The Chatbot Is In: A Qualitative Analysis of Student Experiences with Chatbots for Drug Information

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Background

- Generative artificial intelligence (AI) chatbots, such as ChatGPT, have the potential to transform healthcare education. The integration of AI chatbots into curricula has been the center of heated debate on the future of healthcare education.[1,2]
  - Pros: rapid information, customizable, accessible, user-friendly
  - Cons: unclear credibility, potential for bias, inaccurate or irrelevant information, quality is user-dependent
- Specifically for drug information (DI) acquisition, obtaining up-to-date and accurate information is of particular concern.

Objective

To explore pharmacy student perceptions of generative AI chatbot responses following the introduction of a pilot assignment into the curriculum of a didactic DI course.

Methods

- A pilot assignment was created and introduced to 138 second-year students enrolled in a didactic DI course in Fall 2023. Students used an AI Chatbot to answer a DI question of their choice and then submitted a written critique of the chatbot's response.
- An inductive process was used to identify positive and negative perceptions and themes (NVivo 14). A second investigator reviewed codes. Any discrepancies were discussed and resolved.
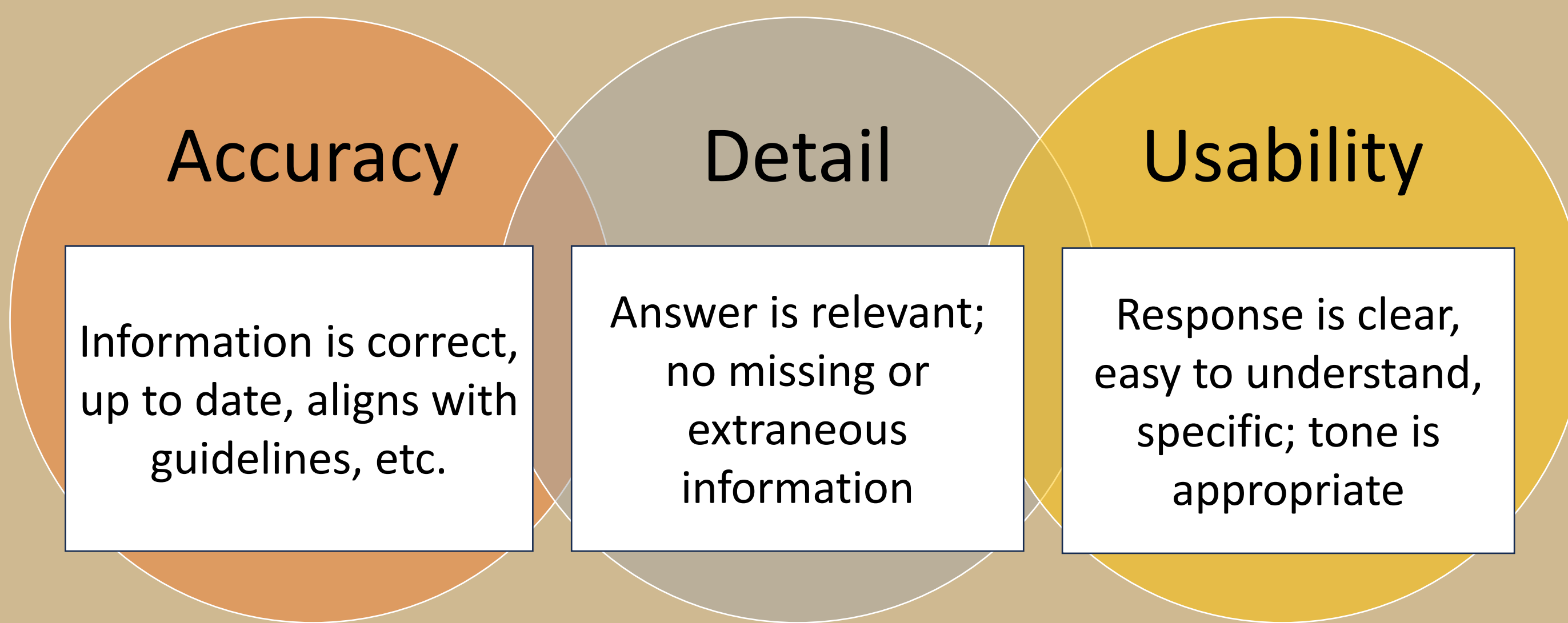

