

SECTION 1

Background and Research Question

Empathy for patients among healthcare providers is a primary component of patient-centered care.¹ Empathy is also a mechanism to support professional identity formation in health professions students, allowing them to discover their own role in addressing patient needs.² *Therefore, empathy-building learning activities are critical to the successful development of professional identity among student pharmacists.* The Accreditation Council of Pharmacy Education (ACPE) mandated requirements for pharmacy school curricula that recognize the importance of displaying empathy during all healthcare interactions.³ While schools and colleges of pharmacy often incorporate learning activities that support empathy development among student pharmacists, very few of these are high-fidelity simulations. A scoping review of the literature recently conducted by our team indicated that the most common learning modality for promoting empathy among pharmacy learners is reflection, followed by didactic teaching, role play, and group discussion.⁴ A high-fidelity simulated patient experience may have more salience, and therefore be more impactful and have long-lasting effects.

The didactic pharmacy program in the Harrison College of Pharmacy currently incorporates learning activities such as a longitudinal patient case and poverty simulation, among other activities, designed to promote empathy for patients suffering from chronic health conditions with negative impacts on quality of life. However, the salience of the patient experience may be greatly enhanced using an immersive technology such as virtual reality (VR), paired with haptic devices to simulate physical impairments associated with chronic disease. VR creates a sense of presence (the feeling of actually being there), plausibility (the feeling that events in VR are actually happening), and embodiment (the feeling that you are actually inhabiting the virtual body).^{5,6} Experiencing “firsthand” the challenges of everyday activities due to physical impairments has the potential to promote empathy development for these students. Pairing VR with haptic gloves provides auditory, visual, and tactile sensory inputs that more accurately simulate patient challenges. **Accordingly, our research question is: what is the effect on student learning and learner satisfaction when incorporating a learning activity to promote empathy development that utilizes virtual reality and haptics into the PharmD curriculum?** This aligns well with AACP Strategic Priority #2, as it *optimizes education* for future pharmacists by delivering *innovative curricula*. Additionally, this project will fulfill a need recently described by Blakely to integrate content related to disabilities into pharmacy curricula.⁷

Description of the VR Application

In Fall of 2022, PI Garza launched a pilot program to use VR for empathy-building among first-year, first-semester students, called Empathy VR. The application simulated color blindness and tasked the user to sort pills into boxes by color. This was paired with a no-tech simulation in which users had to fill a pill box wearing a stiff pair of gloves to simulate joint stiffness with arthritic conditions. The pilot was successful, resulting in high levels of students’ self-reported enjoyment (89% ranked the activity as somewhat or very enjoyable) and perceived usefulness of the activity to support learning (84% ranked it very or extremely useful) according to data collected from pre-post surveys. However, this pilot was only tangentially related to a course focused on the role of the pharmacist in helping patients navigate the healthcare system, which includes a module on patient needs assessment and addressing barriers to care. No assignments related to Empathy VR were included in the course, and students only stood to lose participation points if they did not participate. Even so, of the 132 students enrolled in the course, 131 participated and provided feedback on the experience via pre and post surveys. Additionally, six students participated in a focus group at the end of the semester.

The proposed project for Fall 2023 will utilize a refined VR application, incorporating an immersive arthritis experience using a haptic glove paired with a VR headset and additional elements of gamification. The benefits of these application refinements are twofold. First, use of immersive technology improves realism of the experience by incorporating auditory, visual, and tactile stimuli, providing more salience to the learner than can be achieved using a paper-based case activity. Leveraging the sense of presence, plausibility, and embodiment, VR and haptic devices create the feeling of actually living with the physical impairments that impact patients' lives. Secondly, incorporating elements of gamification can improve student engagement in the learning activity. Based on the concept of reference-dependent preferences,⁸ students are motivated by the sense of competition and reward mechanisms built into the application. This activity will also be formally incorporated into the course, aligned with course objectives, content, and assessments. The use of immersive technologies in this way provides an *unconventional and creative* learning experience. An expanded version of the original VR application incorporates scenarios simulating impairments due to arthritis of the hands and additional elements of gamification and has already been developed and tested in 20 students at our institution using a mechanical (but not haptic) glove to simulate joint stiffness. In addition, our team is currently developing a 3D-printed haptic glove that will be ready for launch in Summer 2023. The haptic glove will provide an additional level of tactile stimuli to enhance authenticity of the experience.

