Journal of the Institute for Educational Research
Volume 55 • Number 1 • June 2023 • 5–32
UDC 37.091.12:005.963(497.11)"2013/2019"

ISSN 0579-6431
ISSN 1820-9270 (Online)
https://doi.org/10.2298/ZIPI2301005S
Original research paper

A PHENOMENOLOGICAL ANALYSIS OF TEACHER EXPERIENCES DURING PROFESSIONAL LEARNING ON THE IMPLEMENTATION OF THE QUESTION FORMULATION TECHNIQUE*

Nada Ševa** and **Ivana Đerić**
Institute for Educational Research, Belgrade, Serbia

Only my ability to ask questions limits my knowledge.
Miroslav Antić, Serbian poet

ABSTRACT

In this study, through an in-depth analysis of teachers' reflections, we examined how personal and professional beliefs influenced school-based professional learning during teachers' experimentation with the Question Formulation Technique – QFT[1]. Semi-structured interviews were conducted with two primary school teachers taught Mathematics and Geography. Two meta-themes emerged from the interpretative phenomenological analysis: Traditional Teachers That Focus on the Atmosphere and Quality of Motivation and Engagement During Question Formulation Technique Implementation. Teachers' condensed experiences were shaped by their personal and professional beliefs and values. This determined the quality and type of motivation and behaviour during school-based professional learning. Teachers emphasized that students were more behaviourally, cognitively, and socio-emotionally engaged. The functions of the QFT in Mathematics and Geography classes were considerably fulfilled, mostly in creating a classroom atmosphere where asking questions was valued.

Key words:
the theory of self-determination, motivation, autonomy, question quality, focus creation.

* *Note.* This research was funded by the Ministry of Science, Technological Development, and Innovation of the Republic of Serbia (Contract No. 451-03-47/2023-01/ 200018).

** E-mail: nadaseva@gmail.com

[1] Creative Commons license: *Source: The Question Formulation Technique (QFT) was created by the Right Question Institute* (rightquestion.org)

INTRODUCTION

The importance of school-based professional learning has been well-established in educational literature for more than two decades (Kwakman, 2003). It aims at modifying teachers' practice by helping teachers discover, explore, and reflexively learn through their own experience (Koellner *et al.*, 2023; Džinović, 2016). In this type of learning, a supportive professional environment is essential (Ryan & Deci, 2017).

In the context of school-based Professional learning, teachers also consider the introduction of innovative methods and techniques as well as the modification of established assessment practices. However, there is a need for more qualitative studies focused on in-depth explorations of teachers' experimentation with different instructional practices within experiential, reflexive, and cooperative professional learning activities at school. The significance of this type of qualitative research lies in offering an insight into the context and quality of school-based professional learning and providing a counterbalance to an increasing number of studies exclusively focusing on the datafication (quantification) of the learning process (Guihen, 2020; Stevenson, 2017).

In this study, we conducted an in-depth analysis of teachers' reflections to determine how personal and professional beliefs and values shaped school-based professional learning. The Question Formulation Technique – QFT (Rothstein & Santana, 2011)[2], presented in this paper, was applied in the classroom by Mathematics and Geography teachers.

Questioning Practice in Teaching

Questioning is one of the basic techniques teachers use in class to improve learning, encourage student participation, and support critical thinking (Hill, 2016). Numerous studies have shown that teaching practice is dominated by questioning that activates lower cognitive levels, aimed at recognizing and remembering previously covered content (Dillon, 1998; Paramore, 2017; Phillips & Duke, 2001; Sellappah *et al.*, 1998; Wragg & Brown, 2001). It has been noted that students ask questions the same way that teachers formulate questions in their mutual interactions (Almeida & Neri de Souza, 2010; Chin & Kayalvizhi, 2002). Likewise, findings suggest that students pose higher cognitive level questions only when encouraged by the teacher (e.g., questions that encourage students to evaluate and synthesize information; Degener & Berne, 2016; Jiang, 2020). Hence, teachers' questions become a means of controlling the process of learning and discipline and the engagement of different students and they should be aimed at deepening knowledge, modelling questioning skills, and creating

2 A detailed description of the technique is provided in Appendix 1.

an atmosphere in which posing questions is valued in itself (Hayes, 2002; Roehrig & Luft, 2004; Stokhof *et al*., 2017).

