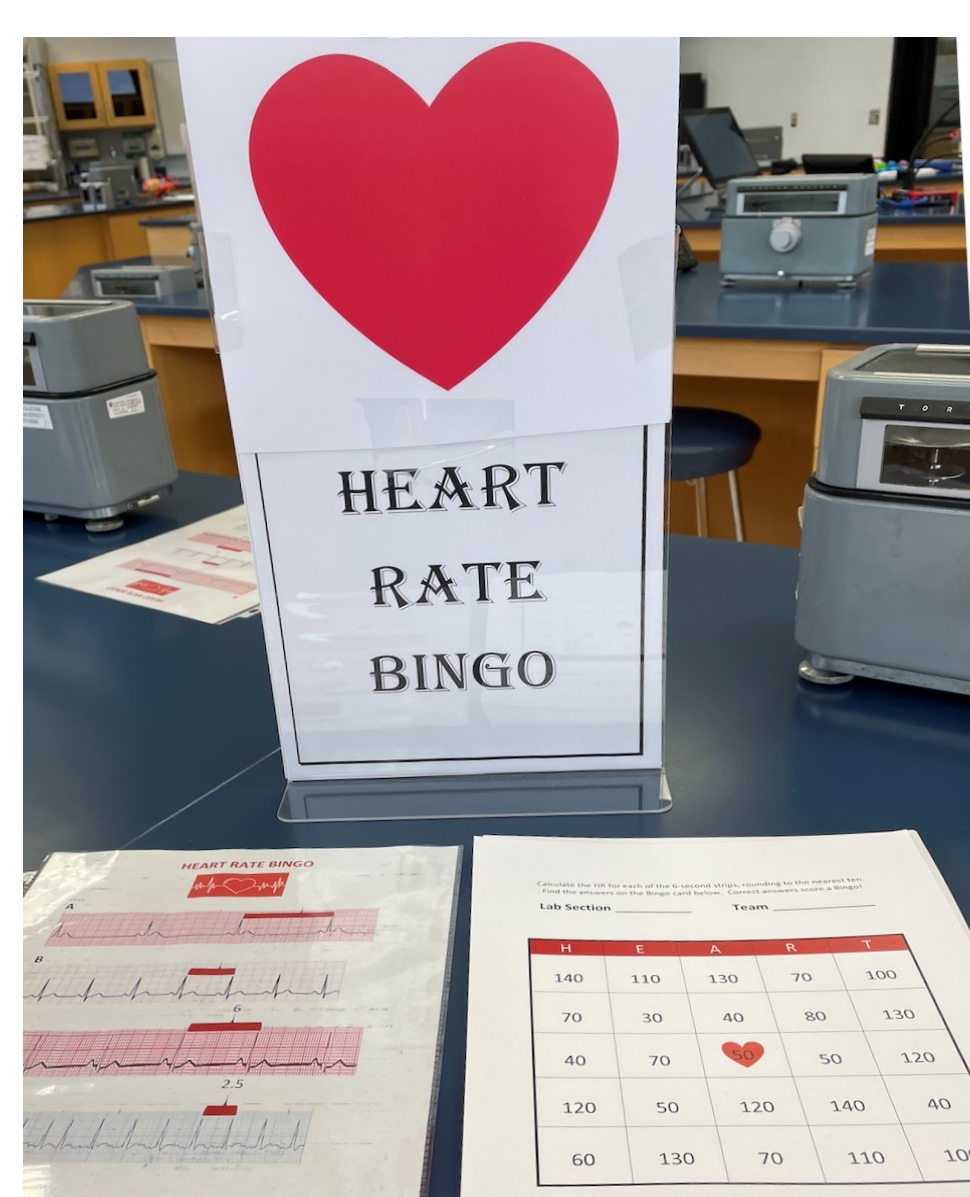


Highlights

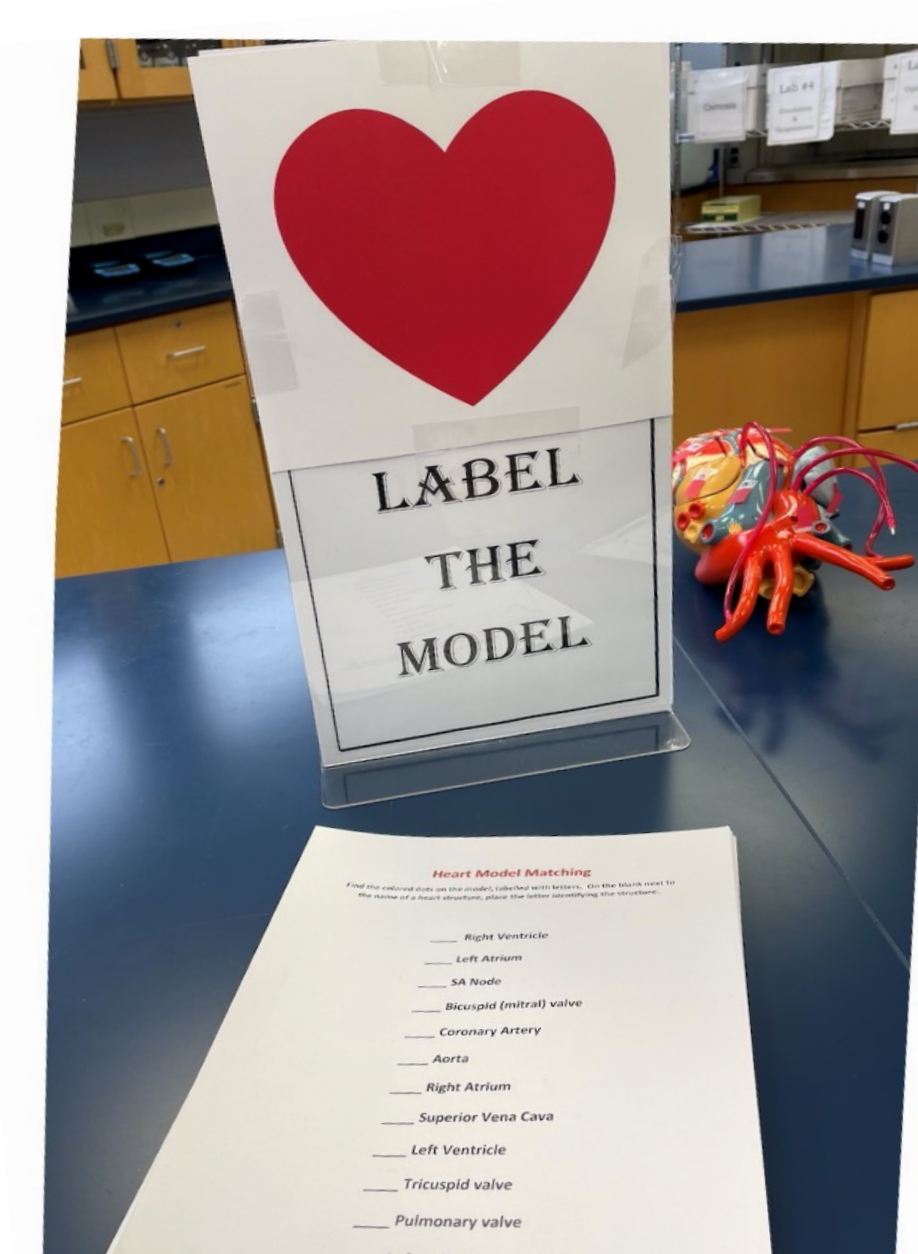
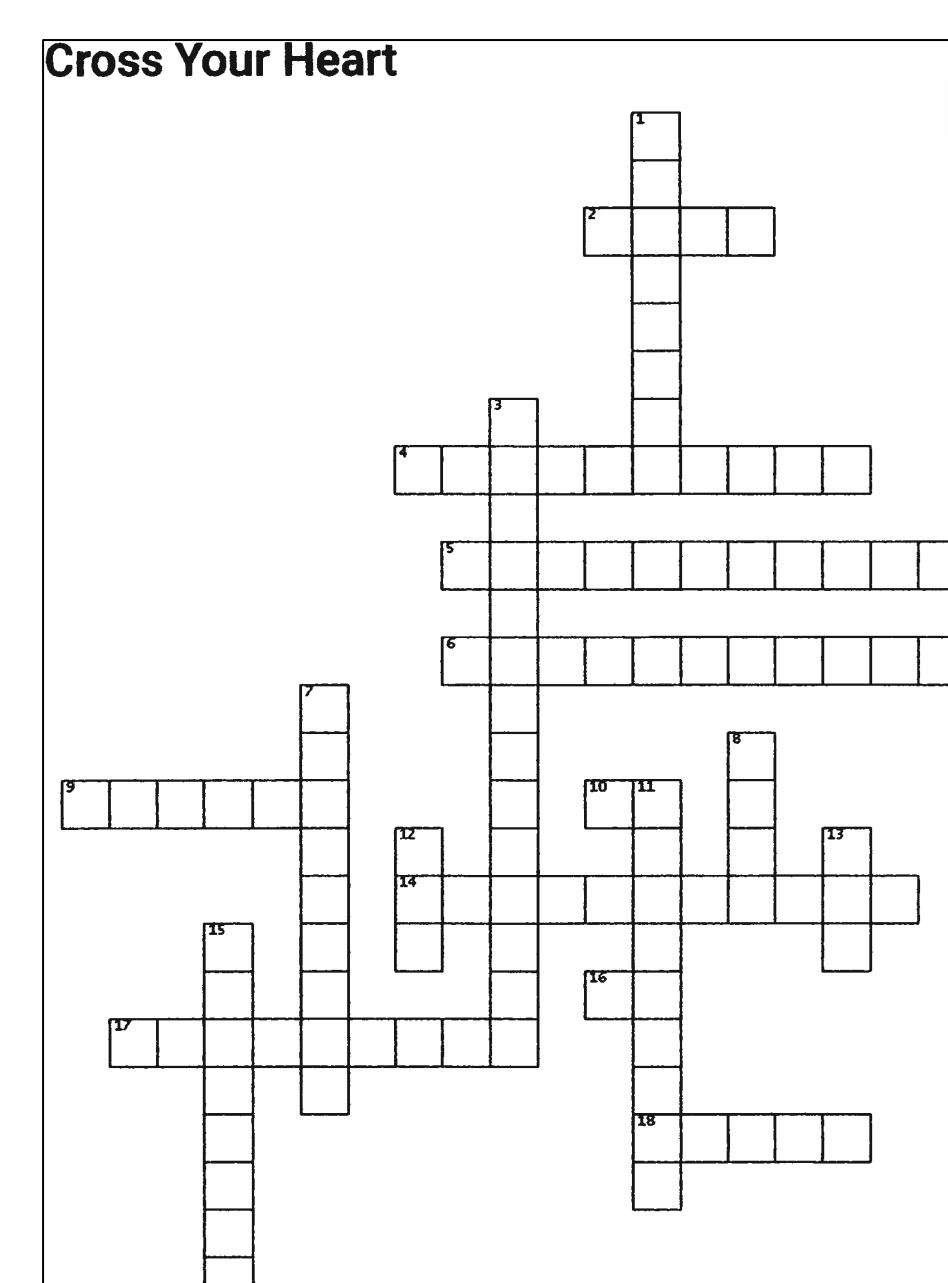
- **Game-based lab activities merging basic science knowledge of the heart with practice skills** can enhance student confidence in knowledge.
- **Interactive and competitive learning environments**, with rotating stations and game-like activities, **build an enjoyable learning process**.
- **Results** suggest these game-based activities can **effectively allow for application of basic science knowledge to pharmacy practice skills**.
- Faculty envision this approach to be **applicable to other basic sciences** and useful in **showing students the relevance to clinical practice**.

