A Sample Tutorial Dialogue

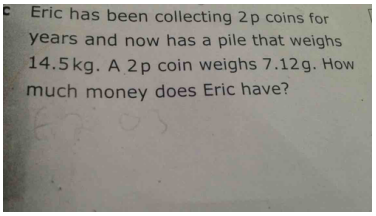

Fig. 1. The Image sent by student

Student: [Image Link] (as shown in Figure. 1)
Tutor: Hi [Anonymized], welcome!:)
Tutor: Please give me a minute to look over your problem.
Student: Ok thank you
Tutor: How much progress have you made so far? Or are you unsure of how to start?
Student: I know that I have to do 1450g divided by 7.12g but I'm a bit stuck after that
Tutor: You're nearly there! Looks like you just need some assistance with the unit conversion. I can certainly help you with that. Remember to participate as much as you can and we'll have this in no time.:)
Tutor: Tell me, how many grams are there in a kilogram?
Student: 1000
Tutor: Excellent! So, how many grams would be 14.5kgs?
Student: 14500
Tutor: Exactly! Now, you have got it right. Why do you think we would now divide 14500 by 7.12?
Student: Because one 2p coin weighs 7.12g and we want to find out how many 2p's are 14500g
Tutor: Very good! Alright, so how many 2p coins would be there?
Student: Well 14500 divided by 7.12 is 2036.52 so 2036?
Tutor: Absolutely correct! This is the number of coins that Eric would have.
Tutor: You can also find the equivalent amount of money in pounds, do you have any ideas on how we can do that?
Student: I'm not sure maybe multiplication???
Tutor: Yes, there can be multiplication. How many pounds do you think equal to 1p?
Student: Well there is 100 pennies on a pound so £20.36
Tutor: Awesome! Good job there.:)
Tutor: Thanks for participating. Is there anything else that I can help you with?
Student: Thank you for your help that's all for now but maybe later
Tutor: Sure, thanks for using our service! Have a good one.:)

B Full Dialogue Act Scheme

Table 1. The Dialogue Acts (DAs) scheme used in [32]. The column **Role** indicates whether a DA is only specific to the category of tutors (**T**), students (**S**), or both (**T&S**). The DAs were sorted based on their frequency (i.e., the column of **Freq.**) in the dataset for each role category.

Dialogue Acts (DAs)	**Role**	**Sample Utterances**	**Freq.**
General Positive Feedback	**T**	*"Well done!"*	9.46%
Information		*"The last card also has to be a 7."*	8.42%
Probing Question		*"Can you quickly simplify 6/24?"*	8.07%
Factual Question		*"How did you find an irrational number?"*	3.37%
Operational Question		*"Do you have any other questions for me?"*	3.21%
Directive		*"Take a look at what's circled in yellow."*	3.14%
Hint by Image		*[Image]*	2.34%
Reassurance		*"No problem, we will do it together."*	2.26%
Elaborated Positive Feedback		"Yep, 5 is right!"	2.08%
Lukewarm Feedback		*"You are almost there!"*	1.49%
Evaluation Question		*"Does that make sense?"*	1.44%
Negative Feedback		*"Hmmm, not quite."*	1.42%
Open Question		*"What is the next step?"*	0.97%
Ready Question		*"Ready for the Question 18?"*	0.09%
Confirmation Question	**S**	*"So that'd be 5?"*	4.93%
Request Feedback by Image		*[Image]*	4.34%
Understanding		*"Oh, I get it"*	1.46%
Direction Question		*"Okay what do we do next?"*	1.20%
Information Question		*"Isn't there a formula to find the nth term?"*	1.06%
Not Understanding		*"I don't know."*	0.24%
Ready Answer		*"Yep, ready to go."*	0.07%
Acknowledge	**T&S**	*"Ok!"*	7.15%
Yes-No Answer		*"No, I don't have any progress"*	6.02%
Extra Domain Other		*"Ok, I'll load again."*	5.94%
WH Answer		*"The 4 point questions"*	5.92%
Observation		*"We initially had these 5 terms."*	4.36%
Greeting		*"Hello!"*	3.54%
Explanation		*"That's what we've been doing"*	3.16%
Extra Domain Question		*"Did you cover this in your class?"*	1.20%
Correction		*"Oops sorry 100 degrees"*	0.85%
Extra Domain Answer		*"I don't know how the payments work."*	0.75%

