Perception of preceptors on support in IPE implementation during pharmacy professional practice internship

More than 90% of the preceptors at least somewhat agree that the implementation of IPE at the PPPI location requires more support from the educational institution sending students, with 53.3% strongly agree. However, when asked if they were confident that IPE could be carried out during PPPI at their practice location, most respondents (63.3%) answered "*somewhat agree*". In line with the previous question, most preceptors answered "*somewhat agree*" (53.3%) when asked if they are confident that implementing IPE will receive support from healthcare professionals/other professionals at their practice location. Interestingly, around 12-13% of the preceptors are not confident that IPE can be carried out during PPPI at their practice location and are confident that the implementation of IPE will receive support from healthcare professionals/other professionals at their practice location. Most of the preceptors were "*somewhat agree*" regarding the Potential Integration of IPE in PPPI (Figure 5).

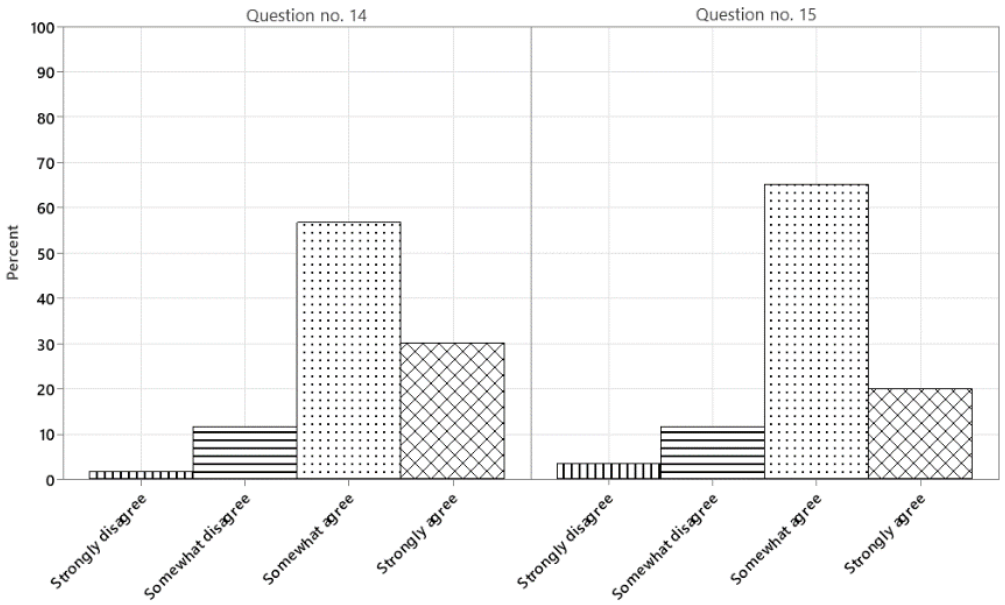

Figure 5: Perception of preceptors on potential integration of IPE in pharmacy professional practice internship

Approximately 56.7% and 65% of preceptors somewhat agree that interprofessional education (IPE) can be integrated into the Pharmacy Practice Project Internship (PPPI) at their institution within the next year. They believe that the challenges and obstacles to implementing IPE during the PPPI at their practice locations can be overcome and that solutions can be found. Again, for each question, around 13-14% of the preceptors disagree regarding the potential integration of IPE in PPPI.

Finally, although no statistically significant differences were found compared to other practice settings, a noticeable trend indicates that preceptors from pharmaceutical industry settings consistently had the lowest perception scores, except in the perception of the effectiveness of IPE (Figure 6).