Therefore, it is necessary to understand better the way teachers and students develop competencies that enable them to pose higher cognitive order questions in order to encourage inquiry-based learning, foster personal meaning, and develop a sense of ownership and autonomy in relation to the questions they pose and decide on (Ryan & Deci, 2017). The following is an overview of the latest information on teachers' professional learning in the domain of questioning.

Teachers' Professional Learning on Questioning in Teaching

When it comes to teachers' professional learning programs focusing on the practice of questioning in teaching, two theoretical positions have emerged in the literature: 1) "teaching how to ask questions' and 2) "asking questions to learn" (Stokhof *et al*., 2017). According to these authors, in the first approach, teachers are trained to apply different methods, techniques, and materials for improving questions in their practice and eliciting student questions from the perspective of scheme theory, action theory, and metacognitive theory (Janssen, 2002). Thus far, research in this field has focused on how to help teachers and students ask quality questions in class (Capps, Crawford, & Constas, 2012).

The second approach relates to training teachers to encourage the development of an inquisitive attitude in students and nurture their personal meanings and a sense of ownership over the questions they pose. The aim is to change their mindset and lead them to see posing questions as valuable. The inspiration for this approach lies in the theory of self-determination (Ryan & Deci, 2000, 2002, 2017) and the sociolinguistic perspective (Carlsen, 1991). An overview of 51 studies on teachers' professional learning highlighted that teachers can adopt an autonomy-supportive teaching style (Reeve & Cheon, 2021), which includes letting students ask questions to learn. According to the theory of self-determination, teachers who adopt this pedagogical approach actively encourage students' initiative, support their perspectives and affinities and allow them to give suggestions in class. By supporting autonomy, teachers improve students' autonomous motivation, fostering their agency and engagement. This, in turn, supports students' autonomy even more (Reeve & Shin, 2019; Reeve, Cheon & Yu, 2020; Reeve & Cheon, 2021). This nature of student-teacher relations is dialectic, in the sense that student questioning transforms teacher behaviour, in the same way, teacher behaviour effects changes in the quality and quantity of student engagement (Reeve, 2013).

Additionally, research has shown that school-based professional learning is shaped by teachers' personal beliefs and values (e.g., openness to new experiences and cooperativeness, self-confidence, self-efficacy, and a sense of fulfilment, Kwakman,

2003; Reeve & Cheon, 2021, Stokhof *et al*., 2017), along with teachers' theories regarding their profession and their professional role (Voet & De Wever, 2019). Likewise emphasized in the literature is the significance of a supportive environment for teachers' professional learning, in which all of their basic psychological needs are fulfilled, including autonomy, competency, and relatedness (Koestner & Losier, 2002; Ryan & Deci, 2000, 2017). Sprott (2019) also found that during professional learning, teachers preferred reflection with colleagues and other experts by building a relationship in which they shared their ideas, difficulties, and questions, which is in line with double-loop professional learning (Argyris & Schön, 1978). In other words, professional changes result from inquiry-based, experiential, and reflexive learning, with the support of facilitators who use questions to encourage teachers' reflexivity. In this process, teachers can experience different types of motivation during professional learning – from amotivation to intrinsic motivation (Chiu *et al*., 2021; de Wal *et al*., 2014; Ryan & Deci, 2000, 2017). Kwakman (2003) empirically demonstrated that of all the aforementioned factors, the personal dimension most greatly affected the quality of school-based professional learning. Due to Kwakman's (2003) correlational design, it was unclear how the isolated factors in the professional learning process interacted with one another and whether the intensity of their influences changed. This research aimed to illuminate some of the characteristics of dynamic relationships between factors that affect school-based professional learning.