[32] Vail, A.K., & Boyer, K.E.: Identifying effective moves in tutoring: On the refinement of dialogue act annotation schemes. In: International conference on intelligent tutoring systems. pp. 199-209. Springer (2014)

C Distribution of Sample Informativeness

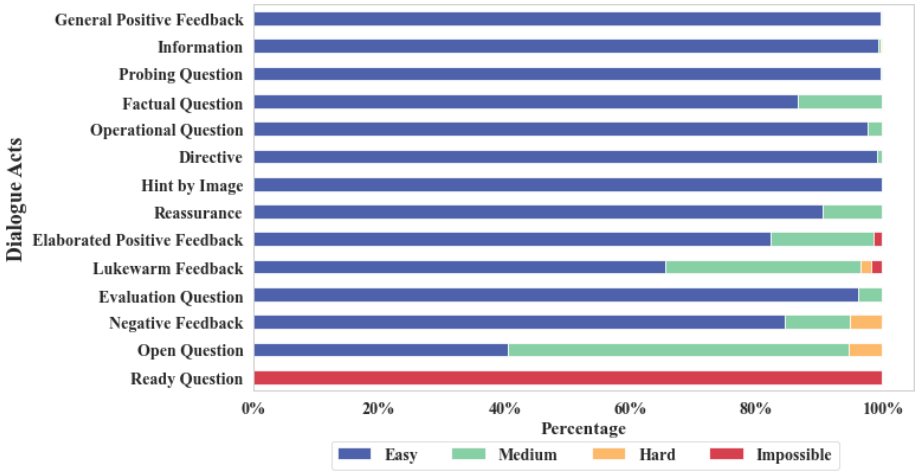

Fig. 2. Distribution of informativeness level for each sample **(Tutor)**

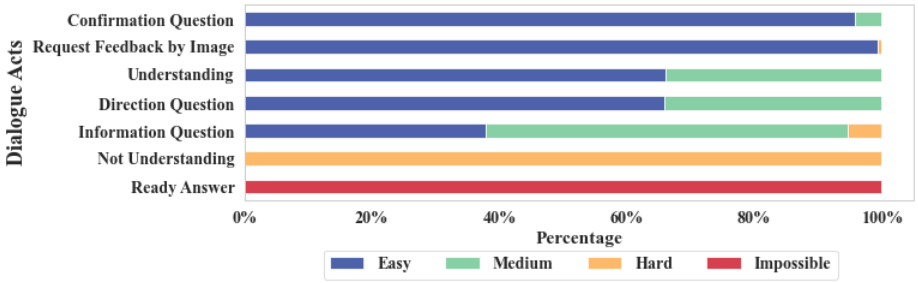

Fig. 3. Distribution of informativeness level for each sample **(Student)**