Figure 1: Key Areas of Focus for Students' Critiques

- **Accuracy:** Information is correct, up to date, aligns with guidelines, etc.
- **Detail:** Answer is relevant; no missing or extraneous information
- **Usability:** Response is clear, easy to understand, specific; tone is appropriate

Figure 2: Assignment Template Provided to Students

Results

- **17.5%** said the response was usable as is for a patient.
- **29.2%** described the tone as appropriate or professional.
- **74.5%** noted a lack of references to literature evidence.
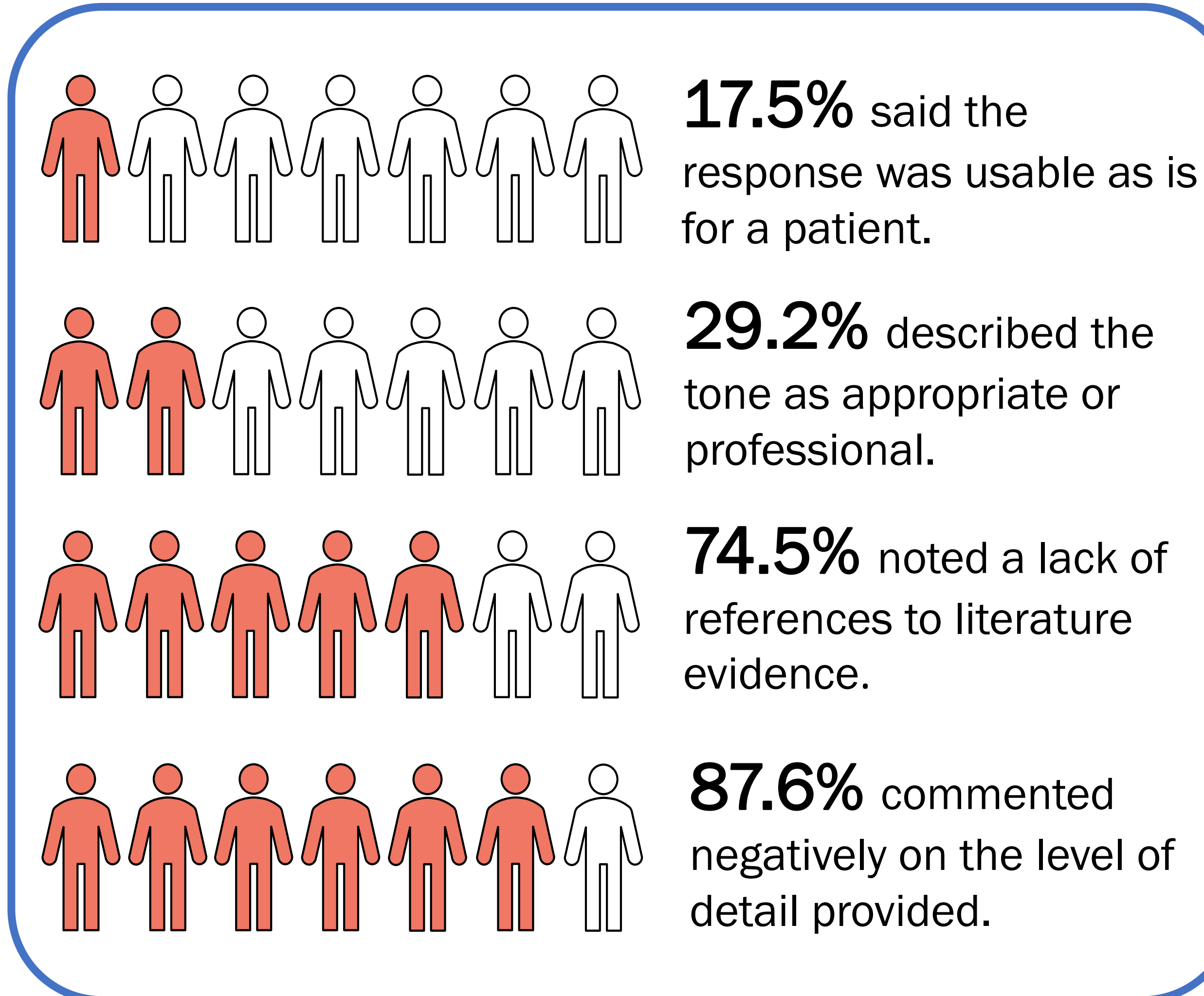- **87.6%** commented negatively on the level of detail provided.