Specific Aims and Hypotheses

Aim 1: To assess the effect on empathy of a VR/haptics activity to promote student empathy for patients with physical limitations due to chronic diseases. Our hypothesis is that empathy will increase from pre to post intervention in the intervention group to a greater degree than in the control group and will be maintained over the course of the semester.

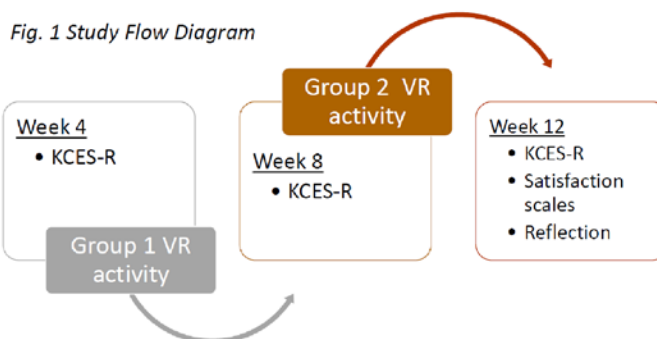
Aim 2: To assess the effect of a VR/haptics activity to promote student empathy for patients with physical limitations due to chronic diseases on student satisfaction. Our hypothesis is that students will have a high degree of satisfaction with the activity.

SECTION 2

Project Design and Implementation Plan

We propose a pre-post design with a “wait list” control group. All first-semester, first-year students enrolled in the Longitudinal 1 course in the Harrison College of Pharmacy (HCOP) (n≈approximately 135) will participate in the learning activity.

Random assignment to intervention groups: Half of the class will be randomly assigned to complete the activity between Week 4 and Week 8 of the course (Group 1), and the other half will be assigned to complete the activity between Week 8 and Week 12 (Group 2). The second group will serve as the control group for the first round.



The Intervention: Students will sign up for 15-min time blocks to use the VR application. Students on the Auburn, AL campus will go to the Auburn University Library's Innovation and Research Commons, a state-of-the-art facility that houses a VR space with multiple Oculus Quest 2 headsets available for our use. Co-I Grabowsky, our subject librarian, will be our liaison to the library. Students on the satellite

campus in Mobile, AL will participate in a conference room in the HCOP suite on that campus. Technical support for hardware and software will be provided by information technology staff on both campuses.

Curricular planning and assessment: PI Garza, who is the course coordinator, will oversee the process in consultation with Co-I Moseley, the curricular coordinator. The activity will be aligned with curricular competencies and learning objectives. Relevant competencies include:

- 55 - Evaluate patient quality of life or satisfaction with therapy
- 56 - Determine patient-specific healthcare needs/resources

An example learning objective tagged to Competency 55 is, “Discuss the potential impact of chronic conditions on a patient’s quality of life.” Content related to the activity will be incorporated into a unit on *Addressing Patient Needs and Barriers to Care* through didactic lectures and active learning exercises, including think-pair-share, role play, interaction with a standardized patient, and a group case.

Measures: The following assessments will be used to measure student outcomes:

1. *Empathy and satisfaction scales will provide quantitative data:*

Empathy will be assessed using a validated scale, the Kiersma-Chen Empathy Scale - Revised (KCES-R),⁹ which is widely used for measuring empathy among student pharmacists, at three time points in the semester (Week 4, Week 8, and Week 12). The KCES-R is a 14-item tool that utilizes a 7-point Likert scale and measures empathy in both the cognitive and affective domains. Permission has been obtained by the authors to use the KCES-R for this purpose.¹⁰ Satisfaction scales will measure student enjoyment and perceived usefulness to support learning at Week 12. Data will be collected using online surveys administered through Canvas. Survey items appear in the Appendix. The surveys will be graded as complete/incomplete and be worth a total of 1% of the course grade.