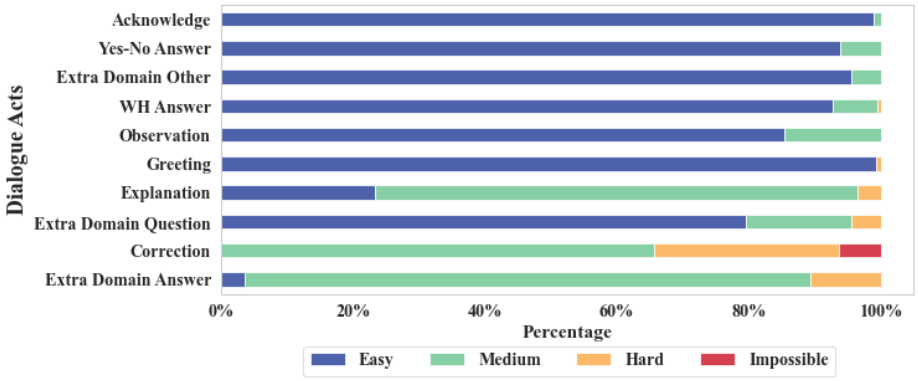

Fig. 4. Distribution of informativeness level for each sample **(Both)**

D F1 Score for each Dialogue Act in Sampling Process

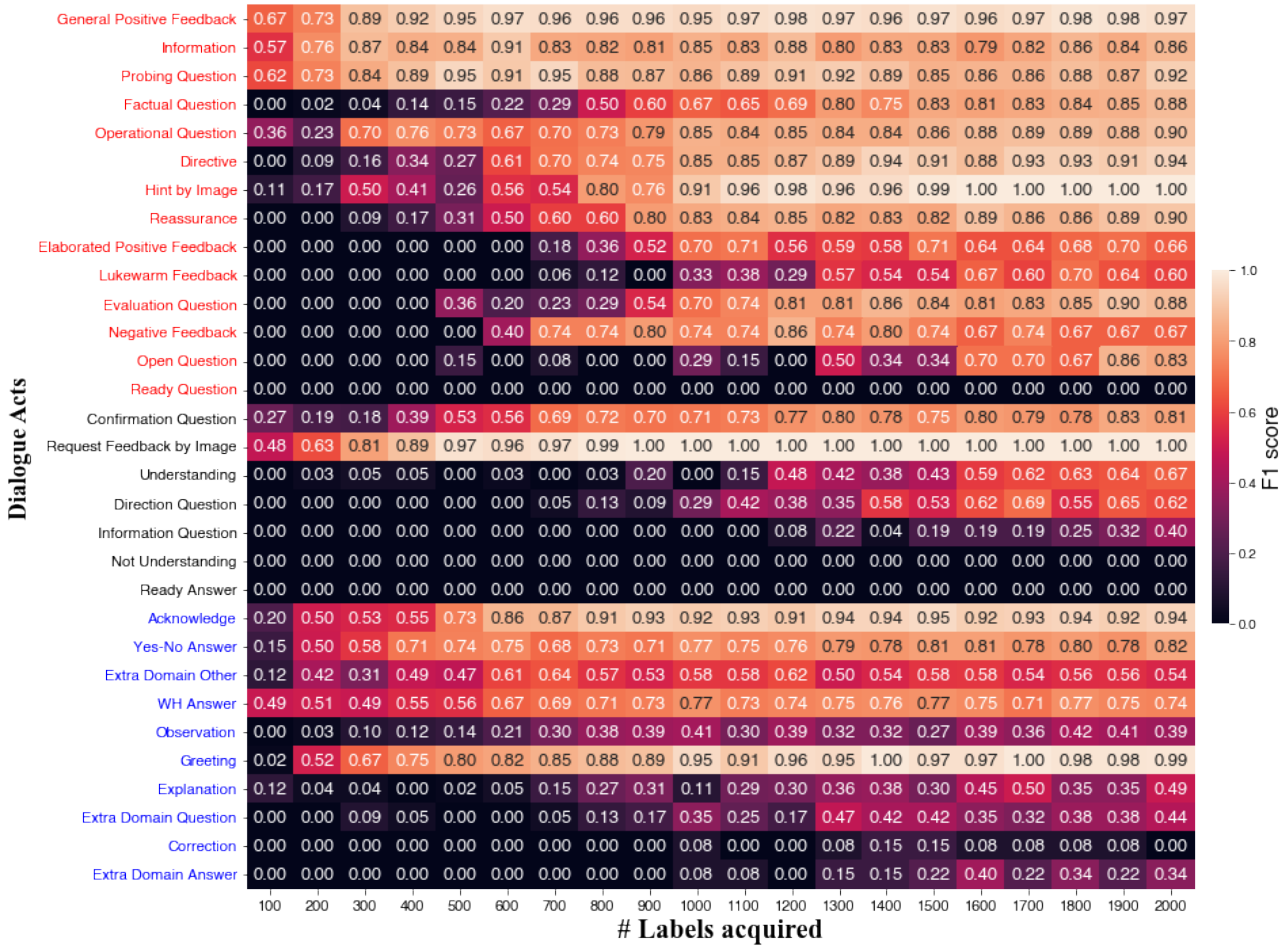

Fig. 5. F1 score for each dialogue act by using **Random** sampling method. The dialogue act (DA) labels on the y-axis were highlighted in red for tutor's DA, black for students' DA, and blue for the DAs shared between tutors and students.