Figure 3: Landscape of Student Perceptions (N=137)*

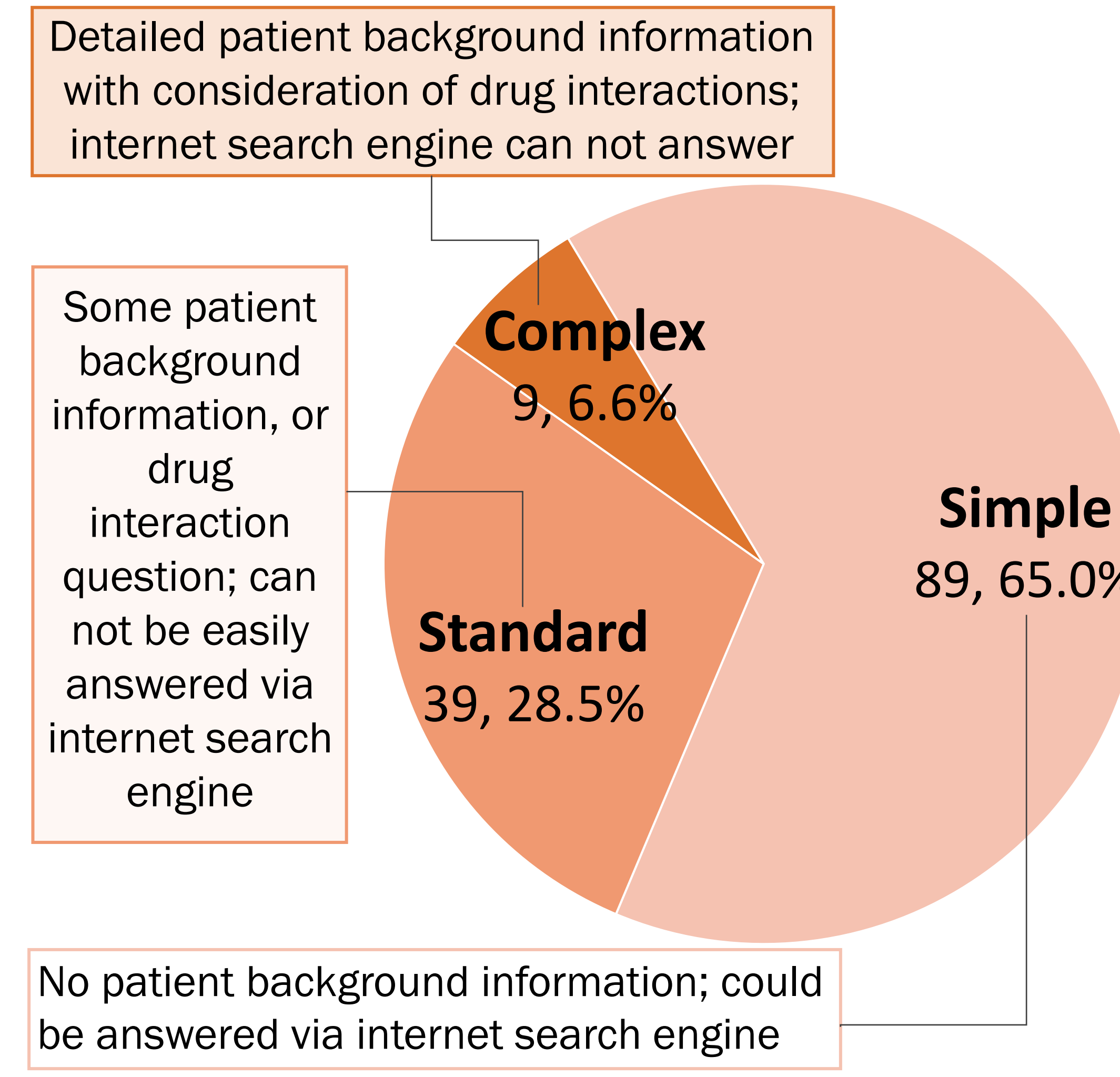*1 student did not complete the assignment according to provided instructions