METHOD

Research Context

The research was conducted at a primary school in Belgrade that participated in the scientific project[3]. The project was realized in two cycles. The first cycle encompassed the school years of 2013/2014 and 2014/2015, while the second cycle was organized during the final phase of the project, in the school year of 2018/2019. The final phase focused on the sustainability of the pedagogical approach to teaching and school practices adopted by the participating school (Šefer, 2018). More precisely, the sustainability phase involved the organization of professional facilitatory meetings that allowed for the provision of expert support to teachers for the purpose of innovating teaching practices, while simultaneously collecting research data. The facilitation process was voluntary and participatory on the part of teachers.

[3] The project (No. 179034): *From encouraging initiative, cooperation and creativity in education to new roles and identities in society* funded by the Ministry of Science, Technological Development, and Innovation of the Republic of Serbia in the period of 2011–2019.

Both the facilitatory practice and the research took place in March 2019[4]. The authors of the paper played a dual role. They acted as facilitators in professional learning meetings with teachers at the participatory school, while also being researchers in the research process. This approach is in line with recent trends in school functioning improvement through professional learning programs involving researchers contributing to teachers' professional learning (Postholm, 2018).

Teachers from the participating school who volunteered for the research were asked to choose one of the pre-defined topics: cooperative work, open-ended activities, play, critical dialogue, inquiry-based teaching/learning, and student projects. They expressed an interest in professional learning in inquiry-based teaching. The facilitation process encompassed several elements crucial to inquiry-based teaching: 1) research question/problem formulation skills; 2) (self-)evaluation and monitoring skills in inquiry-based teaching; 3) time-management skills in inquiry-based teaching. Descriptions and analyses of professional meetings focusing on the formulation of research question/problem are presented in this paper.

During the first professional meeting, researchers and teachers agreed upon the purpose, content, and mode of realization of facilitatory and research processes. During the second professional meeting, researchers organized a workshop aimed at helping teachers formulate questions that promote inquiry-based learning among students. This was the first time the Question Formulation Technique (QFT) was introduced to educational community in Serbia. This technique was selected as a true representative of the "asking questions to learn" paradigm[5]. Teachers were introduced to the clearly defined structure of the technique, which directly encourages teachers to support their students' autonomy. This was accompanied by an analysis of a video clip on the implementation of this instructional technique in class. Teachers were also given additional materials (a presentation with instructions) to help them prepare for the QFT implementation in their teaching practice. Facilitators also provided feedback on teachers' plans for lessons using the QFT.

---

[4] Researchers had extensive experience in facilitator roles. One of the researchers entered the process of facilitation with prior theoretical and empirical knowledge about the significance of practitioners' professional learning in small groups and the necessity of reflexive practice during professional learning and teaching practice innovation at the participating school (Džinović & Đerić, 2012; Đerić, Malinić & Šefer, 2017). Both researchers had valuable theoretical, empirical, and practical knowledge in the field of project-based and inquiry--based teaching (Đerić, Malinić & Đević, 2021; Malinić, Stanišić & Đerić, 2021; Ševa & Đerić, 2019). The second researcher previously participated in the realization of teacher professional development programs and had useful theoretical and practical knowledge in the field of learning through play, divergent thinking, and inquiry-based learning. Although researchers were familiar with the pedagogical literature about the QFT, they lacked practical experience with it.

[5] The technique has been included in the professional development program organized by National Geographic: *Teaching Students to ASK Their Own Geo-Inquiry Questions*. More information about this program is available at: https://www.nationalgeographic.org/education/professional-development/courses/

Facilitators observed lessons in which teachers applied the QFT and took informal notes. The purpose of the observation was not to collect data but for facilitators to prepare for the third professional meeting in which they would discuss the implementation of the QFT in class. During this reflexive meeting, participants exchanged their impressions about the lesson, described their experiences, and discussed the didactic and methodical aspects of the applied technique. In this study, we analysed the conversation during the third professional meeting.

