

Chatbot Use in Science Learning: Insights from Czech Upper-Secondary Schools

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Research interest:

What are upper secondary students' experiences with chatbots in science education?

Research questions

RQ1: How common and frequent is the use of chatbots among students, and how is it influenced by their gender and their expected future need of knowledge in science subjects?

RQ2: For what purposes do students use chatbots in science subjects?

RQ3: Do students prefer their mother tongue (Czech in our case) or English when using chatbots?

Data collection

- **When and where**

- September 2023 - February 2024
- During physics-experimental activities for upper secondary students

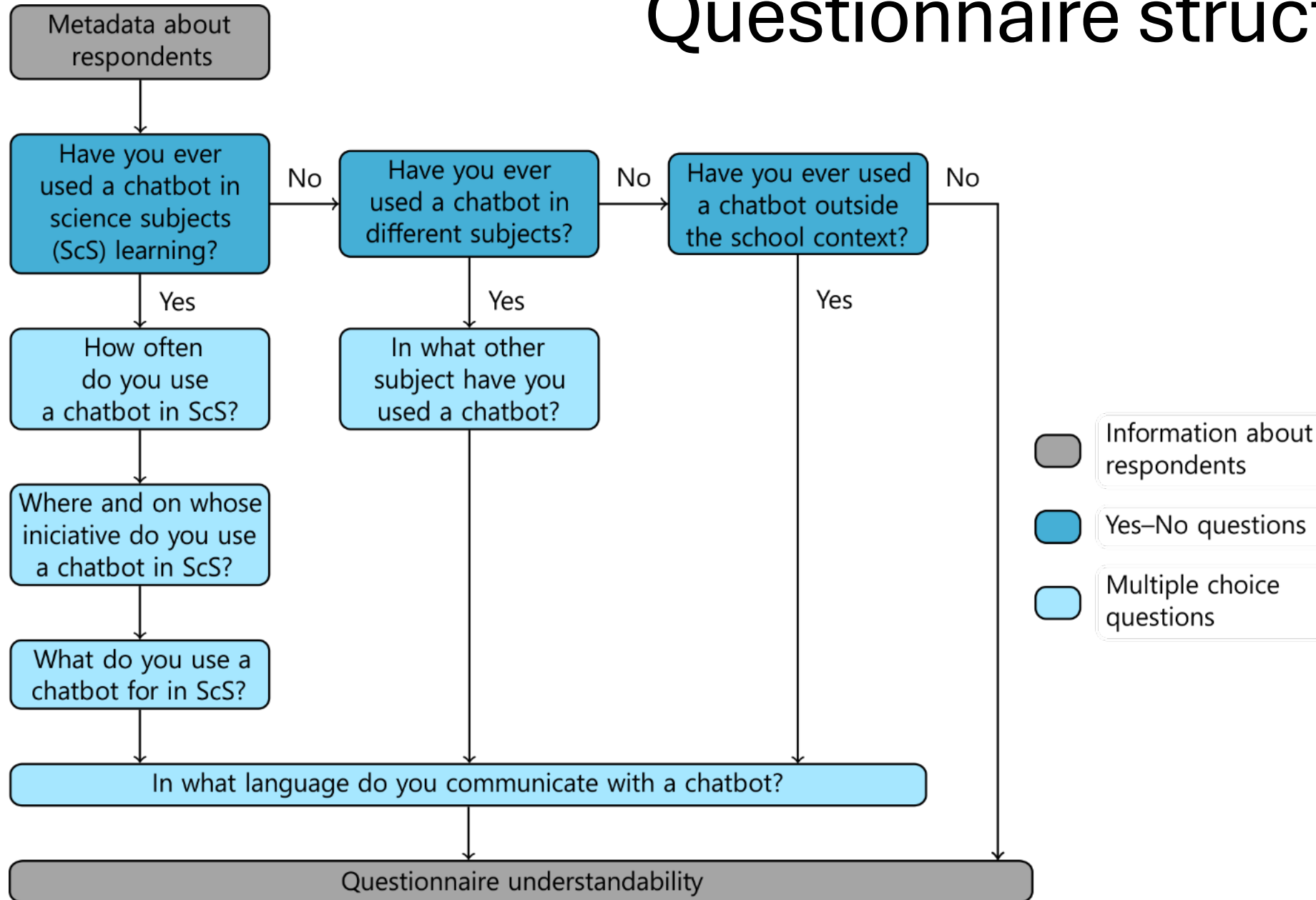
- **Research participants**

- Upper secondary students ($N = 1,175$; cleaned $N = 1,120$)
- Mostly from Prague schools with active physics teachers

