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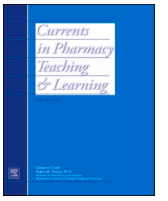

Research Paper

Readiness for virtual experiential education: A qualitative study of PharmD students and faculty preceptor perspectives in a postgraduate program

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ABSTRACT

Introduction: Disruptions to clinical training have prompted exploration of alternative experiential learning models, including virtual internships (VI). Understanding stakeholder perceptions and readiness determinants is important for evaluating the feasibility of VI and informing their structured integration within PharmD curricula. This study explored PharmD students' and faculty preceptors' perceptions of VI and examined factors shaping readiness for implementation within a postgraduate program.

Methods: A qualitative study was conducted within a one-year postgraduate PharmD program. All eligible students ($n = 12$) and faculty preceptors ($n = 8$) were invited to participate. Two focus groups were conducted with students ($n = 10$) and five semi-structured interviews with faculty preceptors. Data were analyzed thematically and interpreted using readiness to change framework.

Results: Participants recognized the necessity of transitioning to VI and described both enabling conditions and constraints. Virtual delivery supported continuity of experiential training and was perceived to facilitate clinical reasoning and self-directed learning. Faculty highlighted structured academic scaffolding, use of electronic health records, and leadership coordination as key implementation enablers. However, limitations related to direct patient interaction, interprofessional engagement, and applied clinical skill development were consistently identified. VI was perceived to be differentially suited to specific competencies and internship types, supporting selective rather than universal application.

Conclusion: VI were perceived as a feasible strategy for maintaining experiential training during disruption and may serve as a complementary adjunct to traditional placements when selectively aligned with appropriate competencies and supported by institutional structures. Further research

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is warranted to evaluate sustainable integration of virtual components and their impact on competency development in evolving practice settings.

Introduction

The transition to virtual learning in health profession education has become increasingly relevant as healthcare delivery and education continue to digitalize. This shift has introduced both opportunities and challenges, prompting reconsideration of how experiential competencies can be developed in digitally mediated environments.[21,34] While earlier studies predominantly examined blended learning approaches, less attention has been paid to fully virtual experiential models, particularly within postgraduate clinical training. Emerging research has explored health profession students' perspectives on virtual internships (VI) during periods of disruption[1,32], yet limited work has examined readiness determinants influencing successful implementation.

In the State of Qatar, Qatar University is the primary national university and includes 12 colleges, among them the College of Pharmacy (CPH), established in 2007. The college offers a one year, full-time postgraduate PharmD program completed after the BSc Pharmacy degree. The curriculum is designed to develop advanced clinical practice competencies and prepare graduates for direct, patient-centered care.[37] Experiential education builds upon foundational clinical training and comprises eight four-week internships across specialized practice settings. These internships are structured around core learning outcomes aligned with internationally recognized pharmacy education frameworks. Prior to the temporary transition to VI during the COVID pandemic, experiential training was delivered exclusively through face-to-face placements. The shift to virtual delivery therefore represented a significant shift in experiential design, supervision, and competency demonstration.

During the period of transition, only PharmD students were engaged in internships, as undergraduate pharmacy students had completed their placement earlier. Implementing a fully virtual experiential model required organizational, pedagogical, and supervisory adjustments. Readiness for change is widely recognized as a critical determinant of successful implementation of organizational and educational innovations.[5] Beyond temporary disruption, experiential education is increasingly influenced by digital care delivery, electronic health records, telepharmacy services, and distributed supervision models.[3,17] Virtual and hybrid placements are therefore emerging not solely as contingency approaches but as components of contemporary experiential education.[4,40] Understanding readiness determinants among both learners and preceptors is thus essential for informing sustainable integration of digitally mediated experiential education.[39,40]

Guided by the readiness to change framework, which includes five key dimensions: discrepancy, appropriateness, efficacy, principal support, and valence,[6,7] this study examined perceptions of PharmD students and faculty preceptors during the transition to a fully VI model. By applying this framework, we aimed to explore determinants influencing adaptation to VI and to generate insights relevant to the structured integration of virtual components within experiential pharmacy education.

Methods

Study design and participants

This qualitative study explored perceptions of PharmD students and faculty preceptors regarding the transition to VI. All 12 students enrolled in the postgraduate PharmD program during the study period and eight faculty preceptors involved in supervising VI (solely or co-precepting with clinical site preceptors) were invited to participate.

The PharmD program at Qatar University is a selective postgraduate program with small annual cohorts, typically enrolling 10–15 students. During the study period, 12 students were enrolled were eligible to participate. Inclusion criteria were: (1) enrolment in the PharmD program during the study period, (2) completion of the VI, and (3) provision of informed consent. There were no additional exclusion criteria. All eligible students were invited to capture the full cohort perspective. Participation was voluntary and no financial incentives, compensation, or academic benefits were provided to students or preceptors. Given the small cohort size and identifiable roles within the program, detailed demographic characteristics were not reported to minimize the risk of deductive disclosure and protect participant confidentiality.

Data collection

Two focus groups were conducted with students, and five semi-structured interviews were conducted with faculty preceptors. As readiness to change involves both individual perceptions and shared organizational experiences, different qualitative approaches were used for students and faculty preceptors.[27,28] Focus groups enabled collective sense-making, peer interaction, and shared reflection on the transition to VI. Semi-structured interviews allowed in-depth exploration of professional responsibilities, and leadership perspectives. Data collection occurred toward the end of the Spring 2020 term, after students had completed their VI, enabling reflective accounts of their experience.