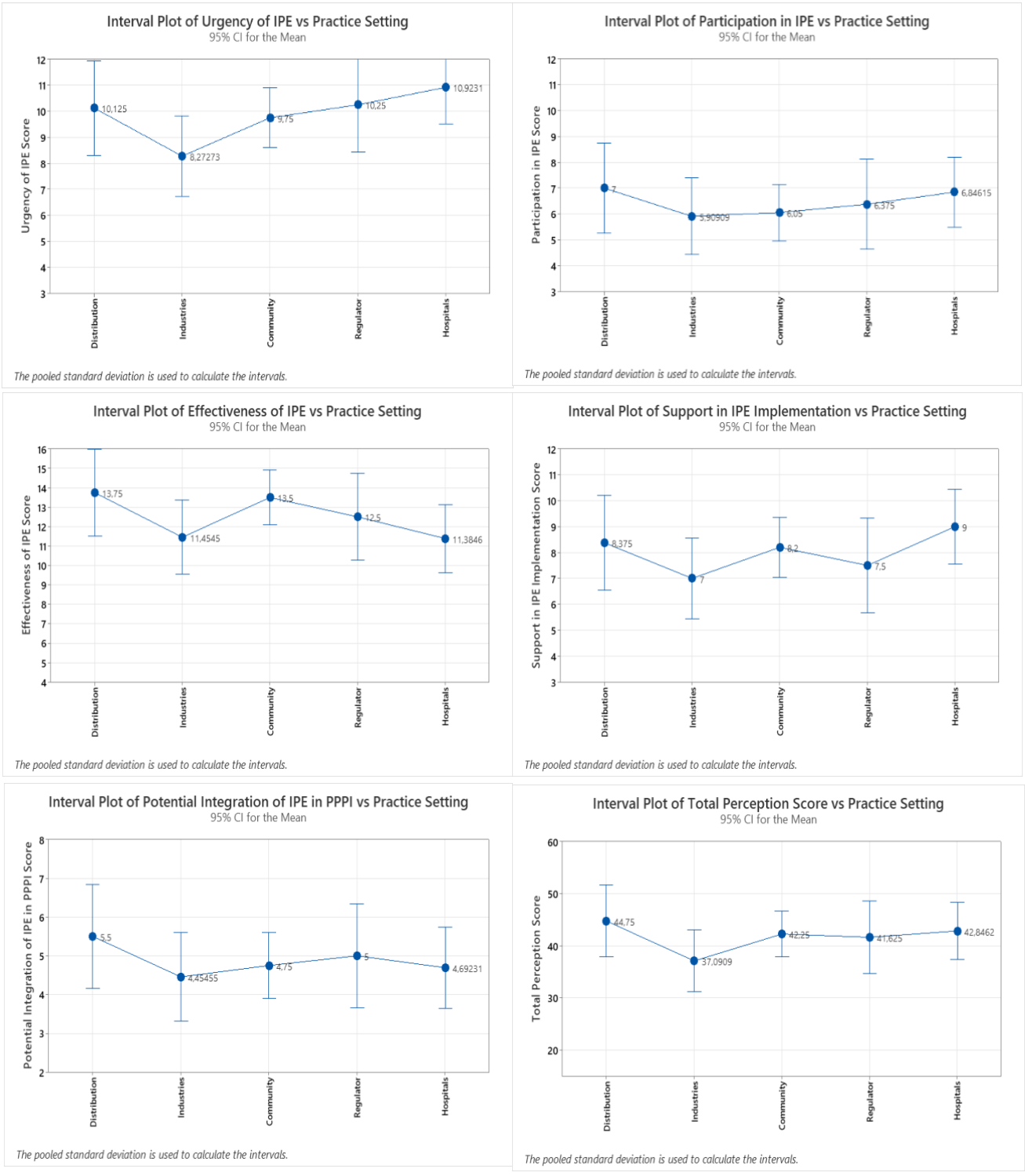

Figure 6: Interval plot of each perception domain score among practice setting

In general, the median total score was 41.7 out of 60 maximum points, indicating a positive perception towards IPE during PPPI (Table III).

