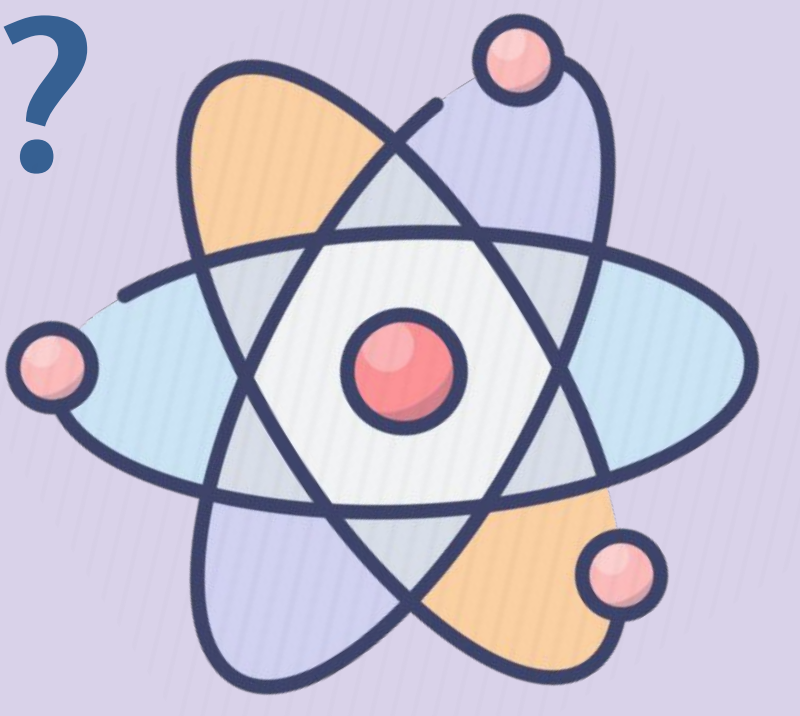


Do student and instructor questions differ between environments in Physics 11? Is the difference perceptive or reflective between the three instructional roles?



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Introduction and Research Question

Physics 11 provides three student (undergraduate and graduate level) roles to participate in course instruction. **Learning Assistants (LA)** accompany ~30 students within lecture, facilitating discussion, supporting students in class, and creating a bridge between the professor and the students. **Section Coaches (SC)** lead ~30 students during recitation, facilitating recitation, grading homework, and supporting students in a smaller problem solving space. **Lab TAs (LTA)** lead ~15 students in lab facilitating experimentation, evaluating performance, and supporting hands-on applications. Facing numerous questions during lecture, we wonder if students ask LAs a different subset of questions. Our LA work in ED-20 included examining the types of questions we ask and engage in with students. This awareness has made us curious about the types of questions students ask of each instructional role, and what questions the roles ask students. **Do the types of questions asked differ between roles and environments?** This includes exploring what students expect of each role and the questions they expect to ask and be asked. We compare this information to the questions asked of LAs during lecture, of SCs during recitation, and of LTAs during lab. We make progress in understanding the different questions asked, as well as differing perceptions of what is actually said in these spaces.

Methods for Collecting Data

We conducted an anonymous survey for all age 18+ Section 1 Physics 11 students during the last 10 minutes of lecture asking the following questions:

1. What do you think a Physics 11 LA's role is?
2. What is a question you think an LA would ask you?
3. What is a question you think you would ask an LA?
4. What do you think a Physics 11 SC's role is?
5. What is a question you think an SC would ask you?
6. What is a question you think you would ask an SC?
7. What do you think a Physics 11 LTA's role is?
8. What is a question you think an LTA would ask you?
9. What is a question you think you would ask an LTA?

We communicated that all questions were optional, the survey would not affect their grade in the course, and their responses would not be identifiable to the professor. There were a total of 83 student responses.