The decision regarding which internships were delivered virtually was guided by competency attainment, feasibility of remote supervision, and access to clinical information systems.[37] Internships in which learning objectives could be achieved through case-based discussions, electronic health record review, therapeutic planning, and evidence-based decision-making were prioritized. Competencies requiring direct patient interaction or real-time interprofessional collaboration were recognized as more challenging to

replicate fully in a virtual format. Although direct face-to-face patient interaction was not possible, students engaged in patient-centered learning through electronic medical record review, development of therapeutic care plans, structured case presentations, supervised clinical discussions, and exposure to telehealth processes where available.

Purposive sampling was used and invitation emails were sent to all eligible participants, including study information and consent form. Two reminders emails were sent. Focus groups and interviews were conducted via WebEx online platform and audio recorded. At the beginning of each session, the facilitator reiterated study information and confirmed consent.

All sessions were conducted by a faculty member (AE) with doctoral-level training and experience in qualitative research and health professions education. At the time of the study, she served as the Assistant Dean for Student Affairs and was not involved in the coordination or delivery of the PharmD clinical training. Field notes were not formally collected. Transcripts were not returned to participants for member checking; however, verbatim transcription and independent coding by two researchers were employed to enhance credibility. No non-participants were present during data collection. Interview guides were developed using the readiness to change framework, addressing five domains: discrepancy, appropriateness, efficacy, principal support, and valence. Guides were reviewed by the research team to ensure clarity and comprehensiveness (Table 1).

Data analysis

Transcripts were validated verbatim and analyzed manually without qualitative software. Analysis was guided by readiness to change framework, which served as an initial coding matrix. Two researchers independently coded the transcripts, identified themes, and met to compare interpretations and reach a consensus. Disagreements were resolved through discussion. Constant comparisons was used to refine and differentiate themes. Although coding was theoretically informed, the research team remained open to data that did not fit predefined categories. No substantively new domains emerged; however, subthemes within domains were inductively refined.

Given the bounded sampling frame, thematic sufficiency was sought than strict iterative saturation.[48] Thematic sufficiency refers to the adequacy of the dataset in developing conceptually rich themes relevant to the research question. Data collection and analysis proceeded iteratively, and sufficiency was determined when no substantively new insights were identified in the later transcripts and themes were considered sufficiently developed to address the study aims.

Results

The study included two focus groups with PharmD students ($n = 10$) and five semi-structured interviews with faculty preceptors ($n = 5$), each session lasting 60–90 min. All participating students were female and were in the final stage of their one-year postgraduate PharmD training. The faculty preceptor group included two female and three male participants, with three to six years of precepting experience within CPH. Preceptors represented diverse clinical and academic areas, including mental health, internal medicine, cardiology/coronary care, infectious disease, drug information, pharmacy academia, research, and academic assessment.

Findings were mapped to the readiness to change framework. Five overarching themes emerged: discrepancy (necessity for transition), appropriateness of VI, efficacy and confidence in implementation, principal support, and valence (Fig. 1). A summary of

Table 1
Guiding questions for focus groups/ semi-structured interviews.

Students	Preceptors
• Describe your current experiences of the clinical training please? • How appropriate do you find the current design of training? • What skills/attitudes/knowledge do you think you was needed to succeed in this VI program? • Do you feel that you have those skills/attitudes/knowledge right now? • What support or preparation you think was needed to succeed in reaching the goals of the program? • Do you currently feel supported, by college, PharmD director, preceptors, or instructors? • In what ways do you think the program supported the success of reaching the expected goals? In what ways it may not? • How confident did you feel going through the training program and reaching the expected goals? • In what ways you feel your instructors/mentors and the overall program share this confidence? • How do you see these experiences benefit your career and life in the long run? • How would you assess your program's response to the current COVID-19 situation, specifically handling of the clinical training? • What are the good practices that you experienced so far? What did you enjoy the most? • What are the challenges from your point of view? Can you please elaborate with examples? What do you do to overcome these challenges? • What suggestions would you provide to improve your training?	• Describe your current experiences of the clinical training please • How appropriate do you find the current design of training? • What support or preparation you think you need to succeed in reaching the goals of the program? • Do you currently feel supported by administration,[college, preceptors, or instructors? • In what way do you think the program will support the success of reaching the expected goals? In what ways it may not? • How confident do you feel to go through the training program and reach the expected goals? • In what ways you feel your instructors/mentors and the overall program share this confidence? • How do you see these experiences benefit your career and life in the long run? • How would you assess your program's response to the current COVID-19 situation? • What are the challenges from your point of view? • Can you please elaborate with examples? What do you do to overcome these challenges? • What are the good practices that you experienced so far? • What suggestions would you provide to improve your training?

themes and illustrative quotations is presented in Table 2. The theme of appropriateness is described in greater detail below.

Appropriateness of virtual internships

1) Facilitating conditions:

Students perceived that the timing of VI, toward the end of the program, was important in shaping its acceptability. Having completed multiple prior face-to-face internships, they felt better prepared to contextualize patient cases and adapt to the virtual format.

"If I haven't done six clinical internships in the past… I feel like my attitude would have been different. Because now, at least I can relate to some patients that I've seen previously… but if I did not have this exposure at all, my attitude now would have been so much different." [CPH student 5].

Some students indicated that, had VI occurred earlier in the program, they might have preferred postponement to preserve direct clinical exposure.

"I think, I wouldn't want to have done PharmD in this pandemic, to be honest, from the beginning. If I was faced with this similar situation, I would have postponed my PharmD internships for a better future". [CPH student 3].