Table III: Score of each dimension of questionnaire

Questions	Mean (SD)
Score on urgency of IPE (max. score 12)	9.9 (2.6)
1. In general, I believe it is essential for IPE to be integrated into the implementation of Pharmacy Professional Practice Internship.	3.3 (1.0)
2. I consider it important for IPE to be part of the Pharmacy Professional Practice Internship implementation, especially in the location where I currently practice.	3.2 (1.0)
3. The implementation of IPE will enhance the dignity and professional status of pharmacists in the eyes of other professionals as well as the community/patients.	3.4 (0.9)
Score on participation in IPE (max. score 12)	6.4 (2.4)
4. Before today's workshop, I had already heard presentations about IPE.	2.1 (1.1)
5. I possess the necessary capacity as a preceptor to guide students in conducting IPE during Pharmacy Professional Practice Internship.	2.3 (1.0)
6. I have tried to implement/present IPE for pharmacy professional students at my practice location.	2.0 (0.9)
Score on effectiveness of IPE implementation (max. score 16)	12.6 (3.2)
7. If I had received IPE presentations during my professional studies, I could collaborate more effectively with other healthcare professionals.	3.0 (1.0)
8. If I implement IPE/After implementing IPE, both I and the institution where I practice will experience greater benefits.	3.1 (1.0)
9. Implementing IPE during Pharmacy Professional Practice Internship will enhance the interprofessional collaboration abilities of students when they practice as pharmacists	3.2 (1.0)
10. IPE is necessary to optimise patient-centred care and/or consumer-centred care.	3.3 (1.0)
Score on support in IPE implementation (max. score 12)	8.1 (2.6)
11. The implementation of IPE at the Pharmacy Professional Practice Internship location requires more support from the educational institution sending students.	3.1 (1.0)
12. I am confident that IPE can be carried out during Pharmacy Professional Practice Internship at my practice location.	2.4 (1.0)
13. I am confident that the implementation of IPE will receive support from healthcare professionals/other professionals at my practice location.	2.6 (1.1)
Score on potential integration of IPE in pharmacy professional practice internship (max. score 8)	4.8 (1.9)
14. IPE can be integrated into the Pharmacy Professional Practice Internship conducted at my institution within the next year.	2.5 (1.1)
15. Challenges and obstacles to implementing IPE during Pharmacy Professional Practice Internship at my practice location can be overcome, and solutions can be found.	2.3 (0.9)
Total score (max. score 60)	41.7 (9.7)

The median score of each dimension of the questionnaire showed that most of the preceptors feel the urgency of IPE (median 9.9 out of 12 maximum scores), acknowledge the effectiveness of IPE implementation (median 12.6 out of 16 maximum scores), and feel confident with the support in IPE implementation (median 8.1 out of 12 maximum scores). However, the participation score and the potential integration of IPE in PPPI were quite low (median 6.4 out of 12 and 4.8 out of 8 maximum scores, respectively).

Association analysis between respondent characteristics and preceptors' perception

The association between respondent characteristics and score in each section was captured as a correlation coefficient (Table IV).

Table IV: Correlation between respondent characteristics and questionnaire score based on Spearman correlation test

	Age	Experience as a pharmacist	Experience as a preceptor	The number of students supervised as a preceptor in the last year
Score on urgency of IPE	-0.251	-0.246	-0.061	-0.175
Score on participation in IPE	0.041	0.039	0.324†	0.205
Score on effectiveness of IPE implementation	-0.050	0.025	0.185	0.128
Score on support in IPE implementation	-0.130	-0.098	0.145	0.082
Score on potential integration of IPE in pharmacy professional practice internship	-0.070	-0.034	0.099	0.047
Total score	**-0.098**	**-0.049**	**0.212**	**0.095**

† *p*-value < 0.05

Overall, the correlations among the variables were very weak to weak and statistically nonsignificant. There was a moderate correlation between participation scores in interprofessional education (IPE) and the experience level of preceptors (r = 0.325, $p < 0.05$). This suggests that individuals with more experience as preceptors tend to have higher perception scores regarding their participation in IPE. Preceptor characteristics like gender, education level, and practice setting did not show significant differences in the median total perception score. (Table V).

Table V: Comparison of total perception score based on characteristics (of categorical scale)

Characteristics	Median	IQR	*p*-value
Sex†			
Male	44	15	0.695
Female	42	16	
Degree of edcucation†			
Pharmacist	41.5	18.5	0.158
Masters	45	5.25	
Practice setting††			
Community (pharmacies, clinics, public health centres)	43	14.75	0.618
Hospital	42	17	
Pharmaceutical industries	33	19	
Regulator (NAFDC, Ministry of Health)	42.5	21.5	
Pharmaceutical and medical devices distribution	43.5	12	
Characteristics of the practice location†			
A work environment consisting of various professionals from different disciplines, even though they are not non-pharmacy healthcare personnel.	42	17.25	0.253
A work environment consisting of various types of non-pharmacy healthcare professionals.	4.5	14	

† Based on Mann-Whitney test, ††Based on Kruskal-Wallis test

Discussion

Overall, the majority of the preceptors expressed a positive perception towards IPE during PPPI. Most of the preceptors feel the urgency of IPE, acknowledge the effectiveness of IPE implementation, and feel confident in their support of IPE implementation. However, the participation score and potential integration of IPE in PPPI were relatively negative.