Transcripts / Recordings of student and role interactions were provided by 2 LAs, 2 SCs, and 2 LTAs. We informed students that recordings would be kept anonymous, all names would be recorded as pseudonyms, and that recordings would be deleted after transcripts were created. We used the six transcripts to extract the questions posed by students or a role. All other dialogue in the transcripts was deleted.

We organized this data by loading all survey responses and transcript questions into a spreadsheet. Keeping each question from the survey as a separate column, we could categorize the data.

First, we analyzed questions 1, 4, and 7 to focus specifically on student perception of what a specific instructional team role is responsible for.

Next, we analyzed the remaining questions to focus specifically on student perceptions of what they are asked, and vice versa. Due to the nature of the types of data being read, we needed to analyze both sets of data in different ways.

The data on Role Expectations needed to be sorted based on expectations, and the data on questions being asked (survey and transcript) needed to be sorted based on type of question.

Coding Definitions for Data Analysis

To maintain consistency, we created two sets of coding for analysis of the survey results and transcripts. Figure 1 shows the coding that was used to analyze student expectations of each role.

Expectation	Definition	Example
Facilitation of Discussion	Student expects Role to participate in discussions / involve all students	"To join group discussions and ask us questions to keep our discussion going."
Teach / Give info / Lecture	Student expects Role to give information about topics in lecture format / recite information	"Help reiterate or explain unfamiliar concepts of ideas that we still have questions on"
Deepen Understanding	Student expects Role to create a student led space for exploring information	"Making us consider something new"
Provide Answers	Student expects Role to give / confirm answers	"Encourage discussion and eventually give the right answer"
Miscellaneous	Anything else	

Figure 1: Role Expectation Coding

Figure 2 displays the coding used to analyze student questions to each role, as well as questions from each role to the students.

Type of Question	Definition	Example
Conceptual Question	Asking about a concept	"Can you explain this concept?"
Technical Question	Asking a specific question relating to content	"What data points are you collecting?"
Interrogative Question	Asking to understand reasoning	"What is your reasoning?"
Expanding Question	Making a connection to another topic / idea	"What if friction wasn't negligible?"
Probing Question	Figuring out where people are at (temperature check)	"Where are we?"
Miscellaneous	Anything else	

Figure 2: Type of Question Coding

Each piece of data can be coded to at least one of the codes from the respective chart. This means some responses are categorized to multiple codes.

Example 1: An LA's job is to facilitate discussions and answer questions. [We coded this to "Facilitation of Discussion" and "Provide Answers"]
Example 2: Student would ask an LA for clarification of a problem, including how to use a certain topic for that questions. We coded this to a Technical and Conceptual questions, as they are interested in a concept as well as the method to use for answering the question in that certain way.