Faculty preceptors similarly viewed the transition as appropriate within the program structure, noting that students had already achieved core competencies during earlier internships and were therefore positioned to adapt to a virtual format..

"They had direct patient care contact by the sixth internship.., many of them have met or exceeded those competency levels… So, for the seventh and eighth internship, the transition into virtual, was just fine." [Faculty preceptor 2].

Preceptors also emphasized structural features that enhanced appropriateness, including small cohort size, faculty expertise, and exposure to diverse practice settings.

"Many students always think that the internships should all be acute care… but in the PharmD program, you're supposed to expose them to a variety of healthcare settings." [Faculty preceptor 2].

CPH students appreciated the structured internships and the efficient orientation offered for each internship, with clear expectations and timelines on what to expect. Each internship started with a pre-assessment to tailor internship to student needs in terms of skills and knowledge, with weekly reflections.

2) Perceived quality and competency alignment

Students valued the structured orientation of internships, including pre-assessment of learning needs and weekly reflections, which supported clarity of expectations. Participants highlighted that the virtual format enabled protected time for evidence appraisal, guideline use, and structured therapeutic discussions, with students reporting improved self-directed learning and increased confidence in independent information-seeking. Faculty preceptors described redesigning learning activities to preserve core clinical reasoning processes, including electronic health record review, care plan development, and documentation, which were viewed as well suited to virtual delivery. The shift also stimulated curricular innovation, with the development or strengthening of academic, research, and assessment-focused experiences, and participants suggested that future iterations could adopt a hybrid model that selectively retains virtual components aligned to these competencies and incorporates additional digital strategies (e.g., telehealth exposure, simulated patients) to strengthen experiential learning. One faculty highlighted that virtual rotations allowed students to:

"Take a much deeper dive into the literature, have a much better understanding about why we do what we do and to really take a look at some of those clinical controversies" [Faculty Preceptor 4]

3) Limited clinical immersion

However, limitations were consistently identified. Students reported reduced opportunities to practice direct clinical skills,

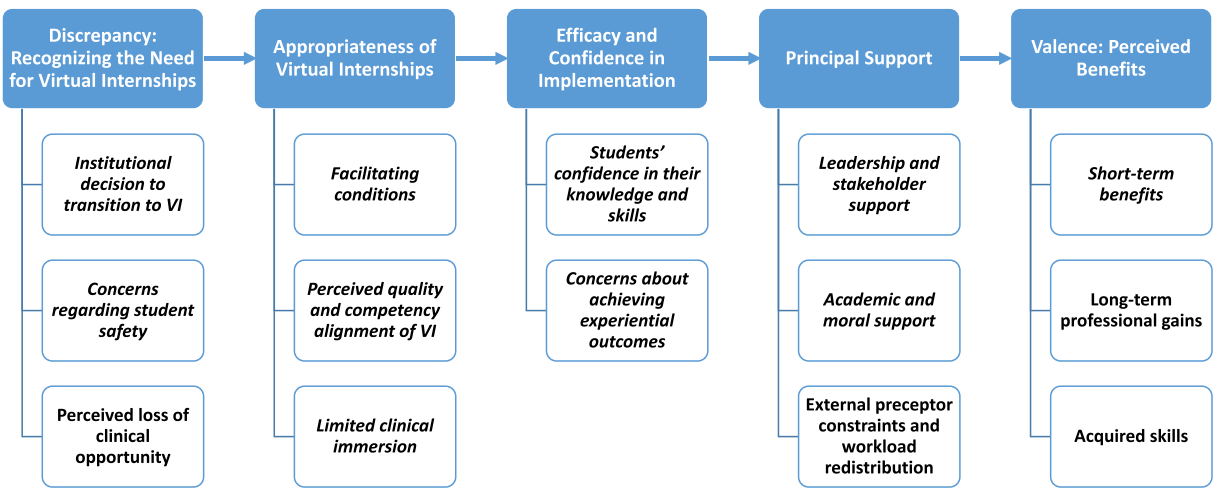

Fig. 1. Emerging themes mapped to the readiness to change framework .

Table 2
Key Themes and subthemes from focus groups/ semi-structured interviews with illustrative quotes.

