

Quantum physics in the past, present and future of Finnish university students

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Abstract. Quantum boom has brought quantum physics to everyday life, e.g., to movies or newspaper articles. But do Finnish university students with different majors notice it? Here, we explore their perceptions about the presence of quantum physics in their lives (past), its importance (present), and a possible interest to study it (future). We find that noticing the word “quantum” in their free time and considering quantum physics being relevant to society and everyday life is independent of study major. In addition, if study credits can be provided, students express interest in studying different topics related to QP.

Introduction

Quantum physics (QP) is becoming a worldwide boom driven by quantum technology development and media. This boom can be seen as a great benefit for the society, but it can also conceal a potential danger (“quantum hype”) if people are unaware of what QP is really about. One can hear the word “quantum” while watching a movie or even to find a product in a supermarket making use of quantum hype. But do Finnish university students with different majors notice these mentions of “quantum” in their surroundings, do they feel that QP is relevant to them, and would they be interested in knowing more about QP? Here, we explore the perceptions of Finnish university students with different majors about the presence of QP in their lives (past), its importance (present), and a possible interest to study QP topics (future). All students either have no or a narrow background in QP from high school and university.

Research

Our research questions are

1. Where do Finnish university students notice the presence of QP in their life?
2. In which ways do they perceive QP as being relevant?
3. How much are they interested in studying QP topics?

To address these questions, we collected questionnaire responses from 270 Finnish university students (122 men, 133 women, 8 others, 7 declined to respond), 50% of which are studying STEM and 50% non-STEM fields. Most of them study at the University of Turku (201 students), others at the University of Helsinki, the University of Jyväskylä, and Aalto University.

Methods

The questionnaire was designed by the authors to discuss contexts in which students have come across QP, their perceptions of QP’s relevance, and their interest to study QP. We also collected information about the students’ backgrounds, including their studies before the university and self-assessed knowledge of QP. The questionnaire had open, multiple-choice, and single-choice items.

We report here some of the descriptives from the questionnaire items and the results of the emergent thematic coding of the open-ended items.

Findings

Independent of study majors, university students had noticed the word “quantum” in pop culture (43%), during their free time (39%), for example while reading books or watching YouTube, and in their surroundings (26%), like news and conversations. “Quantum” was also noticed in studies or work by 46% of the students, 2/3 of whom studied STEM-related subjects. In addition, even 84% of all students have either heard about QP but didn’t know much about it (45%) or had got to know QP a little bit (39%).

The majority of university students considered QP to be relevant or almost relevant for the future of society (94%) and their everyday life (85%), but over 60% of them saw QP as mainly irrelevant to their studies and future work. Nevertheless, they expressed moderate interest in studying topics related to QP, especially about its relevance to society and possible connections of QP to their study fields (see Fig.1), if such studies would fit into their curricula and students would get study credits. Students would prefer to study the topics from Fig.1 either in a shorter intensive course or a full-length course via videos, podcasts, and online platforms. In addition, approximately half of the students would like to have textbooks or lecture notes, and educational games as a part of QP teaching.

Conclusions

The quantum boom is indeed visible for Finnish university students in their studies and work, especially for STEM students. They also notice QP in pop culture, during their free time and in their surroundings. Almost all students consider QP to be relevant to the future of society and their everyday life, but not that relevant for their studies and future work. This captures the absence of QP in present curricula in different study fields and also the well-known attitude that QP is “important, but not for me” (1-3). Considering the future, however, students express quite satisfactory interest in studying different topics related to QP, if study credits can be provided.

These findings not only indicate an urgent need to educate all university students with basic knowledge of QP, but they also uncover the willingness and readiness of students to learn about QP. The results of our study can help Finnish quantum educators to create good QP teaching modules taking into account what contents students want to learn and how. However, we need to find ways to naturally fit these contents into the already overloaded schedules of students, without adding extra pressure, but rather triggering and maintaining interest towards QP.

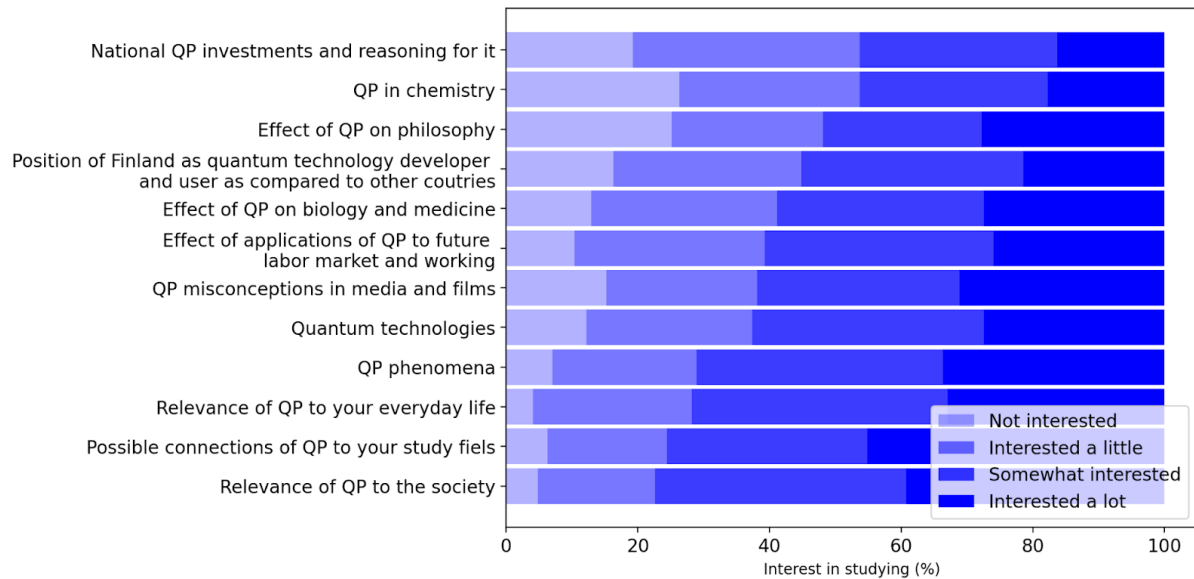


Fig. 1. Responses to the question “How much are you interested to study the following subjects?”.

References

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