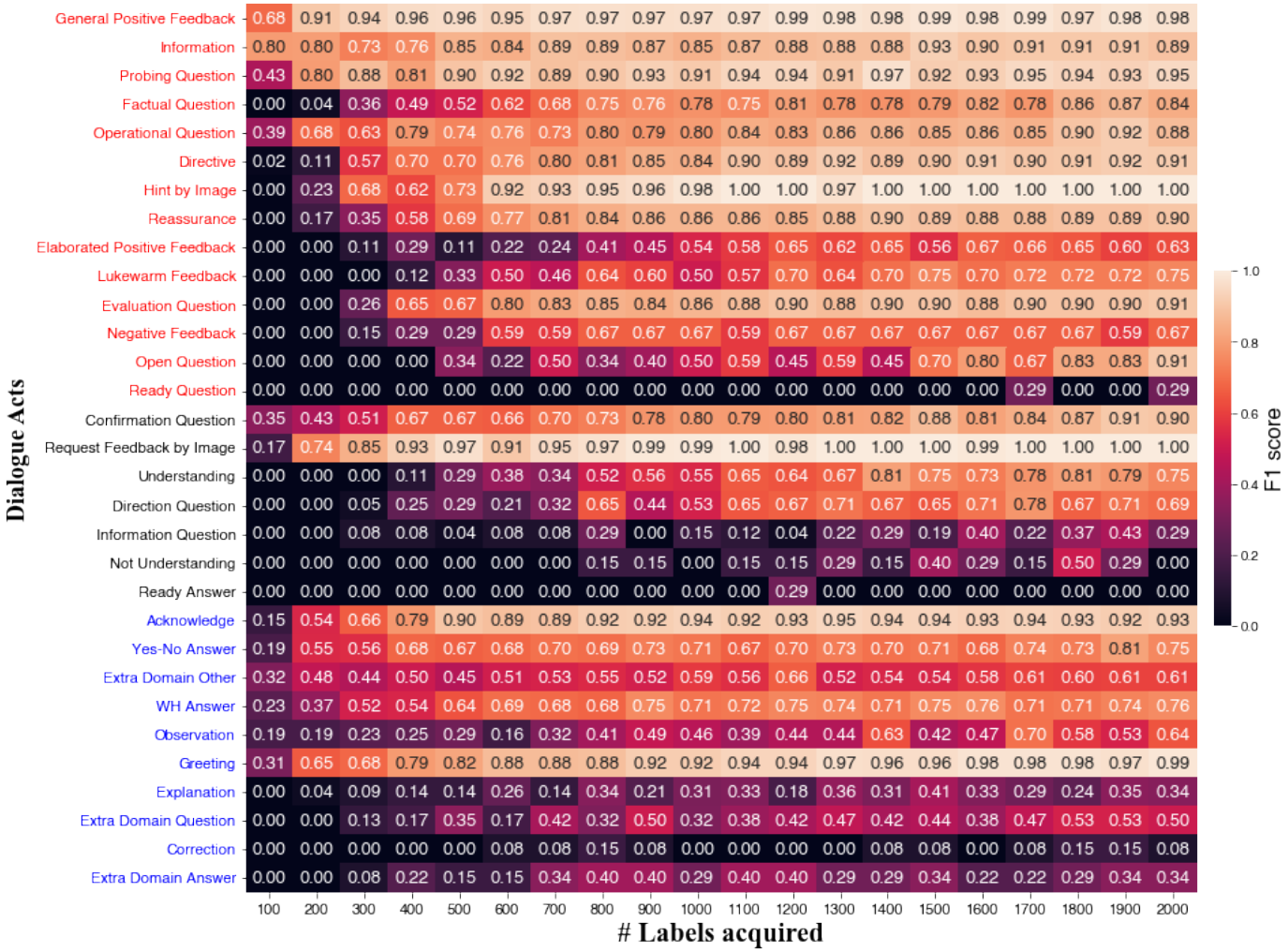

Fig. 6. F1 score for each dialogue act by using **CoreMSE**. The dialogue act (DA) labels on the y-axis were highlighted in red for tutor's DA, black for students' DA, and blue for the DAs shared between tutors and students.