The positive perception shown by preceptors in this study was in line with previous research towards different respondent backgrounds. A systematic review reported that pharmacy students, pharmacists, and faculty members highly appreciated interprofessional education and collaborative practice and maintained favourable attitudes towards them (El-Awaisi *et al.,* 2018). The majority of pharmacy faculty members from five universities in Korea also had positive perceptions towards IPE across the four categories examined (Yune *et al.*, 2020). Surveys conducted in Indonesia and Kuwait found that the majority of students from healthcare-related programmes had a favourable view of IPE. Among these study programmes, the pharmacy programme had the greatest number of students with a positive perception of IPE in both studies (Syahrizal *et al.,* 2020; Katoue *et al.,* 2021). Thus, in general, the pharmacist preceptors in Indonesia already possess a strong sense of urgency when it comes to introducing IPE to upcoming pharmacists.

A low perception score on IPE participation and on the potential integration of IPE in PPPI may suggest that not all internship locations are suitable for conducting IPE. The IPE is designed for use in clinical settings to facilitate the delivery of patient-centred care in a collaborative team environment (Buring *et al.,* 2009; 2003). The notion of IPE may not be applicable in certain PPPI sites, such as the industrial sector. This is also evident in the lower overall perception score reported by industry-based preceptors, which shows a

difference of around ten points compared to other settings (see Table V and Figure 6).

This is comprehensible since, in the industry, unlike in clinical settings, the "*patient*" is not the primary focus of the business process. Even in clinical settings, not all internship locations are suitable for conducting IPE in pharmacy due to various barriers, including institutional affiliations or geographic constraints (Schramm *et al.,* 2017), lack of specific training (Depasquale et al., 2022), limited resources (Jones *et al.,* 2012), logistical challenges and cultural issues (Smith *et al.,* 2009). Selecting the right setting and addressing these barriers is essential to ensure effective and meaningful IPE experiences for pharmacy students.

Previously published studies have explored preceptors' perceptions of IPE. A recently published qualitative study from the USA concluded that preceptors regularly collaborated and teamed with diverse healthcare practitioners. However, students' participation in IPE frequently consisted solely of observation or shadowing. Participants believed IPE promotes patients by enhancing care outcomes and improves the healthcare system by elevating provider satisfaction and well-being (Brand *et al.,* 2024). A small study also found that community pharmacy preceptors expressed positive views, stating that IPE in internship settings should be continued (O'Connell *et al.,* 2021). However, unlike the present study, which includes preceptors from the pharmaceutical industry and regulatory settings, the previous research focused exclusively on preceptors from clinical backgrounds, such as community pharmacies, hospital pharmacies, clinic pharmacies, and specialty clinical practices.

Preceptors, acting as facilitators for pharmacy students throughout their internships, played a crucial role in introducing and familiarising these students with interprofessional teamwork through interprofessional education in a practical context. A study in China towards student facilitators from medicine, nursing, pharmacy, speech and hearing sciences, and social work-study programmes indicated that student facilitators placed a high level of importance on their experience in facilitating IPE. This experience was in line with their initial expectations and resulted in the formation of social networks, enhanced self-assurance, deeper comprehension of other professions, and the acquisition of skills that may be utilised throughout their lives. In addition, the student facilitators exhibited cognitive and social alignment by creating a calm, educational setting, demonstrating understanding and encouragement, and employing inclusive language to involve IPE learners in group conversations (He *et al.,* 2024).

In this study, a statistically significant positive correlation was discovered between the duration of serving as a preceptor and higher scores in IPE participation. The more experienced a preceptor is as a practising pharmacist and preceptor, the more they are exposed to interprofessional settings and collaboration activities. This firsthand experience may improve the awareness of the significance of IPE in preparing future pharmacists with the necessary skills to thrive in such a diverse team. Previous studies have also highlighted a positive relationship between Interprofessional Attitudes Scale (IPAS) scores and interprofessional collaborative practice experiences (Pabian *et al.,* 2022). Prior to selecting a prospective location for PPPI, it is important to consider this aspect to enhance the participation of students in the IPE.