- Detailed patient background information with consideration of drug interactions; internet search engine can not answer
- Some patient background information, or drug interaction question; can not be easily answered via internet search engine
- No patient background information; could be answered via internet search engine

Complex 9, 6.6%
Standard 39, 28.5%
Simple 89, 65.0%

Figure 4: Complexity of Question Entered by Students (N=137)*

Table 1: Student Perceptions Within Key Areas of Focus

Accuracy

Positive: "The accuracy of the information in the ChatBot's response did seem to hold up well with the standards we have learned and based on guidelines I searched" [Simple]
"The response that was given by ChatGPT was fairly accurate for the most part, since it was a pretty simple question" [Standard]

Negative: "The information did lose some points on being up to date. The chatbot did state that this was its knowledge of the drugs from up to September 2021. That was two years ago." [Simple]
"However, that is not to say that it is all correct, the accuracy is all over the place." [Complex]

Detail

Positive: "ChatGPT's response was more in detail than I was expecting" [Standard]
"ChatGPT provided a thorough response to the question that was asked of it" [Standard]
"The chatbot also took the current disease states of the patient into consideration and addressed the potential risks and benefits" [Complex]

Negative: "This response was not very detailed and missed a lot of key elements a pharmacist would include when speaking to a patient" [Simple]
"The potential risks weren't addressed with using these medications which could lead to some unsafe events" [Simple]
"more information than required to answer" [Standard]
"The responses might be considered somewhat broad" [Complex]

Usability

Positive: "The information was presented in a very clear and concise manner, and almost all of its language was patient friendly" [Simple]
"the AI chatbot is very quick to respond and user-friendly" [Simple]
"the understandability of the language used by ChatGPT is very patient-friendly as compared to the CDC website" [Standard]
"The response was clear and easily understandable from a patient's perspective." [Complex]

Negative: "There are large amounts of information that does not seem relevant to a patient" [Simple]
"If I were a patient without much knowledge on levofloxacin and had read ChatGPT's response, I would have contemplated taking the drug as it sounds like the risk outweighs the benefits" [Standard]
"it does use a lot of medical terms which someone without prior knowledge may struggle to understand" [Standard]
"While ChatGPT provides the correct info it is very vague and needs to be interpreted with caution if used as a tool" [Complex]

Table 2: Additional Observed Perceptions

Cannot Replace Personal Interaction	"A real health professional will be able to response with accurate information in a digestible and friendly manner which is truly irreplaceable in the world of healthcare."
More Background Information Needed	"I think in order for ChatGPT to give out the most accurate information, it should begin with asking questions to user." "I assume you would have to ask the chatbot a very detailed and specific question, which unfortunately most patients will not do unless prompted with more questions."
Training Needed	"Maybe I needed to make my question more clear and needed to indicate a time of when I picked up the medication and the chat bot would have given me a more useable answer instead of a vague one." "The response generated is a great start but training the AI to display proper tone and information takes prompt training and overall AI training."

Conclusions

- Students who submitted simple and short questions were more likely to exhibit positive views of accuracy and detail, while students who submitted complex questions more likely commented negatively in these areas. The perceived accuracy, detail, and usability varied based on the content and complexity of the question entered.
- Students demonstrated an understanding that chatbots have shortcomings in accuracy, detail, and usability, but also expressed an interest in learning more about this technology. Possible solutions identified by students to improve the chatbot's response included formal classroom training to better input a query.
- Future Directions:
  - Refine the pilot assignment to include more instruction on how and when to use chatbots
  - Support appropriate use of these rapidly developing AI tools in the field of DI

Limitations

- Represents a snapshot of student perspectives and rapidly progressing chatbot capabilities.
- Unstructured approach to qualitative data collection (self-discovery activity)

References
1. Abdel Aziz MH, Rowe C, Southwood R, Nogid A, Berman S, Gustafson K. A scoping review of artificial intelligence within pharmacy education. *Am J Pharm Educ.* 2024;88(1):100615 2. Jamal A, Solaiman M, Alhasan K, Temsah MH, Sayed G. Integrating ChatGPT in Medical Education: Adapting Curricula to Cultivate Competent Physicians for the AI Era. *Cureus.* 2023;15(8):e43036.