Aim of the Study

The aim of this exploratory research was to gain a deeper understanding of teachers' personal and professional beliefs and values that shape the experience of professional learning through the implementation of the QFT in Mathematics and Geography teaching.

Participants

Two subject teachers (Mathematics and Geography) participated in the study. The number of participants was limited by the context of the realization of the final phase of the project focusing on the sustainability of the professional learning program, along with the size of the school, the number of newly employed teachers (who did not participate in previous phases of the project), and teachers' interest in professional learning in the domain of inquiry-based learning. Two teachers, Andrea and Barbara, are profiled in the following paragraphs[6].

Andrea, *the Mathematics teacher*, taught seventh-grade and eighth-grade Mathematics at the participating school. She graduated from the Faculty of Mathematics at the University of Belgrade, had 15 years of professional experience, and taught in both rural and urban schools. She strived to popularize Mathematics by organizing sections and working on a mathematical newspaper at the participating school. As a teacher, she actively cooperated with the Centre for Science Promotion.

Andrea used the QFT in two seventh-grade Mathematics classes. The initial agreement with researchers/facilitators was to apply the technique in only one class. Andrea independently decided to use the technique again, in another class during the same day. In both classes, she covered the unit of Adopting the Concepts of Inscribed and Central Angles of a Circle and Their Mutual Relations utilizing the QFT. In the first class, the introductory segment involved presenting the focus in the form of an image featuring three circles without marks for angles. This focus was

[6] Teachers' real names are replaced with pseudonyms in the paper.

meant to encourage students to think and produce questions during the instructional technique implementation.

Barbara, *the Geography teacher,* graduated from the Faculty of Geography at the University of Belgrade and had 2.5 years of teaching experience. She taught 5th-8th grades at the participating school. She described herself as a teacher who encouraged students to participate in geography competitions.

Barbara used the QFT in one seventh-grade class, covering the unit on the Physical Features of Central America. In the introductory part of the lesson, she presented the focus in the form of a map of Central America. This inspired students to cognitively engage and produce questions (Appendix 2, Figure 2).

Data Gathering

Because this was an exploratory and phenomenological study, data was gathered through interviews. The third professional learning meeting included semi-structured interviews with teachers. Each teacher interview lasted 45 minutes. A transcript of recorded conversations served as the sample in this study.

The semi-structured interviews focused on teachers' cognitive, emotional, and motivational impressions as they applied QFT during professional learning. Discussions addressed specific aspects of using QFT in teaching (e.g., understanding the procedure during the use of the technique, student engagement, focus creation, and types of questions students produced). In addition, emotional experiences and teachers' motivation were considered during the implementation of the technique.

Data Analysis Method

A method of interpretative phenomenological analysis (IPA) was chosen in this study as a suitable approach for describing teachers' authentic experiences and impressions during professional learning on the implementation of the QFT (idiographic approach) and the significance of this experience for their teaching practice (integrative approach) (Smith, 2017; Smith, Flowers & Larkin, 2009; Smith & Osborn, 2003). The contribution of this research lies in expanding the corpus of research applying the IPA method to the analysis of experiences during the teaching process and during teacher professional development(Emery & Anderman, 2020; Felstead & Springett, 2016; Gauntlett *et al*., 2017; Guihen, 2020; Hooper, Potts & Walton, 2022; Tallman, 2019).