2. *End-of-semester guided reflection will provide qualitative data:*

Reflection prompts will ask students to describe how the experience affected their awareness of challenges in performing everyday tasks faced by patients with limitations due to chronic disease and how it might impact their future practice. Full assignment details appear in the Appendix. This assignment will be graded and worth 1% of the course grade.

Budget and Timeline

Budgeted funds in the amount of \$4,000 will be used to hire a part-time GRA for 10 hours per week. The GRA will help facilitate the activity on both campuses and provide support for data collection and analyses. All VR equipment is currently available in-house and does not need to be purchased for this project. “In kind” effort will be used for further VR and haptic glove development prior to the project start date as part of another funded project. Development of the expanded pilot application and IRB submission will take place in Summer of 2023. The application will be delivered to first-year students in Fall of 2023. Data analysis, report writing, and presentation of results will take place in Spring 2024. See Appendix for full timeline.

Next Steps

With full integration into a required PharmD course, the VR intervention will impact a large number of students. Further, the long-range objective is to incorporate the activity into HCOP’s interprofessional education program, potentially impacting a far greater number of Auburn University health professions students, including those in nursing, social work, and nutrition, as well as medical students at the nearby Edward Via College of Osteopathic Medicine. By expanding the target audience, the project will lead to more widespread use of *new and innovative teaching methodologies that incorporate immersive technologies into the classroom experience.*

APPENDIX

References

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Project Timeline

	Summer 2023		Fall 2023		Spring 2024	
	1-8	9-16	1-8	9-16	1-8	9-16
Project Milestones by week						
1. Development of expanded pilot VR application						
2. Submit documentation of IRB approval						
3. Launch activity in Group 1						
4. Launch activity in Group 2						
5. Data analysis						
6. Report writing and presentation						

Guided Reflection Assignment Description

Over the course of the semester, you have learned about the role of the pharmacist and how they can assist patients to navigate the US healthcare system. Through your progressive case assignment, group cases, role play activities, mock PBA, and the Empathy VR activity, you had the opportunity to better understand the various challenges that patients face and how pharmacists can address barriers to care. Compose a 1-2 page reflection about your course experience using the following prompts:

1. What was the overall impact of the course on your perceptions of the patient experience?
2. What was the impact of the Empathy VR activity in particular on your perceptions of the patient experience?
3. How realistic was the Empathy VR experience? In what ways could it be made more realistic?
4. Stepping into the patient's shoes for a moment, if you were to experience the physical impairments that you experienced in VR in real life, in what ways would that impact your quality of life?
5. How do you think your perceptions of the patient experience after taking the course might affect your future pharmacy practice and your role in addressing patient needs?

Survey Items

1. Kiersma-Chen Empathy Scale – Revised⁹
 - 14 items on two 7-point Likert scales
 - “Unnecessary” to “extremely necessary”
 - “Does not describe me” to “describes me extremely well”
2. “Rate your level of enjoyment in the Empathy VR activity you experienced.”
 - a. One item on a 5-point Likert scale
 - b. “very”; “somewhat”; “neutral”; “not very”; “not at all”
3. “Rate the level of usefulness of the Empathy VR activity to support your learning about patient needs and barriers to care.”
 - a. One item on a 5-point Likert scale
 - b. “Extremely”; “very”; “moderately”; “slightly”; “not at all”
4. Demographics
 - a. Gender identification
 - b. Race
 - c. Ethnicity
 - d. Age
5. Past use of virtual reality
 - One item with 3 response options
 - “Never”; “once or twice”; “three times or more”