

## Can we just learn: Re-examining pedagogical changes and the implications for teaching and learning

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### INTRODUCTION & AIM

Promoting inquiry learning can develop science education and contribute to individual development and learning outcomes (Öztürk et al., 2022). Paunova-Hubenova et al (2025) conclude that schools need more integrated learning resources and additional qualifications by teachers to apply STEM methods effectively in Bulgarian schools. This may require collective effort and changes in pedagogy to develop science education. However, Koleva (2011) argues that improving scientific literacy and key competences of students in natural sciences especially chemistry is an objective in Bulgarian school education. Therefore, exploring the challenges faced by schools such as curriculum and assessments requires pedagogical shifts to promote inquiry learning. This study compared various teaching methods employed in secondary schools in Bulgaria and its impact on inquiry learning.

#### Research questions:

- What are students' perceptions of the teaching methods used by teachers and its impact on inquiry learning?
- What factors hinder the effective promotion of inquiry learning in schools?

### METHOD

This mixed-method study is underpinned by a constructivist learning theory. The theory relates to the social construction of knowledge. Participants included 79 secondary school students and 12 science teachers.

Data was collected through interviews, questionnaires and lesson observations. Interview questions for teachers aimed at their views on changes to teaching pedagogies, professional development they have engaged with, technology use and interests of students in science. While students' questionnaires explored their views on approaches to learning science, behaviors and attitudes and opportunities for investigations.

The qualitative data was analyzed using thematic and content analyses, while the quantitative data involved correlation analysis. Thematic analysis involved familiarization with the data, generating initial codes and searching for and reviewing themes (Braun & Clarke, 2006). While the content analysis helped to generate the frequencies of occurrences of special codes that relates to the research questions. The three researchers went through the data and themes generated rigorously as critical companions to ensure its validity and reliability and areas not agreed were discussed. For this conference, we will present findings from the qualitative data analysis and only the preliminary outcomes from the quantitative data analysis.

### RESULTS & DISCUSSION

Findings from the thematic analysis included themes such as digitalization of education and online learning; teachers' pedagogical knowledge in promoting student-led learning; professional development for teachers and a lack of resources for practical work. From the themes generated, teacher pedagogical knowledge in promoting student-led learning had a frequency of 83 (37.2%) indicating this to be an area that teachers would require support with. This is followed by professional development support for teachers with a score of 63 (28.3%).

These findings have serious implications for pedagogical approaches, especially considering how to promote student-led learning, an area of professional development support among teachers. This was evidenced by rote learning involving memorization as opposed to giving students ownership of their learning that can promote self-regulation. The lack of resources as reported in most cases, hindered student-led inquiry learning as they were unable to carry out investigations because these were conducted as demonstrations by teachers with students watching. Digitalization and online learning involved activities such as researching, simulations and using interactive and multimedia means to promote learning. Teachers found this useful, however, with varied experiences as some preferred doing life practical sessions rather than using technology to replace real-life experience for students.

A preliminary analysis of the quantitative data shows that traditional modes of teaching such as relying on textbooks persist without marked impact on learning, and practical work was teacher led and inconsistent due to lack of resources and laboratories that can accommodate all students. Teachers resorted to using simulations and other interactive means rather than real practical work.

### CONCLUSION

Outcome from the study shows that students' perceptions of teaching method did not give them autonomy over their learning as it was teacher-led. This can be a barrier to promoting inquiry learning in addition to other factors highlighted, such as teacher-led experiments and a lack of professional development support. We suggested the use of micro-scale practical to improve inquiry learning, especially in chemistry.

### FUTURE WORK / REFERENCES

Future research could focus on alternative approaches to promoting student-led inquiry learning and teacher development.

#### References

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