Materials, Activities, and Methods

- Faculty developed a novel lab in the ABLE (*Abilities-Based Learning Experiences*) PY1 course aimed at: 1) **merging basic science knowledge of the heart with pharmacy practice skills**; 2) **enriching knowledge**; and 3) **illustrating the clinical relevance of the basic sciences**.
- The lab consisted of 8 rotating game-based stations for groups of 4 students, working as a team and competing with scorecards.
- Stations included: **Heart Rate Bingo, SimMan® Heart Sounds/Pulse, Cross Your Heart Crossword, Heart Model Matching, Name the Arrhythmia Challenge, Heart Terms Heads-Up, Student Electrocardiograms, and a Quiz**.



H	E	A	R	T
140	110	130	70	100
70	30	40	80	130
40	70	50	50	120
120	50	120	140	40
60	130	70	110	100



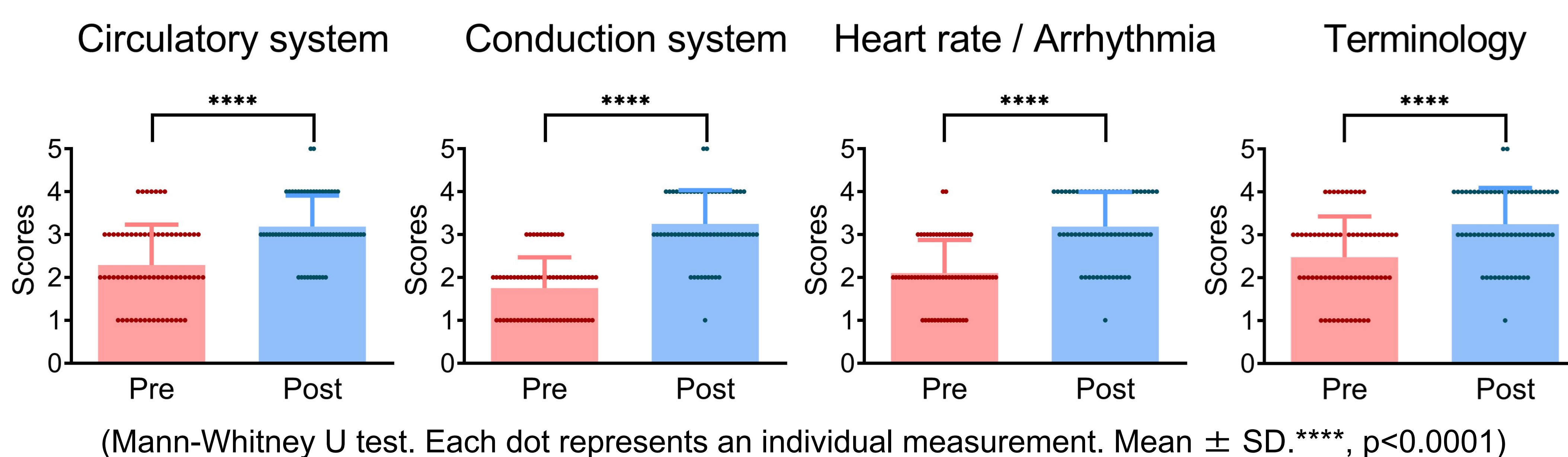
# Student EKGs	
# SimMan® Pulses	
# Cross Your Heart	
# Heart Heads Up	
# Heart Model	
# Arrhythmias	
Bingo	Y/N
TOTAL	5pt/ Opt



All lab activities

- Pre- and post-lab surveys were used to assess student perceptions of confidence in the content areas of the circulatory and conduction systems of the heart, heart rate, arrhythmias, and cardiology terminology.
- A Mann-Whitney U test was conducted to analyze the changes in student perceptions obtained from the pre- and post-surveys.
- A p-value of <0.05 was considered to be statistically significant.

Results



Content Area	Pre	Post	% Increase
Circulatory system	2.29 ± 0.94	3.18 ± 0.73	39.07
Conduction system	1.75 ± 0.72	3.25 ± 0.79	85.11
Heart rate / Arrhythmia	2.10 ± 0.77	3.18 ± 0.81	51.54
Terminology	2.48 ± 0.95	3.25 ± 0.85	30.99

(% increase: normalize to pre-score)

- There was a **significant increase in student perceptions of confidence in their knowledge** in all four content areas evaluated: the circulatory system, conduction system, heart rate/arrhythmias, and cardiology terminology (**all p<0.0001**).
- **Average post-survey confidence level was 3.3 (on Likert scale of 1-5) in applying basic science knowledge to pharmacy practice skills**.
- **Out of 65 students who completed the post-survey, 93.8% agreed that “the format was enjoyable and helped me to learn.”**

Conclusion

- Game-based learning activities in ABLE lab fostered an **engaging, enjoyable, and competitive atmosphere** with the intent for students to apply their knowledge of the basic sciences to clinical practice topics in cardiology that will be further discussed in upcoming therapeutics courses.
- The results of the study demonstrated a **significant increase in student perceptions of confidence in their knowledge** of the circulatory and conduction systems of the heart, heart rate, arrhythmias, and cardiology terminology.
- The high level of agreement among students regarding the **enjoyable and effective nature of the activities** further reinforces their positive impact.
- The findings highlight the potential of game-based lab activities to not only **enhance confidence in learning of basic science knowledge** but also **promote the practical application of knowledge**.

Future Directions

- Addition of a **“Heart to Heart Chat” station** in which students can enter queries into a generative AI chatbot, such as ChatGPT, requesting simple explanations of their muddiest heart lab topics and discuss results with a teaching assistant.
- Addition of pre- and post-lab **assessments of student knowledge** of lab content.
- This approach **holds promise for enriching and reinforcing knowledge in other areas of basic sciences and promoting student engagement in pharmacy education**.

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- OpenAI (2023) *ChatGPT* (May 12 version) [Large language model]. <https://chat.openai.com/chat>