Both researchers analysed transcripts of semi-structured interviews in accordance with the IPA protocol (Smith & Osborn, 2003; Smith, Flowers & Larkin, 2009; Smith, 2017). Inductive coding was applied to both transcripts to determine differences and similarities in participants' experiences during the implementation

of the QFT. This coding strategy has been recommended for IPA studies on small samples (Smith & Osborn, 2003). The first phase of inductive analysis involved independently reading the text multiple times and taking free-form and associative notes. The second phase focused on independently identifying and naming codes that emerged from the transcribed text. In these descriptive phases, researchers strived to exclude the interpretive approach from the coding process, which was ensured by writing notes in brackets (memo technique, Creswell & Poth, 2016). During the coding process, researchers independently defined codes that represented participants' raw experiences. The final codes were agreed upon by researchers after this phase. In the third phase, researchers defined categories and their interrelations. Using the abstraction strategy, they combined categories with similar meanings into higher-order themes (Vilig, 2016). The following phase involved the integration of individual case themes into a list of major and common topics that reflected the experience of the participant group as a whole. In this phase, researchers jointly established analytical and theoretical links between the identified themes, with some themes being grouped together and others constituting superordinate concepts (Smith & Osborn, 2003).

RESULTS

The data analysis yielded two meta-themes: 1) *Traditional Teacher Who Focuses on the Atmosphere* and 2) *Quality of Motivation and Engagement During Question Formulation Technique Implementation*.

I Traditional Teacher Who Focuses on the Atmosphere

The first meta-theme, Traditional Teacher Who Focuses on the Atmosphere (Radišić & Baucal, 2015), pertained to teachers' professional beliefs and values that illustrated their attitudes towards teaching, learning, and students in regular classes as well as in the domain of the implementation of the QFT. The isolated profile described teachers who focus on the realization of highly structured activities in class and prioritize knowledge transfer and students' successful reproduction of the content, while also paying attention to the atmosphere in class (Radišić & Baucal, 2015). Table 1 features themes and categories from teachers' statements that illustrate this meta-theme.

Table 1: The contents of the meta-theme of traditional teacher who focuses on the atmosphere

Theme 1: Military structure (Teacher Andrea)	Theme 2: Repetition is the mother of learning (Teacher Barbara)
• Balance Between Strictness and Fairness	• Covering a Lesson Using Questions Is Not a Lecture to Students
• Need for a Clear Structure	• Fast and Efficient Teacher
• Chaotic Nature of Group Work	
• Experiential Learning	

Andrea preferred frontal instruction because it allowed her to control the learning process more easily (category: Balance Between Strictness and Fairness). She was aware of the need to establish good interpersonal relationships with students and create a supportive classroom climate in order for students to engage in the learning process. She achieved this by being open to students' opinions and problems and occasionally engaging in spontaneous conversations with them based on their interests and needs. Instead of remaining at her desk or in front of the blackboard, she moved through the classroom to discuss the content with students, but unidirectionally, through questions from teacher and answers from students. She expressed the need to establish a balance between strictness and fairness in her expectations from students in terms of their knowledge and behaviour.

> *So, unless our communication is good and they know they should not be afraid of us, but there is something that still needs to be done, then they will do what we ask of them. As they say, strict but fair, is the best solution, to which most of us aspire.*

The absence of control was unacceptable to Andrea during the implementation of the instructional technique, since she had a strong need for these lessons to be strictly and clearly structured as well (category: Need for a Clear Structure).

> *...I need a solid structure, almost military-like, since I need to know first, it needs to be clear to me, I have to get a sense of the structure before I can explain it to them...*

The predictability of each situation in class made her feel ready to answer student questions and satisfy the demands of the curriculum and syllabus, including grading. Otherwise, she felt that teachers' insecurity reflected on students.

> *When I have a good command of the class... I do not need to prepare in advance because I know every step, I would present to them and what I am going to ask them. There is no chance that something could go wrong. When I have a problem, if something has*

> *been changed, then I feel that I pass it on to the children. Teacher's insecurity is always transferred.*

Barbara emphasized that she usually opted for frontal instruction, with traditional lectures and repetition constituting the main teaching strategies. Despite the positive, authentic, and cognitive experience they had during the implementation of the QFT, the teacher highlighted that students expected her to teach the lesson again in "the usual way". Such student expectations and needs arose even in situations where the teacher chose to apply other instructional techniques in class. There seemed to be a silent agreement between Barbara and her students that students learn more effectively when the class is traditionally organized (category: Covering a Lesson Using Questions Is Not a Lecture to Students).