E Sampling Frequency for each Dialogue Act

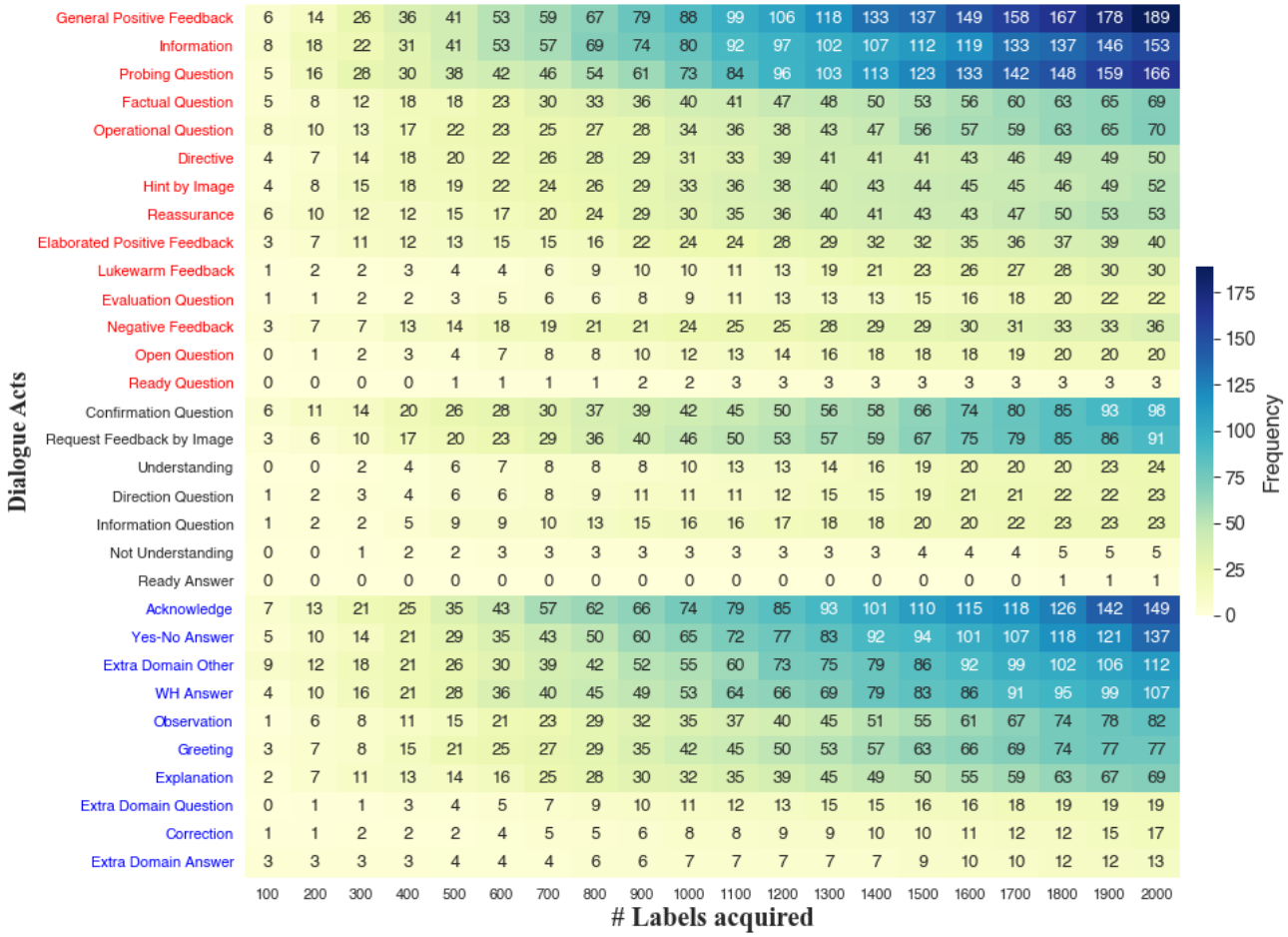

Fig. 7. The sampling frequency for each dialogue act by using **Random** method. The dialogue act (DA) labels on the y-axis were highlighted in red for tutor's DA, black for students' DA, and blue for the DAs shared between tutors and students.