Theme	Subtheme	Illustrative quotes
Discrepancy: Recognising the Need for Virtual Internships	Institutional decision to transition to VI	"I think the college is has actually done a good job. They were responding quickly… the college and the program has actually responded very well, with the short time that I've seen, the college has actually done such a good job by involving faculty members, switching our rotations, trying to handle it, and I think they handle it as well as they could with the available resources in available time." [Student 5]
		"I think, giving the situation that we're in. I think that the right decisions were made… I think that the transition to the online platforms was good, and I think that we had good leadership and we also had a good frequent meetings to discuss how things were going" [Preceptor 5].
	Concerns regarding student safety	"It's not only me I'm worried about; it's me, my family, the community itself, even clinical pharmacists in Hamad, who are working right now. They're operating on a minimum capacity so not all clinical pharmacy their jobs every single day." [Student 1]
		"I think, to remove the student from the potential harm. I think it was the, the right decision to do" [Preceptor 5].
	Perceived loss of clinical opportunity	"We signed up to be clinical practitioners regardless of what the situation is. So, I don't really see what's the difference of me or another pharmacist just being there in the front line, trying to help our patients." [Student 5]
Appropriateness of Virtual Internships	Facilitating conditions	"If I haven't done six clinical internships in the past… I feel like my attitude would have been different. Because now, at least I can relate to some patients that I've seen previously… but if I did not have this exposure at all, my attitude now would have been so much different." [Student 5].
		"I think, I wouldn't want to have done PharmD in this pandemic, to be honest, from the beginning. If I was faced with this similar situation, I would have postponed my PharmD internships for a better future". [Student 3].
		"They had direct patient care contact by the sixth internship.., many of them have met or exceeded those competency levels… So, for the seventh and eighth internship, the transition into virtual, was just fine." [Preceptor 2].
		"Many students always think that the internships should all be acute care… but in the PharmD program, you're supposed to expose them to a variety of healthcare settings." [Preceptor 2].
	Perceived quality and competency alignment of VI	"Take a much deeper dive into the literature, have a much better understanding about why we do what we do and to really take a look at some of those clinical controversies" [Preceptor 4]
	Limited clinical immersion	**"**The student cannot see the patient, cannot talk to the patient… there is no communication with the patient or even the family." [Preceptor 3].
		"The biggest challenge is how do you really observe a student's patient care skills in an actual setting because it's all virtually done, it's all a discussion. We're not able to really observe the student in an actual environment" [Preceptor 5].
Efficacy and Confidence in Implementation	Students' confidence in their knowledge and skills	"So, because we have we gained these skills from our previous rotations, like patient communication, communication, communicating with the team. These are all important skills that we will not be able to get from virtual rotation, but because we have them from before it, it was fine." [Student 9]
		"My students do have access to Cerner… they review patients, develop care plans, document interventions…" [Preceptor 1]
		"I think, that the students had ability to adapt so for our PharmD students, they go to a new rotation every four weeks. They've had the kind of opportunity to adapt to varieties of clinical settings. And I think that the switch to a new virtual context really, I think helps prepare them to adopt a lot easier a lot quicker." [Preceptor 5]
		"I felt that… this online clinical rotation was helpful for the student to be self-dependent… this will really help them in their career." [Preceptor 3]
	Concerns about achieving experiential outcomes	"Because everything is just knowledge based, everything is based on the information that we have… you're not making a change, which for me, personally, as a PharmD student, I don't feel I am reaching what I really set limits for." [Student 2]
Principal Support	Leadership and stakeholders support	"Their response was quick, which was very respectful so quickly we were given a full clear plan of what's going to happen in in a time where everything was very uncertain. The college did put a very clear plan, which was very respectful." [Student 10]
		"I think that the right decisions were made… we had good leadership and frequent meetings to discuss how things were going." [Preceptor 5]

(*continued on next page*)

Table 2 (*continued*)

Theme	Subtheme	Illustrative quotes
	Academic and moral support	"She [faculty preceptor] did an amazing work with me she was really supportive…I know she's stressed out herself so much like, she used to work more than twelve hours consequently, from one meeting to the other, but she never compromised my time [Student 5]
		"I think the addition of preceptor from Hamad allows you to get a small glimpse into what's going on practice, especially if you do have meetings with him or her." [Student 1].
		"We have faculty advisors that are assigned to each of our students, and if we knew that there was a struggling student and depending on what skills that they lacked in, the faculty advisor and current preceptor would work together to devise other activities to help further develop their skills." [Preceptor 2]
	External preceptor constraints and workload redistribution	"It felt at sometimes that maybe his Pharm D students where a bit of a lesser priority than his other commitments". [Preceptor 1]
		"I'm not really getting the support that I really needed for ID rotation; especially I was really looking forward to managing resources, understanding in depth antimicrobials, but I don't believe that I got this chance from the preceptor because they are already very busy with the COVID-19 that's going on." [Preceptor 5]
		"This was not accounted for… volunteer work from all the cross-appointed faculty members." [Preceptor 4]
Valence: Perceived Benefits	Short term gain	"I'm able to read evidence and literature and in a more relaxed manner, and to actually go in deeper into detail. ….I think I've benefited a lot from looking into the literature and guidelines and we're spending a lot of time on them because there's a lot, it's a very wide variety." [Student 8]
		"We were able to cover more topics in the virtual setting." [Preceptor 5]
	Long term professional gains	"..To teach myself and to look for each and single information on my own. And I think this is very, very, very important. Especially that we are entering practice… And there will be no one, like, on there for us, only to teach us, like, from now on, we need to do it on our own." [Student 9]
		"I felt that self-dependent learning was of big benefit for this, for the students because in the practice, this is what they will do… And also the, like, let's say, the ability to deal with this current circumstances, and the stressful circumstances, maybe this also kind of helpful for them in the future career." [Preceptor 3]
		"The student actually said 'Can this be offered as an elective rotation? I found it really beneficial.'" [Preceptor 5]
		"Self-dependent learning… will really help them in their future career." [Preceptor 3]
	Acquired skills	"Time management in such a routine less day… time management has a new meaning right now because when you were in college or when you have rotations, it's kind of a routine. But when you don't have a routine, it's very difficult to set up a time to work." [Student 1]
		"Students' need to have an open mind. They have to be very flexible, and adaptable, which I feel that our students have been … I couldn't have asked for a better students to have gone through this circumstance, than with this class because this class has been very, very understanding, and very adaptable quickly." [Preceptor 2]

communication, and interprofessional collaboration, particularly in internships such as infectious disease and coronary care, where bedside interaction and real-time clinical decision-making are central. The inability to participate in ward rounds and informal team discussions limited their understanding of contextual clinical reasoning.

"The student cannot see the patient, cannot talk to the patient… there is no communication with the patient or even the family." [Faculty Preceptor 3].