> ...*You did not teach* (the teacher cited a student's comment about the class in which the QFT was applied)*, they expect me to start over again the usual way. I told them, no, you have done it already... we have covered everything using these questions... they asked me to go back to that, to repeat it for them one more time...*

Barbara maintained discipline in her Geography classes using mechanical learning activities, through "cramming, grinding, or drilling" (transferring facts, memorizing and repeating facts with students, and reminding students by asking questions). She most often used the strategy of multiple revisions with students through short and quick questioning to determine the level of content understanding.

> *...if they do not remember on their own immediately, as soon as I remind them, they know where, what, how, and then they remember something else that follows. Because we revise everything multiple times...*

Unlike Andrea, who emphasized the Need for a Clear Structure, Barbara highlighted efficiency as a mechanism through which she ensured that the class was highly structured while taking into consideration students' needs (category: Fast and Efficient Teacher).

> *...with eight-graders, I had to do it all over again... then, when we returned to my system, then I had to spend very little time...*

Furthermore, she described herself as a teacher with high self-confidence (*I felt confident... even though I was unprepared... I did not feel lost or confused...*).

Both teachers encourage students to independently find answers to questions and solve tasks using specific examples and practical situations. Andrea highly values situations in which students reached mathematical conclusions using images, specific

examples, and practical learning situations (category: Experiential Learning). This belief was rooted in her experience as a student.

> *...Simply because we drew the figure, we knew how to solve it... You know, I could not understand extended proportion at your age... I could not understand it until I drew the entire picture... And after I had given them this instruction, most of them solved the problem correctly in the written exam...*

Barbara encourages students to find answers on their own while standing in front of a geographical map (category: Covering a Lesson Using Questions Is Not a Lecture to Students).

> *...They look for it on the map and by the time they find it on their own they probably learn it. Because they remember a lot of things, they really remember a lot...*

Finally, the profile of a Traditional Teacher Who Focuses on the Atmosphere is described as more likely to believe in the efficacy of individual student work than group work (Radišić & Baucal, 2015), which was only mentioned in Andrea's statements. She emphasized that she avoids group work in her Mathematics classes (category: The Chaotic Nature of Group Work). She needs silence and discipline for learning to remain undisturbed, while changes in classroom space contributed to "chaos". The teacher further stated that group work lacked interaction and cooperation between groups in the learning process. Due to all of the above, we assumed that Andrea had difficulties maintaining discipline and establishing control during question formulation in small groups.

> *Essentially, group work always turns into a bit of a chaos; ...when they see their desks arranged like that...; that all groups do on their own, and then they are like that, they only listen to themselves...*

II Quality of Motivation and Engagement During Question Formulation Technique Implementation

Data encompassed by the second meta-theme, Quality of Motivation and Engagement During Question Formulation Technique Implementation, were integrated using the following questions: What similarities and differences in motivation, experiences, and impressions could be identified between teachers during the implementation of the QFT in class? How did teachers perceive student motivation? Table 2 shows themes and categories from teachers' statements that illustrate this meta-theme.

Table 2: The contents of the meta-theme quality of motivation and engagement during question formulation technique implementation

Theme 1: Turnaround in students' and teachers' motivation and initiative (Andrea)	Theme 2: Repetition is the mother of learning (Barbara)
• Conscientious Approach to Preparation for Technique Implementation	• Teacher Unprepared for Technique Implementation
• Chaotic Versus Successful Experience	• Purposefulness of the Technique despite Unpreparedness
• Different Students' Cognitive Engagement	

Andrea thoroughly prepared for the implementation of the QFT (category: Conscientious Approach to Preparation for Technique Implementation). Having in mind that she positioned herself as a "nerd" (...*They say, you are a nerd. But here I know my knowledge is limited, so I got down to work*...), she had a pronounced need to practice the use of the instructional technique and thus master it.