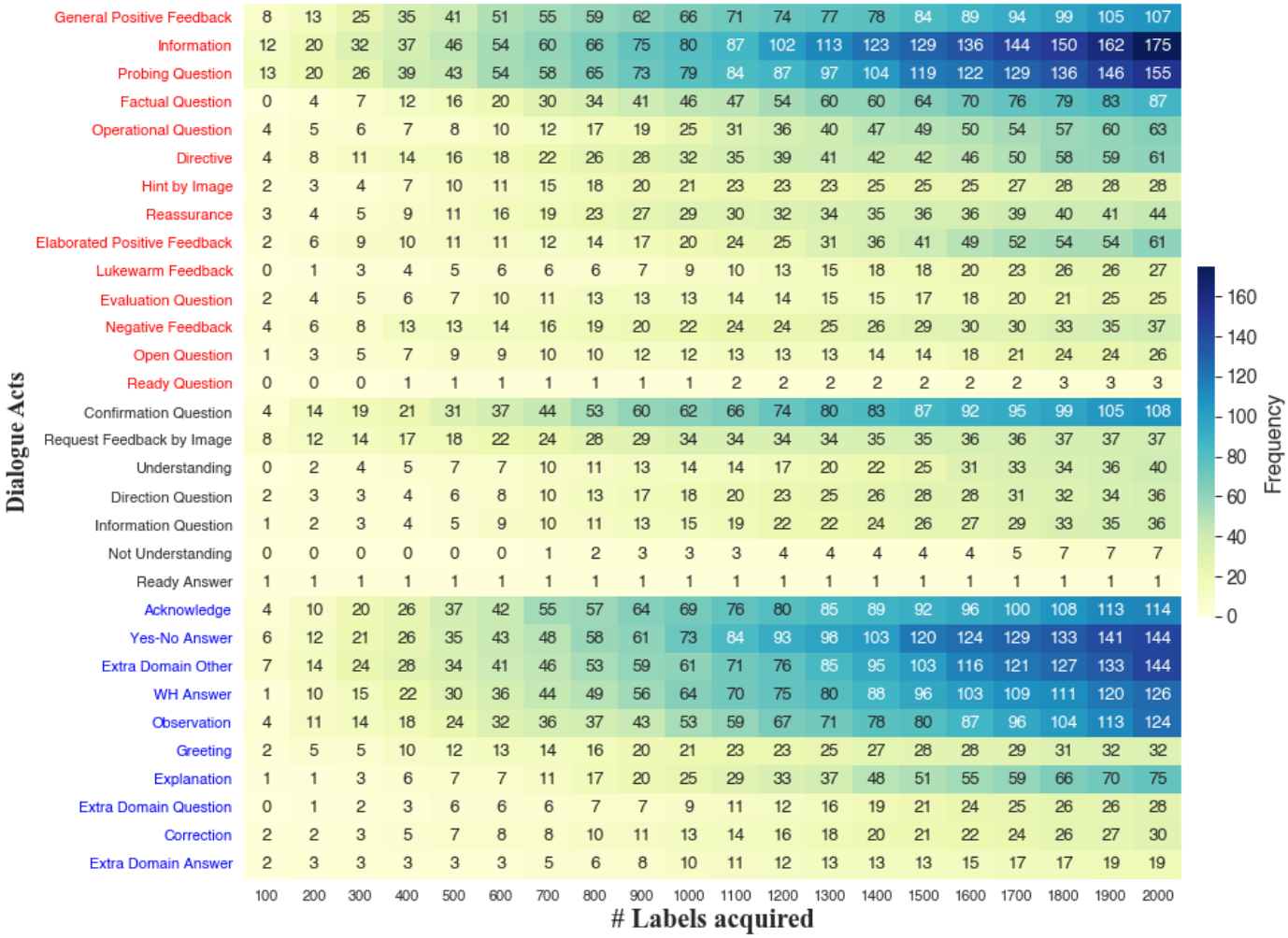

Fig. 8. The sampling frequency for each dialogue act by using **CoreMSE** method. The dialogue act (DA) labels on the y-axis were highlighted in red for tutor's DA, black for students' DA, and blue for the DAs shared between tutors and students.