"The biggest challenge is how do you really observe a student's patient care skills in an actual setting because it's all virtually done, it's all a discussion. We're not able to really observe the student in an actual environment" [Faculty Preceptor 5].

Students also expressed dissatisfaction with the reduced number and complexity of clinical interventions and the limited opportunity to respond to real-time patient requests. Faculty acknowledged this tension, noting that while virtual activities supported clinical reasoning, certain experiential elements were inherently constrained in the absence of direct patient and team engagement.

Discussion

This study examined readiness for the transition to VI among PharmD students and faculty preceptors using the readiness to change

model. By applying a theoretically grounded lens, this study moves beyond descriptive accounts of pandemic adaptation and offers a structured analysis of how discrepancy, appropriateness, efficacy, principal support, and valence shaped stakeholders' responses to rapid experiential redesign.

Discrepancy: recognizing the necessity for change

Participants widely acknowledged the necessity of transitioning to VI to ensure program continuity, protect academic progression, and prevent delays in graduation during unprecedented disruption. This recognition aligns with the discrepancy dimension of readiness for change, where awareness of the need for change precedes meaningful adaptation.[6] The institutional imperative to deliver the remaining placements virtually[37] was understood not merely as a contingency plan but as a strategic response to safeguard professional training.

Although some students expressed concerns regarding personal and family safety, others demonstrated a strong sense of professional responsibility and willingness to serve during the pandemic. Similar patterns have been observed internationally. In Brazil, approximately one-third of students wished to continue clinical placements, while another third preferred virtual training.[13] Medical students in Singapore who expressed a desire to return onsite reported higher professional identity and intrinsic motivation[15]. The sense of responsibility observed among participants in this study may reflect their status as graduate pharmacists, cognizant of professional obligations embedded in pharmacy practice standards.[19] These findings suggest that readiness is shaped not only by structural arrangements but also by professional identity formation.

Appropriateness: perceived fit of virtual delivery

Studies across health professions have examined readiness for virtual clinical education beyond crisis response. For instance, research on medical students' readiness for virtual clerkships highlighted preparedness, confidence, and perceived learning value as key determinants of sustainable integration[10,11]. These findings align with our results and reinforce that understanding readiness determinants is essential for embedding digitally mediated experiential learning within contemporary pharmacy curricula.

In our study, the structured and tailored nature of the VI program appreciated by students; however, concerns regarding reduced patient interaction, limited interprofessional engagement, and constrained procedural practice were consistently expressed. These concerns reflect broader literature demonstrating that virtual modalities may support knowledge acquisition and clinical reasoning but cannot fully replicate the relational, communicative, and contextual elements of in-person care.[24,26,47] Although various strategies were implemented, including electronic health record based case discussions, telemedicine exposure, role-plays, journal clubs and structured presentations,[37] students perceived competencies linked to care provider, communicator, collaborator, and health advocate roles as particularly affected.[37]

Local and international literature similarly emphasizes that essential competencies in collaboration, communication, responsibility, and professional integrity must be deliberately cultivated within health profession curricula ([16,18,31,43];). Our findings are consistent reports from multiple contexts indicating that students perceive onsite training as more effective for developing clinical confidence and teamwork ([2,16,18,31,36,43]). For example, in a study that utilized a model for utilizing distance learning post COVID-19, medical students and faculty agreed that face-to-face learning provided a better chance for enhanced teamwork and for achieving cognitive, communication, and clinical skills than distance learning. It is also called for to combine face-to-face learning with other forms of education [2]. This is also in accordance with the results of Nuffer and Duke,[36] who found that final-year PharmD students perceived onsite training to be more effective than online training in preparing them to become more oriented and confident in managing patients during their diabetes management clinic internship.[36]

At the institutional level, decisions regarding which internships were delivered virtually were guided by competency mapping and feasibility assessments. Internships in which learning outcomes could be met through case discussions, electronic health record review, evidenced-based decision-making, and structured remote supervision were prioritized for virtual delivery. This approach mirrors strategies reported in other readiness studies in health professions education [10,11,29,41]; and reinforces that appropriateness depends on competency–delivery alignment rather than modality alone.

While dissatisfaction with fully virtual placements has been documented in several contexts[13,14,18,30,34] more positive institutional perceptions have been reported in other regional settings,[26,42] suggesting contextual variability in readiness determinants. The convergence of our findings with prior research reinforces the importance of selective integration rather than wholesale replacement of in-person experiential training.

Efficacy and principal support: confidence and institutional mechanisms

Students expressed confidence in their ability to succeed in VI, especially as they had completed six out of the eight internships onsite prior to the pandemic. This sense of efficacy was shared by faculty preceptors and grounded in students' prior clinical exposure. Additionally, CPH students were digital natives that enabled them to navigate online training easily, in contrast to what pharmacy students expressed in two other studies, where they perceived online skills as a barrier to learning during VI.[26,42]

However, confidence in achieving experiential goals was moderated by reduced opportunities for applied skill practice. Communication gaps with onsite preceptors, who were often engaged in pandemic-related responsibilities, influenced perceptions of support. Literature confirms that inadequate communication and feedback in online environments can negatively affect learner satisfaction and self-efficacy.[9,20,23,25,38,46] Our findings reinforce that principal support extends beyond moral encouragement to

include structured coordination, preceptor preparedness, and protected supervisory time.[12] Addressing these gaps could enhance students' perceptions of efficacy and their overall learning experience.