> *I do not want to finish something without learning and mastering it, so we could follow a plan and I could say that I have finished it and then when I enter the classroom, I know that there is a segment that was not properly covered, that does not work.*
>
> *As far as I am concerned, I want us to do it, to take care of everything properly. Now, if you think that we could do more regarding the research question, play, to have something that we have finished, to say, alright, now this is good, we can move on. Come on, give us a suggestion and then we will move on.*

Andrea expressed dilemmas about the applicability of the technique in conversations with facilitators. She contemplated the age-appropriateness of the technique (I think it should be introduced earlier... the younger the children are, the more directly they ask questions) and the timing of specific steps in the technique and brought into question the technique's area of implementation during the teaching process.

> *I am afraid that if we do it during revision, their questions would be too monotonous. So, I am not sure they would have anything to ask if we have already covered the lesson.*

Furthermore, she expressed concern regarding the quality of the focus and her research approach in the implementation of the technique.

> *....I literally did what you asked, but I did no research, I did not think about whether the focus was good or not...*

As part of the first class, she assessed the quality of focus and noticed that an element was missing from the figure (Appendix 2, Figure 1). When the technique was applied for the first time, there was a sense of "chaos" (category: Chaotic Versus Successful Experience). The emotionally charged atmosphere from the previous class lingered in her class as well. At the beginning of the class, the teacher stated that students' concentration was poor and their behaviour was undisciplined, which is why they needed more time to accomplish what the teacher intended. Additionally, Andrea brought additional materials and tools, but the inadequate selection resulted in students losing more class time.

Andrea was dissatisfied with the manner in which she conducted the class. However, despite the obstacles, the teacher realized that the major challenge involved creating a focus (stimulus/provocation) during the implementation of the technique. There was insufficient information provided in the focus. In her opinion, this adversely affected students' cognitive focus and the quality of their questions. After gaining insight into the quality of focus during the first class, the teacher decided to use the technique again in another class without consulting the facilitators beforehand. Andrea stated that changes in focus (in the new figure, she indicated the angle, that is, the part of the circle to which the angle belongs; Figure 1) had a significant impact on question production quality, insight into the relationship between questions (open-ended versus closed-ended questions), and recognition of differences between central and inscribed angles. During the second class, the teacher described the atmosphere as constructive and noted that students carefully followed her instructions and were more focused and interested in each step of the process. Furthermore, the teacher attributed the success of the technique in another class to the element of surprise, as the students had not previously employed the technique (unlike students in the previous class, who used the same technique in Barbara's Geography class).

> *So, this was new to them, they waited for an explanation and all, and there was only this one complaint in one group, because this child determined who can ask what and then they were afraid to ask a question because he would tell them no. Although they did form groups on their own, I did not group them together. But they were really well-behaved and truly worked as a group. So, there was no chaos of that kind...*

Unlike Andrea, Barbara did not prepare for the implementation of the QFT in class (category: Teacher Unprepared for Technique Implementation). In other words, she did not prepare the lesson in accordance with the QFT procedure, nor did she prepare her students for the upcoming experience.

> *I did not prepare them at all. They came to the class completely unprepared. They did not know what to expect, I did not tell them that someone would be coming to the class, nothing, nor did I tell them anything about the questions.*

Furthermore, Barbara did not use the instructional materials provided by facilitators, which is why she skipped some of the steps in the technique (question selection and reflection).