The predominance of community pharmacists among the participants can be attributed to the structure of the pharmacist professional program internship in Indonesia. It is a standard requirement for all pharmacy schools to include internship experiences in community settings, such as pharmacies, clinics, and public health centres, as part of their curriculum. However, unlike other practice settings, the number of pharmacists in community settings is often limited, which constrains their capacity to host internship students. As a result, the allocation of students for internships tends to be higher in community settings to accommodate this mandatory requirement. Consequently, this led to a greater representation of community pharmacy practice settings in the study sample, reflecting the distribution of internship placements across the country rather than any selection bias in participant recruitment.

All stakeholders, including educational institutions, policymakers, healthcare organisations, and pharmacy professionals, need to enhance the presence and effectiveness of interprofessional collaboration in pharmacy practice. In fact, both undergraduate curricula and healthcare settings need to make continuous and dedicated efforts to enhance and encourage an interprofessional culture at both the individual and organisational levels (El-Awaisi *et al.,* 2018). For instance, research conducted in the US demonstrated the utilisation of an interprofessional education preceptor survey (IPEPS) to evaluate the availability of interprofessional education opportunities at practice sites. This survey was used to determine the perceived level of interprofessional education taking place at each site. The results were then compared to student field encounter logs and used to guide the development of preceptors (Tanzer & Dintzner, 2018). Periodically doing such evaluations might promote awareness among preceptors regarding the value of IPE and create opportunities for

continuous improvement in IPE during internships. The results can also be followed up by a more structured preceptor development programme, as reported by The University at Buffalo School of Pharmacy and Pharmaceutical Sciences (Fusco & Ohtake, 2019) or by utilising interprofessional objective structured teaching exercises (iOSTE) to train pharmacy preceptors a reported by The Texas Tech University Health Sciences Center (McCutcheon *et al.,* 2017).

Strength and limitations

This study is the first in Indonesia to investigate the perception of pharmacy preceptors in different practice settings towards IPE. Nevertheless, it is important to conduct a qualitative study in addition to the existing research to investigate the barriers and facilitators to the exposure of pharmacy interns to IPE. Formulating the most effective intervention to enhance the preceptor's capacity in IPE can be achieved by evaluating results from such qualitative results. Furthermore, while our study concentrated on the region in Indonesia with the highest number of pharmacist graduates, it is important to note that these findings may not accurately reflect the overall impression of IPE in Indonesia as there may be more barriers present in the more rural areas of the country, potentially leading to different perceptions and experiences of IPE integration.

While this study provides insights into the topic, particularly in Indonesia, several potential sources of bias may have influenced the findings. The study participants were selected from institutions in West Java and Jakarta, regions that may have more developed healthcare infrastructures and greater exposure to IPE initiatives compared to other areas of Indonesia. This could lead to an overrepresentation of positive perceptions and may not reflect the views of preceptors in more rural or under-resourced areas. Future studies should aim to include a more geographically diverse sample. Given the context of the survey being administered in a professional setting, respondents may have provided answers they believed were expected or socially desirable, particularly after participating in a workshop that emphasised the importance of IPE. This bias could inflate the positive responses regarding the importance and effectiveness of IPE. Anonymous data collection methods and assurances of confidentiality were used to minimise this, but future research might consider alternative survey distribution methods that further reduce this bias.

Implications

This study offers valuable insights into pharmacy education, professional practice, and healthcare outcomes in Indonesia. Examining the perceptions of preceptors will not only add to the current knowledge on interprofessional education (IPE), but will also offer practical recommendations for educational institutions, policymakers, and pharmacy professionals to improve the presence and effectiveness of interprofessional collaboration in pharmacy practice.

Conclusion

Overall, the majority of the preceptors expressed a positive perception towards IPE during PPPI. Most of the preceptors feels the urgency of IPE, acknowledge the Effectiveness of IPE Implementation, and feels confident with the Support in IPE Implementation. However, participation score and Potential Integration of IPE in PPPI was relatively negative.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgement

We would like to thank all the respondents for completing the survey.

Ethics approval and informed consent

The Research Ethic Committee of the National Research and Innovation Agency of Indonesia has declared that ethical clearance is not necessary for the research. However, participant consent was obtained before commencing the surveys.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

APTFI, T. P. (2022). *Guidelines for pharmacist professional work practices*. ITB Press.