Faculty perspectives further highlighted practical mechanisms that supported efficacy, including structured academic scaffolding, regular feedback loops, and the use of electronic health records to preserve clinical reasoning activities. They also emphasized that virtual delivery is differentially suited to specific competencies and internship types, supporting selective rather than wholesale integration. Collectively, these findings suggest VI can be integrated as a structured adjunct to experiential education when deliberately aligned with competency goals and supported by institutional infrastructure.[8,29,41]

Valence: perceived benefits and emerging competencies

Despite acknowledged limitations, students identified tangible benefits of VI, including enhanced time management, independence, structured therapeutic reasoning, presentation skills, adaptability, and self-directed learning. These competencies are increasingly relevant within digitally mediated healthcare systems. Literature on online learning similarly identifies gains in autonomy and reflective capacity[2,30,34].

Students also recognized the importance of telepharmacy exposure, reflecting broader calls to integrate telehealth competencies into pharmacy and health profession curricula[33,37]. The pandemic accelerated telehealth adoption globally[35,44], suggesting that virtual components may serve not merely as emergency substitutes but as preparation for evolving care models. While VI and simulations can never replace direct patient engagement, innovative approaches, such as augmented and virtual reality and emerging digital technologies, may complement experiential education when thoughtfully integrated.[45]

Extending readiness to change into experiential education

Since 2020, experiential education in many contexts has incorporated hybrid models, telepharmacy exposure, and digitally supported supervision.[3,4,29] The determinants identified in this study, particularly perceptions of appropriateness, efficacy, and support, remain relevant to current program design decisions when integrating virtual components alongside in-person training. By applying the readiness to change framework within pharmacy experiential education, this study extends its utility beyond organizational management and demonstrates its value as a diagnostic lens for educational redesign.[22] The findings have practical implications for contemporary experiential education where digital care delivery and remote supervision are increasingly common.[3,4]

Our findings suggest that VI is most effective when selectively aligned with competencies amenable to remote delivery, such as clinical reasoning, evidence-based decision-making, and documentation, while recognizing that immersive interprofessional practice and bedside skill acquisition require direct clinical engagement. This supports calls for blended experiential models rather than fully virtual substitution.[8,41]

Strengths and limitations

To our knowledge, this is among the first qualitative studies to explore PharmD students' readiness for rapid transition to VI using a theoretical framework and incorporating both student and faculty perspectives. The small cohort size reflects the structure of the postgraduate program and allowed in-depth exploration; however, findings should be interpreted within this bounded context and may not be transferable to other settings.

Social desirability bias remains possible. Although none of the research team were directly involved in the PharmD program, senior leadership roles (e.g., Assistant Dean of Student Affairs (AE), Dean (MD)) may have introduced perceived power dynamics. To mitigate potential power dynamics, the interviewer (AE) was not involved in students' assessment. Participants were informed that responses would not influence academic standing. Multiple researchers coded the data and interpretations were discussed iteratively to reduce analytic bias, but residual influence cannot be fully excluded.

Future research should examine longitudinal integration of virtual components within hybrid experiential models and evaluate their impact on competency development, particularly in domains requiring interprofessional immersion and direct patient engagement.

Conclusion

This qualitative study provides a theoretically informed examination of stakeholder perceptions of VI within a postgraduate PharmD program. Framed through the readiness to change model, the findings demonstrate that both faculty and student recognized the necessity of the transition and identified factors influencing its appropriateness, efficacy, and implementation. Virtual delivery supported continuity of training and facilitated development of clinical reasoning, self-directed learning, and digital competencies. However, limitations related to direct patient interaction, interprofessional engagement, and applied clinical skill development were consistently highlighted.

Participants demonstrated adaptability to the virtual format, while emphasizing that its effectiveness depended on prior experiential exposure, structured academic scaffolding, and institutional support. Although challenges in communication and clinical immersion were noted, opportunities for innovation emerged, including expanded use of electronic health records, remote supervision, and exposure to telehealth-related practices. Collectively, these findings indicate that VI are best positioned as a complementary component of experiential education when selectively aligned with appropriate competencies and supported by coordinated

institutional structures. Further research is needed to evaluate sustainable integration of virtual elements and their impact on competency development within evolving healthcare environments.

Ethical approval and consent to participate

This study was approved by the Qatar University Institutional Review Board (QUERG-CHS-2020-1). Informed consent was obtained by email prior to participation. Confidentiality and anonymity were maintained throughout the study.

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Declaration of competing interest

The authors declare no competing interests.

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Data availability

The datasets supporting the findings of this study contain information that could compromise participant privacy and therefore cannot be openly shared. Aggregated data underlying the reported results are available upon reasonable request from the corresponding author, Dr. Alla El-Awaisi (elawaisi@qu.edu.qa). Access to the data may be granted to qualified researchers for non-commercial academic purposes, following approval of a reasonable request and, where applicable, completion of a data sharing agreement to ensure confidentiality and compliance with institutional and ethical guidelines.