Graph Results

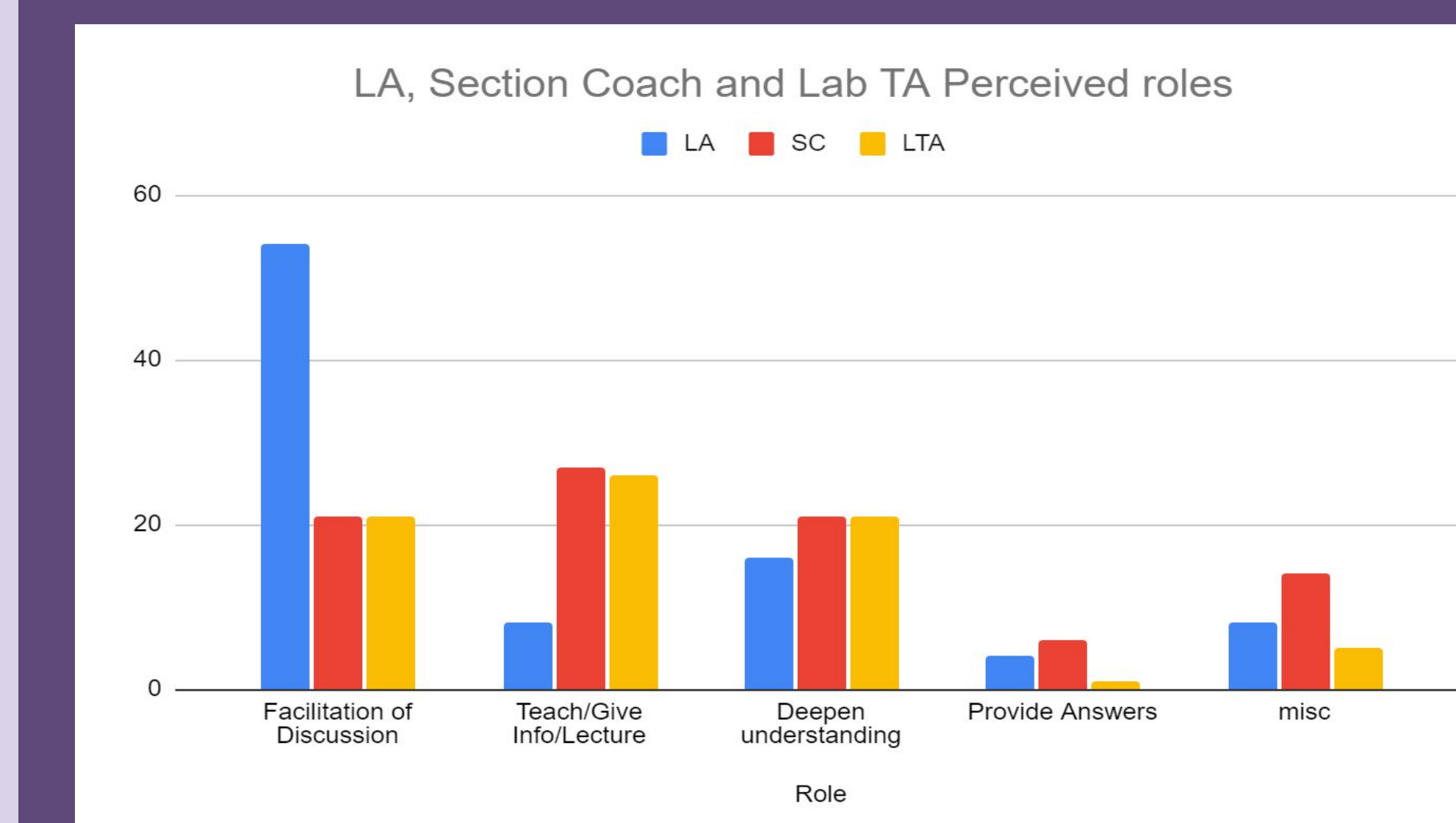


Figure 3: LA, Section Coach, and Lab TA Perceived roles

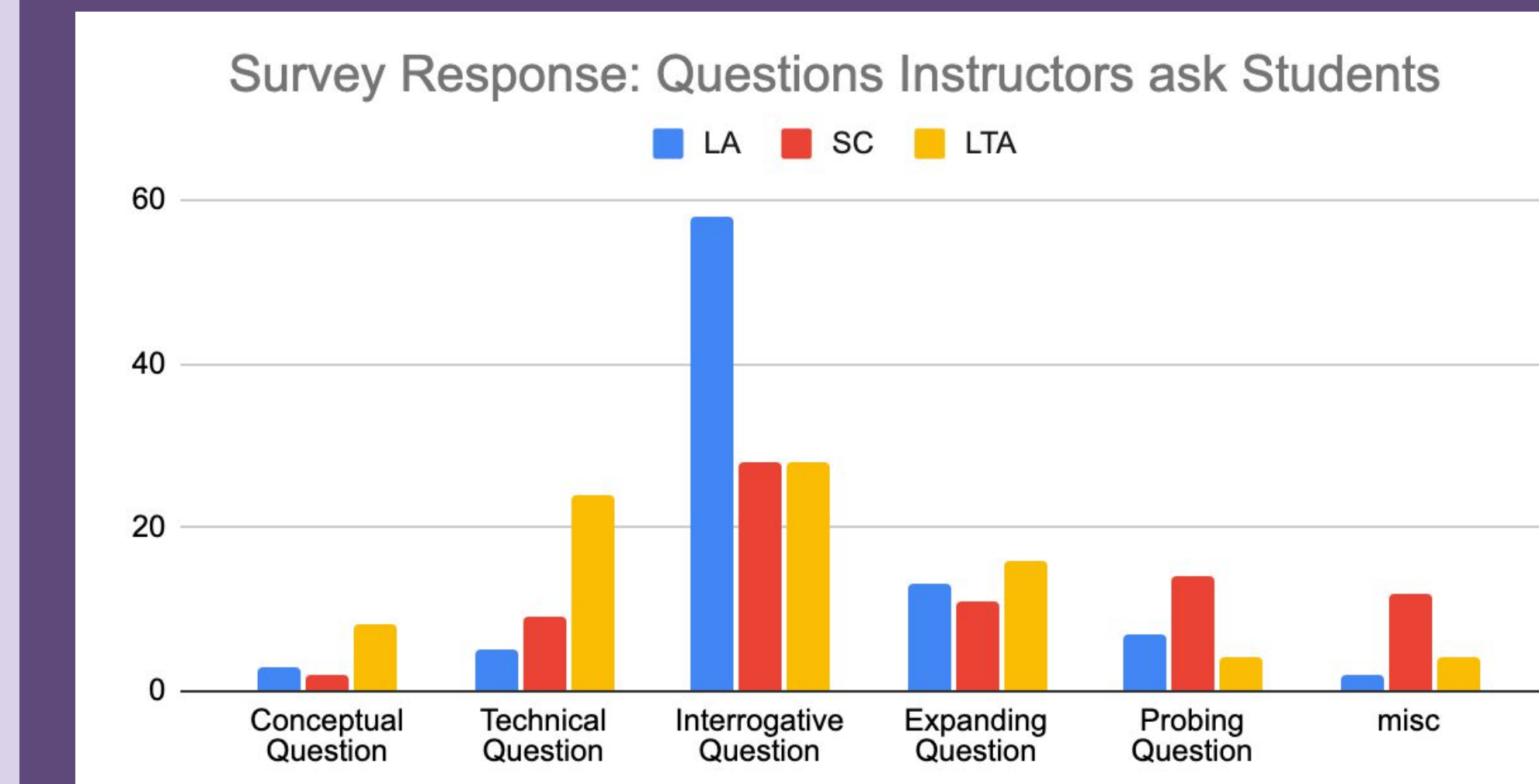


Figure 4: Questions Students say LAs, Section Coaches, and Lab TAs ask

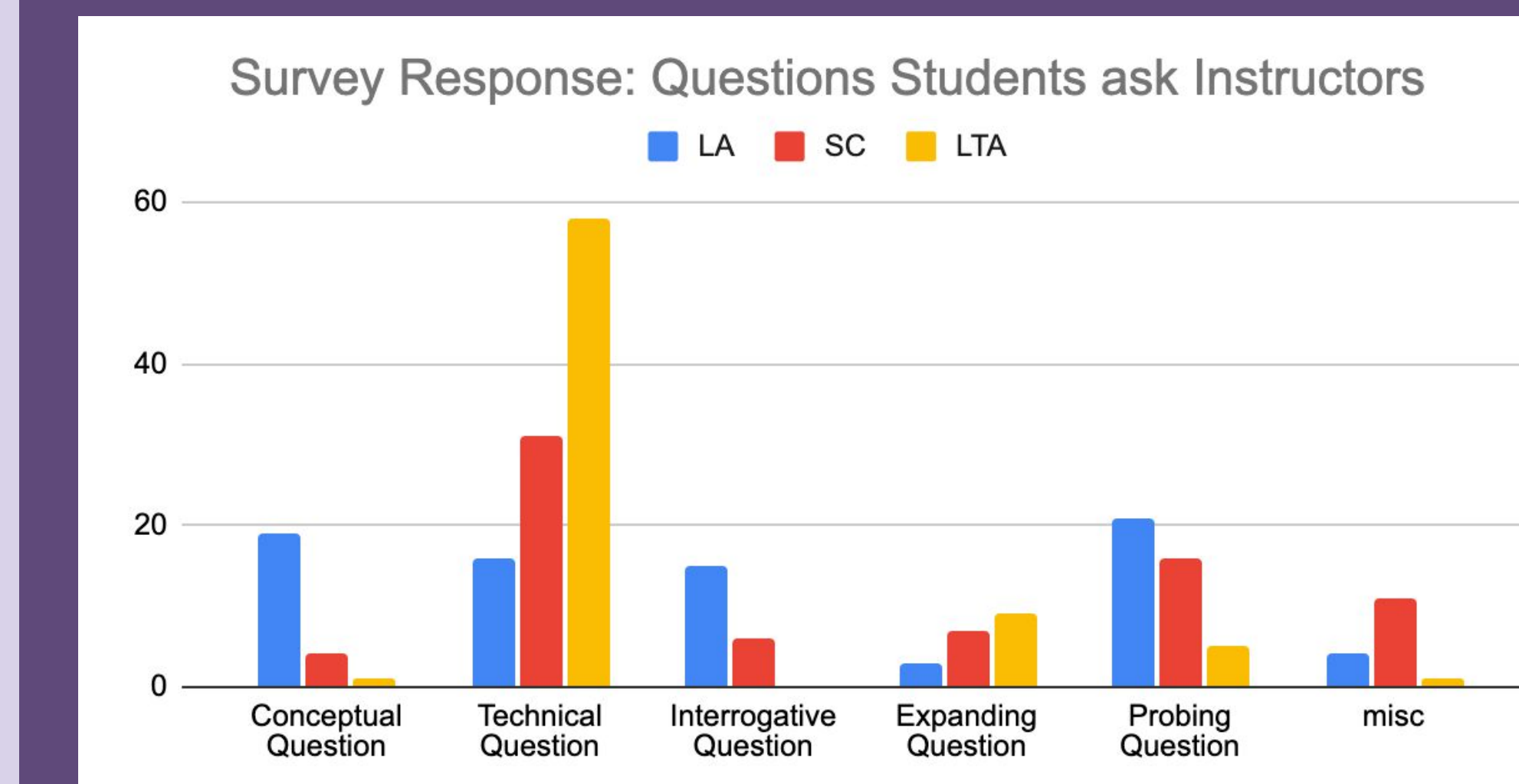


Figure 5: Questions Students say they ask LAs, Section Coaches, and Lab TAs

Conclusion

We summarize the results of our analysis below:

1. **Students perceive different instructional roles as favoring different types of questions:** LAs focus on discussion, ask questions about reasoning and answering a wide range of general questions; SCs and LTAs (viewed as more well rounded) question reasoning and answer logistical questions; LTAs respond to logistical questions.
2. **Different instructional roles actually use the same types of questions with similar frequency.**
3. The relationship between question type prevalence and impact on students needs more careful consideration. We are left to wonder: do the students have an inaccurate perception of the types of questions that are asked of them, or are some questions just more notable?
4. Our analysis, therefore, suggest that **the difference between questions asked by and to LAs, SCs, and LTAs is more reflective than perceptive.**