Brand, D., Stewart, A., Garcia-Garcia, P., & McKeirnan, K. (2024). Pharmacy preceptors' knowledge, perceptions, and experiences with interprofessional education and practice. *Pharmacy Education*, **24**(1), 552–561. https://doi.org/10.46542/pe.2024.241.552561

Buring, S. M., Bhushan, A., Broeseker, A., Conway, S., Duncan-Hewitt, W., Hansen, L., & Westberg, S. (2009). Interprofessional education: Definitions, student competencies, and guidelines for implementation. *American Journal of Pharmaceutical Education*, **73**(4), 59. https://doi.org/10.5688/aj730459

Cokro, F., Atmanda, P. F. K., Sagala, R. J., Arrang, S. T., Notario, D., Rukmini, E., & Aparasu, R. (2021). Pharmacy education in Indonesia. *Pharmacy Education*, **21**, 432–442. https://doi.org/10.46542/pe.2021.211.432442

Depasquale, C., Cunningham, S., Boyter, A., Jacob, S. A., Power, A., Portlock, J., & Addison, B. (2022). Interprofessional education during experiential learning placements for student pharmacists in Scotland. Exploring current support provision and stakeholder views. *International Journal of Pharmacy Practice*, **30**(Supplement_2), ii16–ii17. https://doi.org/10.1093/ijpp/riac089.018

El-Awaisi, A., Joseph, S., El Hajj, M. S., & Diack, L. (2018). A comprehensive systematic review of pharmacy perspectives on interprofessional education and collaborative practice. *Research in Social and Administrative Pharmacy*, **14**(10), 863–882. https://doi.org/10.1016/j.sapharm.2017.11.001

El-Awaisi, A., Joseph, S., El Hajj, M. S., & Diack, L. (2019). Pharmacy academics' perspectives toward interprofessional Education prior to its implementation in Qatar: A qualitative study. *BMC Medical Education*, **19**(1), 278. https://doi.org/10.1186/s12909-019-1689-5

Farmasetika.com. (2023). *Ministry of Health: There are still many provinces that do not have a pharmacist professional study program*. Farmasetika.com. https://farmasetika.com/2023/02/26/kemenkes-masih-banyak-provinsi-tak-miliki-prodi-profesi-apoteker/

Fusco, N. M., & Ohtake, P. J. (2019). Training the trainers: A preceptor development program targeting interprofessional collaboration competencies. *Currents in Pharmacy Teaching and Learning*, **11**(11), 1138–1143. https://doi.org/10.1016/j.cptl.2019.07.007

He, Q., Lei, J., Chong, D., Luk, P., Chan, E., Shen, X., . . . Ganotice, F. A., Jr. (2024). Unpacking the perceptions and experiences of student facilitators in interprofessional education: A qualitative study. *Medical Education Online*, **29**(1), 2330257. https://doi.org/10.1080/10872981.2024.2330257

Hinderer, K. A., Klima, D., Truong, H. A., Rangel, A. G., Brown, V., Talley, W., . . . Joyner, R. L., Jr. (2016). Faculty Perceptions, knowledge, and attitudes toward interprofessional education and practice. *Journal of Allied Health*, **45**(1), e1–4. https://www.ncbi.nlm.nih.gov/pubmed/26937886

Institute of Medicine (US) Committee on the Health Professions Education Summit. (2003). In A. C. Greiner & E. Knebel (Eds.), Health professions education: A bridge to quality. https://doi.org/10.17226/10681

Jones, K. M., Blumenthal, D. K., Burke, J. M., Condren, M., Hansen, R., Holiday-Goodman, M., & Peterson, C. D. (2012). Interprofessional education in introductory pharmacy practice experiences at US colleges and schools of pharmacy. *American Journal of Pharmaceutical Education*, **76**(5). https://doi.org/10.5688/ajpe76580

Katoue, M. G., Awad, A. I., Dow, A. W., & Schwinghammer, T. L. (2021). Interprofessional education and collaborative practice in Kuwait: Attitudes and barriers from faculty. *Journal of Interprofessional Care*, **35**(2), 208–216. https://doi.org/10.1080/13561820.2020.1713062