References

1. Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. *Lancet Infect Dis.* 2020;20(7):777–778. https://doi.org/10.1016/s1473-3099(20)30226-7.
2. Ahmed SA, Hegazy NN, Abdel Malak HW, et al. Model for utilizing distance learning post COVID-19 using (PACT)™ a cross sectional qualitative study. *BMC Med Educ.* 2020;20(1), 400. https://doi.org/10.1186/s12909-020-02311-1.
3. Almeman A. The digital transformation in pharmacy: embracing online platforms and the cosmeceutical paradigm shift. *J Health Popul Nutr.* 2024;43(1):60. https://doi.org/10.1186/s41043-024-00550-2.
4. Alsulami FT. A scoping review on the impact of versatile digital health innovations on pharmacy education [review]. *Front Med.* 2025;12–2025. https://doi.org/10.3389/fmed.2025.1577494.
5. Armenakis AA, Harris SG. Reflections: our journey in organizational change research and practice. *J Chang Manag.* 2009;9(2):127–142.
6. Armenakis AA, Harris SG, Feild HS. Making change permanent a model for institutionalizing change interventions. In: *Research in Organizational Change and Development*. Emerald Group Publishing Limited; 2000.
7. Armenakis AA, Harris SG, Mossholder KW. Creating readiness for organizational change. *Hum Relat.* 1993;46(6):681–703.
8. Bacon R, Hopkins S, Georgousopoulou E, et al. While allied health students prefer face-to-face clinical placement, telehealth can support competency development: results from a mixed-methods study [brief research report]. *Front Med.* 2023;10:*2023*. https://doi.org/10.3389/fmed.2023.1151980.
9. Bates R, Khasawneh S. Self-efficacy and college students' perceptions and use of online learning systems. *Comput Hum Behav*. 2007;23(1):175–191. https://doi.org/10.1016/j.chb.2004.04.004.
10. Bawadi H, Al-Moslih A, Shami R, et al. A qualitative assessment of medical students' readiness for virtual clerkships at a Qatari university during the COVID-19 pandemic. *BMC Med Educ*. 2023;23(1):186. https://doi.org/10.1186/s12909-023-04117-3.
11. Bawadi H, Shami R, El-Awaisi A, et al. Exploring the challenges of virtual internships during the COVID-19 pandemic and their potential influence on the professional identity of health professions students: A view from Qatar University. *Front Med (Lausanne)*. 2023;10, 1107693. https://doi.org/10.3389/fmed.2023.1107693.
12. Bell DJ, Self MM, Davis III C, Conway F, Washburn JJ, Crepeau-Hobson F. Health service psychology education and training in the time of COVID-19: challenges and opportunities. *Am Psychol.* 2020. https://doi.org/10.1037/amp0000673. No Pagination Specified-No Pagination Specified.
13. Carrascosa MMC, Campos T, Sampaio JE, et al. Medical interns and COVID-19: results of national research. *Rev Assoc Med Bras (1992)*. 2020;66(6):812–817. https://doi.org/10.1590/1806-9282.66.6.812.
14. Cipriano SD, Dybbro E, Boscardin CK, Shinkai K, Berger TG. Online learning in a dermatology clerkship: piloting the new American Academy of Dermatology medical student Core curriculum. *J Am Acad Dermatol.* 2013;69(2):267–272. https://doi.org/10.1016/j.jaad.2013.04.025.
15. Compton Scott, Sarraf-Yazdi Shiva, Rustandy Felicia, Krishna R, Kumar L. Medical students' preference for returning to the clinical setting during the COVID-19 pandemic. *Med Educ.* 2020. https://doi.org/10.1111/medu.14268. *n/a*(n/a).
16. Council GM. *Tomorrow's Doctors: Outcomes and Standards for Undergraduate Medical Education*. Manchester, UK: General Medical Council; 2009.
17. Dat TV, Tu VL, Quan NK, et al. Telepharmacy: A systematic review of field application, benefits, limitations, and applicability during the COVID-19 pandemic. *Telemed E-Health.* 2023;29(2):209–221. https://doi.org/10.1089/tmj.2021.0575.
18. Du X, Kassab SE, Al-Moslih AM, Abu-Hijleh MF, Hamdy H, Cyprian FS. Identifying essential competencies for medical students. *J Appl Res Higher Educ*. 2019;11(3):352–366. https://doi.org/10.1108/jarhe-07-2018-0114.
19. FIP. Oath of a Pharmacist. https://www.fip.org/www/streamfile.php?filename=fip/Centennial/IPJ_vol_322_nov_2014_pp12-13.pdf; 2014.
20. Fuller KA, Heldenbrand SD, Smith MD, Malcom DR. A paradigm shift in US experiential pharmacy education accelerated by the COVID-19 pandemic. *Am J Pharm Educ*. 2020;84(6).
21. George PP, Papachristou N, Belisario JM, et al. Online eLearning for undergraduates in health professions: A systematic review of the impact on knowledge, skills, attitudes and satisfaction. *J Glob Health.* 2014;4(1), 010406. https://doi.org/10.7189/jogh.04.010406.
22. Holt DT, Armenakis AA, Feild HS, Harris SG. Readiness for organizational change the systematic development of a scale. *J Appl Behav Sci*. 2007;43(2):232–255.