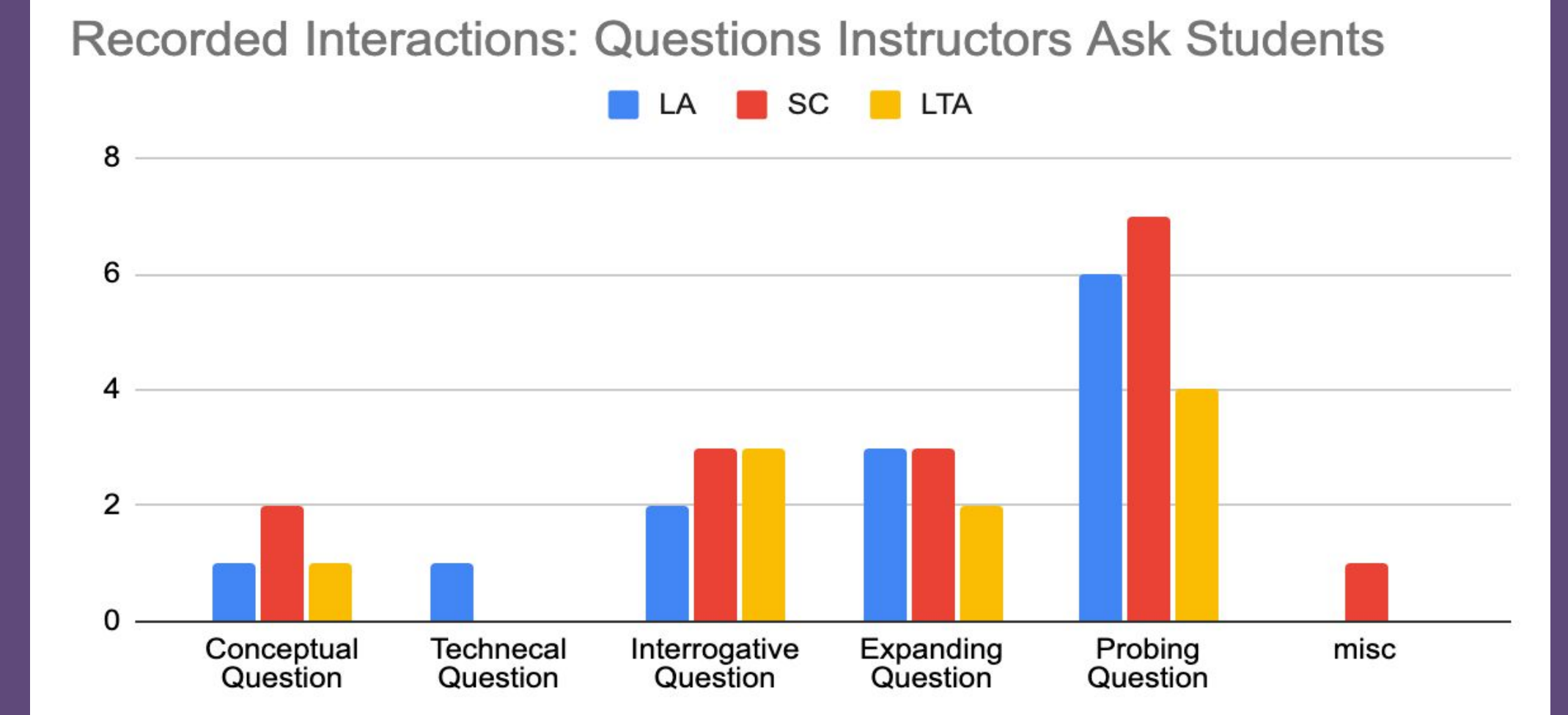


Figure 6: Questions LAs, Section Coaches, and Lab TAs ask

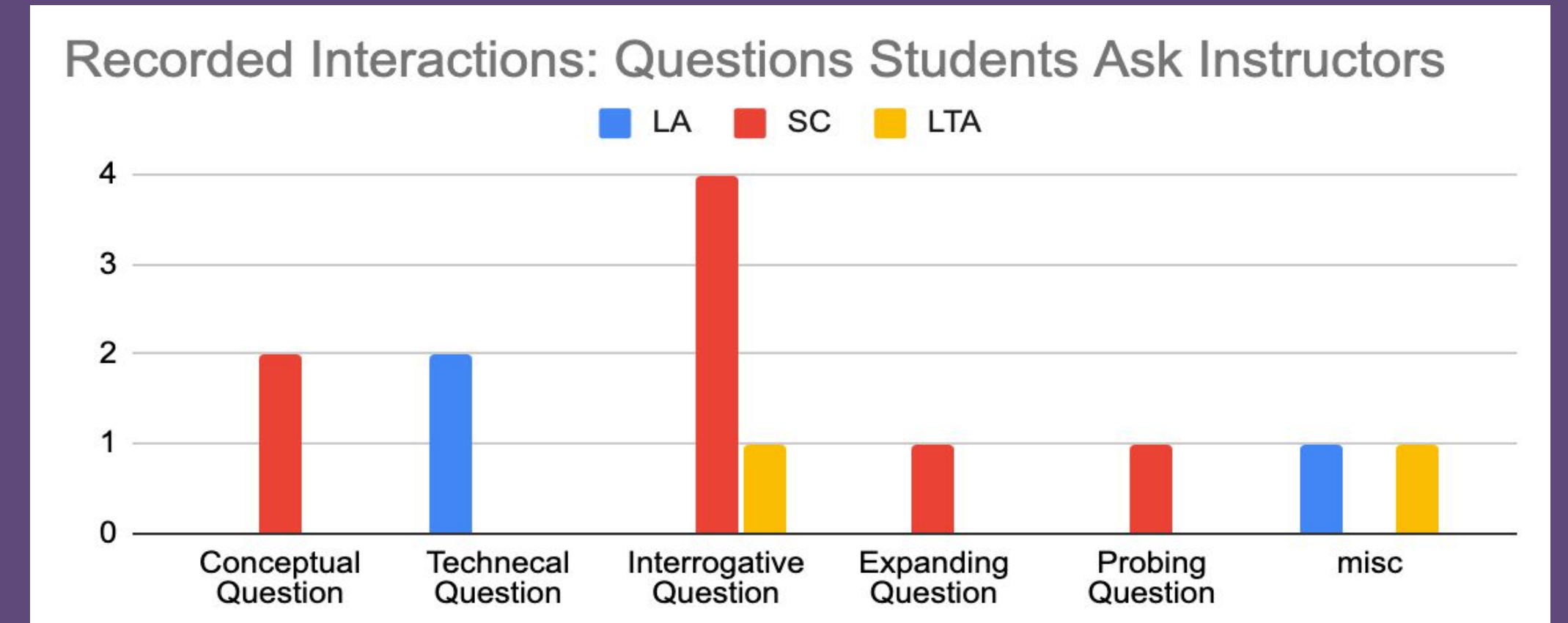


Figure 7: LA, Section Coach, and Lab TA Actual Interactions to roles

Results

Our results show interesting discrepancies between perceived and actual questions asked by and to each instructional role.

Fig. 3, shows the majority of students in the class see LAs as facilitators; they expect them to guide them during discussions and are willing to invite them into their in-class discussions. Students feel that the role of the SCs and LAs were more evenly distributed between facilitating discussions and more direct instruction.

Fig. 4 shows that students think LAs primarily ask them to explain their answers or reasoning. Students also most often think that SCs and LTAs ask about reasoning, although SCs are seen as asking more questions that gauge student confidence, prompt other lines of thought, and recall didactic information, while LTAs are seen as asking didactic questions almost as much as reasoning ones, and prompt other lines of thought more than the other options.

Fig. 5, shows that most students report asking LTAs questions about specific issues that come up in class. Most students said that they would ask SCs these same technical questions or ask about how they are doing. They report asking LAs about concepts, in-class issues, how they are doing with a problem, or about their processes of solving the questions.

Fig. 6 shows that general checking-in questions are the most prevalent across all teaching roles. The LAs in particular asked less about reasoning than student expectation data might suggest. Instead, LAs and SCs asked probing questions with the highest frequency, followed by the more actively instructional interrogative and expanding questions. In terms of content, LTAs asked notably more open-ended questions than students seemed to expect.

The data set from **Fig. 7** is so small that we agreed its findings may be unreliable—it seems that students ask questions much less frequently than instructors. In SC interactions, it did seem like these questions were more process- than answer-driven.