Kennie-Kaulbach, N., Cooley, J., Williams, C., Riley, B., Anksorus, H., & O'Sullivan, T. A. (2024). How preceptors support pharmacy learner professional identity formation. *American Journal of Pharmaceutical Education*, 100740. https://doi.org/10.1016/j.ajpe.2024.100740

Mattiazzi, S., Cottrell, N., Ng, N., & Beckman, E. (2023). Behavioural outcomes of interprofessional education within clinical settings for health professional students: A systematic literature review. *Journal of Interprofessional Care*, **38**(2), 294–307. https://doi.org/10.1080/13561820.2023.2170994

McCutcheon, L. R. M., Whitcomb, K., Cox, C. D., Klein, M. S., Burley, H., Youngblood, T., & Raehl, C. (2017). Interprofessional objective structured teaching exercise (iOSTE) to train preceptors. *Currents in Pharmacy Teaching and Learning*, **9**(4), 605–615. https://doi.org/10.1016/j.cptl.2017.03.023

MoH. (2023). *Decree of the Minister of Health Number HK.01.07/MENKES/13/2023 concerning Pharmacist Professional Standards*. Ministry of Health of The Republic of Indonesia. https://farmalkes.kemkes.go.id/en/unduh/kepmenkes-13-2023/

O'Connell, M. B., Pattin, A. J., Gilkey, S. J., Dereczyk, A. L., Lucarotti, R. L., & Chackunkal, S. J. (2021). Feasibility of interprofessional education in a community pharmacy. *Journal of Pharmacy Practice*, **34**(6), 988–995. https://doi.org/10.1177/0897190020930532

Oelke, N., Lutfiyya, M. N., Chang, L. F., McGrath, C., Dana, C., & Lipsky, M. S. (2019). The state of the science of interprofessional collaborative practice: A scoping review of the patient health-related outcomes based literature published between 2010 and 2018. *PLoS One*, **14**(6). https://doi.org/10.1371/journal.pone.0218578

Pabian, P. S., Neely, L., Gonzalez Luna, E., Presnell, B., Delgado, M., & Tucker, J. (2022). The relationship between interprofessional collaborative practice experience and interprofessional attitudes in students from health professions. *Journal of Allied Health*, **51**(3), 163–171. https://www.ncbi.nlm.nih.gov/pubmed/36100711

Schramm, G. E., Narayanan, P. P., Chutka, D. S., & Nicholson, W. T. (2017). Implementation of an interprofessional clinical pharmacology selective learning experience for pharmacy

residents and medical students. *American Journal of Health-System Pharmacy*, **74**(6), 397–401. https://doi.org/10.2146/ajhp160112

Smith, K. M., Scott, D. R., Barner, J. C., DeHart, R. M., Scott, J. D., & Martin, S. J. (2009). Interprofessional education in six US colleges of pharmacy. *American Journal of Pharmaceutical Education*, **73**(4). https://doi.org/10.5688/aj730461

Spaulding, E. M., Marvel, F. A., Jacob, E., Rahman, A., Hansen, B. R., Hanyok, L. A., . . . Han, H. R. (2021). Interprofessional education and collaboration among healthcare students and professionals: A systematic review and call for action. *Journal of Interprofessional Care*, **35**(4), 612–621. https://doi.org/10.1080/13561820.2019.1697214

Syahrizal, D., Renaldi, T., Dianti, S. W., Jannah, N., Rachmah, R., Firdausa, S., & Vonna, A. (2020). The differences in perceptions of interprofessional education among health profession Students: The Indonesian Experience. *Journal of Multidisciplinary Healthcare*, **13**, 403–410. https://doi.org/10.2147/JMDH.S240195

Tanzer, K. D., & Dintzner, M. R. (2018). The IPE performance report: A tool for preceptor development. *Currents in Pharmacy Teaching and Learning*, **10**(5), 584–595. https://doi.org/10.1016/j.cptl.2018.02.004

Yune, S. J., Park, K. H., Min, Y. H., & Ji, E. (2020). Perceptions of the interprofessional education of the faculty and the level of interprofessional education competence of the students perceived by the faculty: A comparative study of medicine, nursing, and pharmacy. *Korean Journal of Medical Education*, **32**(1), 23–33. https://doi.org/10.3946/kjme.2020.150