23. Jones RA, Jimmieson NL, Griffiths A. The impact of organizational culture and reshaping capabilities on change implementation success: the mediating role of readiness for change. *J Manag Stud*. 2005;42(2):361–386. https://doi.org/10.1111/j.1467-6486.2005.00500.x.
24. Kalet AL, Coady SH, Hopkins MA, Hochberg MS, Riles TS. Preliminary evaluation of the web initiative for surgical education (WISE-MD). *Am J Surg*. 2007;194(1):89–93. https://doi.org/10.1016/j.amjsurg.2006.12.035.
25. Kassab SE, Du X, Toft E, et al. Measuring medical students' professional competencies in a problem-based curriculum: a reliability study. *BMC Med Educ*. 2019;19(1):155. https://doi.org/10.1186/s12909-019-1594-y.
26. Khalil R, Mansour AE, Fadda WA, et al. The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. *BMC Med Educ*. 2020;20(1):285. https://doi.org/10.1186/s12909-020-02208-z.
27. Krueger R, Casey M. *Focus Groups: A Practical Guide for Applied Research*. 2009.
28. Lambert SD, Loiselle CG. Combining individual interviews and focus groups to enhance data richness. *J Adv Nurs*. 2008;62(2):228–237. https://doi.org/10.1111/j.1365-2648.2007.04559.x.
29. Leung R, Hefford H, Chew C, Yuen J. Strategies proposed by students and pharmacists for virtual experiential patient care practicums. *Innov Pharm*. 2023;14(4). https://doi.org/10.24926/iip.v14i4.4985.
30. Liu Q, Hu R, Zhan X, Yan W. *Evaluation of Students' Satisfaction and Attitudes toward Blended Learning in Medical Education: A Survey in Randomized Controlled Trial Course*. Proceedings of the European Conference on e-Learning, ECEL; 2014:679–684.
31. Lurie SJ, Mooney CJ, Lyness JM. Measurement of the general competencies of the accreditation Council for Graduate Medical Education: A systematic review. *Acad Med*. 2009;84(3).
32. Lyons KM, Christopoulos A, Brock TP. Sustainable pharmacy education in the time of COVID-19. *Am J Pharm Educ*. 2020;84(6). https://doi.org/10.5688/ajpe8088. ajpe8088-ajpe8088.
33. Mak V, Krishnan S, Chuang S. Students' and examiners' experiences of their first virtual pharmacy objective structured clinical examination (OSCE) in Australia during the COVID-19 pandemic. *Healthcare*. 2022;10(2). https://doi.org/10.3390/healthcare10020328.
34. Mojtahedzadeh R, Mohammadi A, Emami AH, Rahmani S. Comparing live lecture, internet-based & computer-based instruction: A randomized controlled trial. *Med J Islam Repub Iran*. 2014;28:136.
35. Muflih SM, Al-Azzam S, Abuhammad S, Jaradat SK, Karasneh R, Shawaqfeh MS. Pharmacists' experience, competence and perception of telepharmacy technology in response to COVID-19. *Int J Clin Pract*. 2021;75(7):e14209. https://doi.org/10.1111/ijcp.14209.
36. Nuffer W, Duke J. A comparison of live classroom instruction and internet-based lessons for a preparatory training course delivered to 4th year pharmacy students. *J Sci Educ Technol*. 2013;22(4):522–528. https://doi.org/10.1007/s10956-012-9411-y.
37. Paravattil B, Zolezzi M, Carr AS, Al-Moslih A. Reshaping experiential education within Qatar University's health programs during the COVID-19 pandemic. *Qatar Med J*. 2021;2021:9. https://doi.org/10.5339/qmj.2021.9.
38. Peechapol C, Na-Songkhla J, Sujiva S, Luangsodsai A. An exploration of factors influencing self-efficacy in online learning: a systematic review. *International Journal of Emerging Technologies in Learning (iJET)*. 2018;13:64–86.
39. Prisco JL, Goldman JD, Eguale T, Carace N. Important factors in remote experiential education. *Pharmacy (Basel)*. 2022;10(5). https://doi.org/10.3390/pharmacy10050122.
40. Romli MH, Wan Yunus F, Adam SK, Salihan S. How are alternative clinical placements performed compared to traditional clinical placements during the COVID-19 pandemic? Sought through a systematic review and Meta-analysis. *Med Sci Educ*. 2024;34(4):927–947. https://doi.org/10.1007/s40670-024-02037-5.
41. Serag-Bolos ES, Andrews LB, Beall J, et al. Clinical skills development in the virtual learning environment: Adapting to a New World. In: *Handbook of Research on Updating and Innovating Health Professions Education: Post-Pandemic Perspectives*. IGI Global Scientific Publishing; 2022:265–297.
42. Shawaqfeh MS, Al Bekairy AM, Al-Azayzih A, et al. Pharmacy students perceptions of their distance online learning experience during the COVID-19 pandemic: A cross-sectional survey study. *J Med Educ Curric Dev*. 2020;7, 2382120520963039.
43. Swing SR. The ACGME outcome project: retrospective and prospective. *Med Teach*. 2007;29(7):648–654. https://doi.org/10.1080/01421590701392903.
44. Unni EJ, Patel K, Beazer IR, Hung M. Telepharmacy during COVID-19: A scoping review. *Pharmacy*. 2021;9(4). https://doi.org/10.3390/pharmacy9040183.
45. Woolliscroft JO. Innovation in response to the COVID-19 pandemic crisis. *Acad Med*. 2020. https://doi.org/10.1097/acm.0000000000003402.
46. Zammuto RF, O'Connor EJ. Gaining advanced manufacturing technologies' benefits: the roles of organization design and culture. *Acad Manage Rev*. 1992;17(4):701–728.
47. Zheng J, Hundeyin M, He K, et al. General surgery chief residents' perspective on surgical education during the coronavirus disease 2019 (COVID-19) pandemic. *Surgery*. 2020;168(2):222–225. https://doi.org/10.1016/j.surg.2020.06.003.
48. Moore Ozias, Herman Aguinis, Tanja R Darden, Ayana N Younge. Defining, assessing, and reporting saturation in qualitative research: Review and recommendations☆. In: *Academy of Management Proceedings*. Valhalla, NY 10595: Academy of Management; 2024:13340; 2024 (1).