- **Online questionnaire**

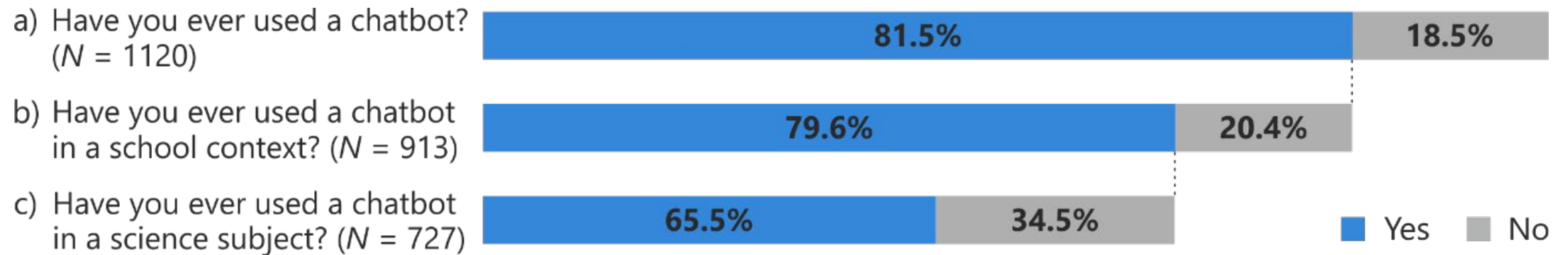
- Access via QR code on own devices
- Take less than 5 minutes

Questionnaire structure



Selected results I

RQ1: *How common and frequent is the use of chatbots among students ...*



476 students:

- 36.1 % less than once a month
- 41.8 % once or twice a month
- 17.4 % once or twice a week
- 4.6 % almost every day

Selected results I

RQ1: ... and how is it influenced by their gender ...

respondent group	gender		χ^2	V	D (%) [95% CI (%)]
	girls	boys			
respondents who have indicated gender (N = 1,062)	600	462			
respondents who have ever used a chatbot (N = 864)	453	411	31.18*	0.17	-0.14
<i>share of those who have indicated gender (%)</i>	75.5	89.0			[-0.18, -0.09]
respondents who have ever used a chatbot in a school context (N = 687)	346	341	5.74*	0.08	-0.07
<i>share of those who have ever used a chatbot (%)</i>	76.4	83.0			[-0.12, -0.01]
respondents who have ever used a chatbot in a science subject (N = 452)	212	240	6.33*	0.10	-0.09
<i>share of those who have ever used a chatbot in a school context (%)</i>	61.3	70.4			[-0.16, -0.02]

* = difference significant at $p < 0.05$

Selected results I

RQ1: ... and their expected future need of knowledge in science subjects?

respondent group	expected need of knowledge in science subjects		χ^2	V	D (%) [95% CI (%)]
	yes	no			
respondents who have declared their expected future need of knowledge in science subjects ($N = 916$)	560	356			
respondents who have ever used a chatbot ($N = 756$)	462	294			0.00
<i>share of those who have declared their expected future need of knowledge in science subjects (%)</i>	82.5	82.6	0.00	0.00	[-0.05; 0.05]
respondents who have ever used a chatbot in a school context ($N = 611$)	366	245			-0.04
<i>share of those who have ever used a chatbot (%)</i>	79.2	83.3	1.96	0.05	[-0.10, 0.02]
respondents who have ever used a chatbot in a science subject ($N = 395$)	254	141			0.12
<i>share of those who have ever used a chatbot in a school context (%)</i>	69.4	57.6	9.01*	0.12	[0.04, 0.20]

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Selected results I

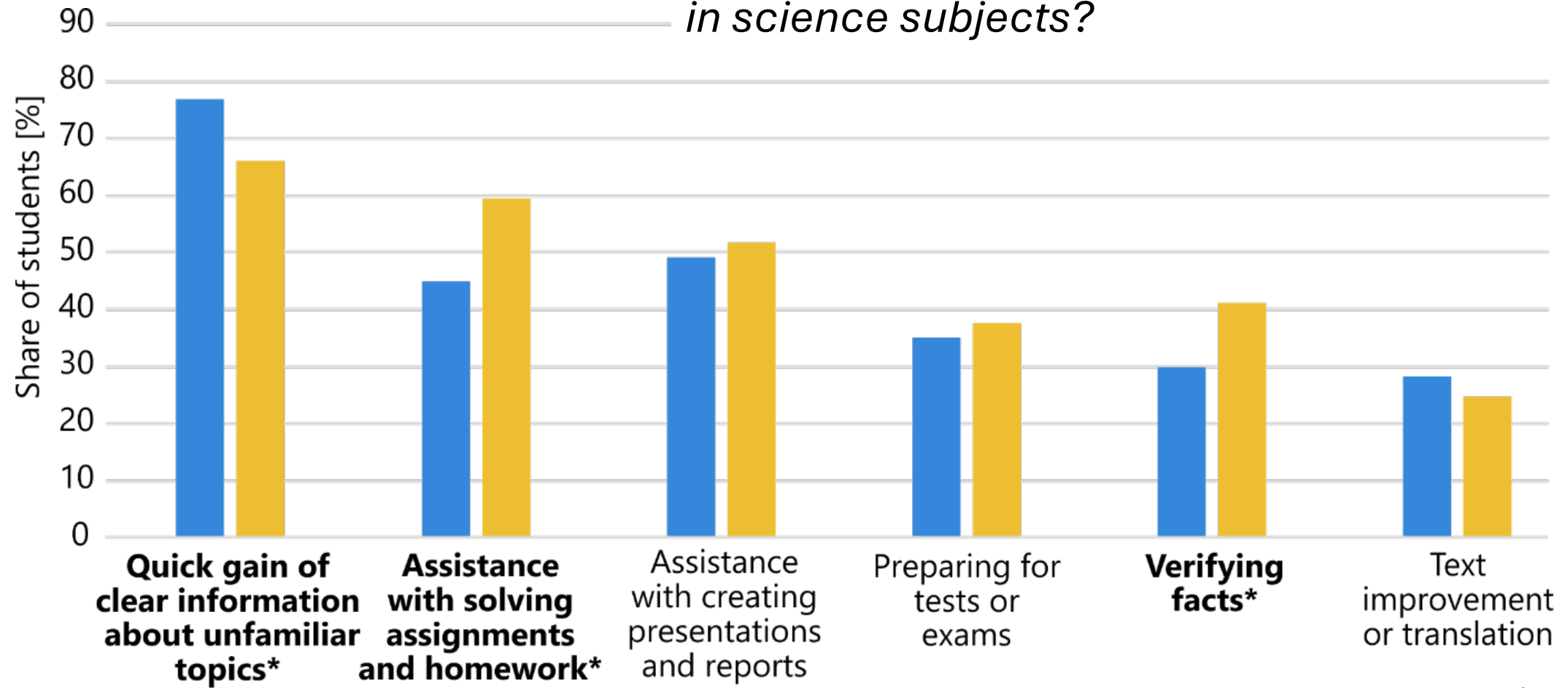
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Selected results II

RQ2: *For what purposes do students use chatbots in science subjects?*



■ Expect to need knowledge in science subjects in the future (N = 254)
■ Do not expect to need knowledge in science subjects in the future (N = 141)



* = difference significant at $p < 0.05$

Selected results III

RQ3: *Do students prefer their mother tongue (Czech) or English when using chatbots?*

- 913 students answered
 - **51.1 %** Czech + English
 - **27.7 %** English only
 - **17.7 %** Czech only

Summary I

- Almost **80% of students** have some experience with chatbots
 - In science education: only **42.5%** of students, and **fewer than one in four** of them use chatbots **regularly** for this purpose
 - Data: Sept 2023 – Feb 2024  likely higher now
- **Boys > Girls** in chatbot use
 - Across all contexts;
 - Statistically significant, but small
 - **! Working with chatbots may contribute to widening gender gaps**
- Future need for science knowledge  more frequent chatbot use in science subjects

Summary II

- Students use chatbots **mainly for quick information**
 - ➔ May indicate a shift from Google/Wikipedia
- Students not expecting future need for science use them more for homework & fact-checking
 - ! These students may be less skilled in science and more prone to misinformation
- **Many students use chatbots in English**
 - ➔ Opportunity to link language and subject learning

Thank you for your attention

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