> *For a moment, I forgot that I should divide them into groups... oh, the horror, I thought that I would lose time, but they formed groups on their own quite quickly... it was my fault, I did not tell them, they needed an example at the beginning... the asked some good questions, but... there was no systematization at the end, to round out the lesson...*

Although Barbara was unprepared, nonchalant, and improvising during class, she had a positive impression of the technique's implementation (category: Purposefulness of the Technique Despite Unpreparedness). She was satisfied with the quality and number of questions that her students produced during the implementation of the technique, as well as with the fact that they created research questions.

> *Although I was unprepared, I felt kind of good... I did not feel lost or confused, so I guess that is why they were motivated... I was sure of myself and I probably made them feel that way, too. So, they somehow immediately got engaged.*

Interestingly, the teacher noticed that when the technique was first introduced, students formulated questions the same way she formulated questions in class. When applying the technique in class, students' authentic and research questions only emerged at the end of the process of formulating open-ended and closed-ended questions.

> *So, these were questions that made it seem like they were emulating me. So, they wrote down the kinds of questions I ask them and I could see myself in them. Who is this, who is that, I mean, I regularly ask them questions like that... But the other half of the questions is good, there are more open-ended questions...*

It was not until the class that followed the QFT implementation that Barbara determined that students' questions did not cover all the information in the syllabus and curriculum (e.g., altitudinal belts and ocean currents). Nevertheless, she failed to connect this to the quality of the focus she prepared for her students and did not realize that she could combine different types of geographic maps into one image to enable her students to ask the questions she anticipated.

Barbara would use the QFT in class again, acknowledging the purposefulness of the technique as well as students' need for occasional changes.

> *Impressions are good, generally, I would apply this again... They enjoy it when we introduce something new from time to time.*

Both teachers stated that the use of the technique had a positive effect on their students. Andrea observed that the QFT inspired most students to engage in both lessons (category: Cognitive Engagement of Different Students). She noticed greater engagement among low-achieving students who wanted to share their ideas, make their voiced heard, demonstrate their knowledge and be positively evaluated. Likewise, Andrea found that the technique allowed students to adopt new concepts and this equally applied to students with high and low grades in Mathematics.

> *There are students who usually get a C or a D... it means a lot to them to say something sometimes, thinking that they might get points for that... And this student who has a D in my class... he managed to somehow get to a point where he can say that he sees angles in a circle and recognize tree identical angles...*

Barbara shared similar insights, emphasizing that students were cognitively engaged and motivated and that student groups listened to one another in class (category: Purposefulness of the Technique despite Unpreparedness).

> *They were truly keen during this class, the whole class was meaningful and they did their best, it was evident in their questions... they examined and covered many things... then the group... then they listened, they were simply engaged.*

DISCUSSION

During the implementation of the QFT, teachers found that defining the question focus (stimulus/provocation) was the most challenging segment, as noted in earlier descriptions of the implementation of the technique. Stokhof *et al*. (2017) highlighted focus quality as a building block of the teaching process directed at "asking questions to learn". In the implementation of the QFT, the focus needs to be clear, must not be formulated as a question, should encourage new lines of thought, and should not reveal the teacher's pedagogical intention (Rothstein & Santana, 2011; Rothstein, Santana & Minigan, 2015). Creating a quality focus is not equally challenging in all subjects and topics. It has been shown that more abstract content makes it harder to create a sufficiently clear, high-quality focus that inspires students to produce a large number of questions (e.g., Mathematics versus Geography).

Therefore, focus creation represents a continuous learning process for teachers, in which their success directly hinges on their personal and professional beliefs and values. In the context of this paper, Andrea's characteristics constitute the professional model of a teacher who can succeed in focus creation in inquiry-based learning. These include conscientiousness, dedication, thoroughness, and openness to research. These qualities greatly influenced Andrea's sense of self-efficacy, which is

a crucial prerequisite to professional learning (Džinović, 2016; Reeve & Cheon, 2021; Voet & De Wever, 2019).

Based on Andrea's first use of the QFT and subsequent experience with the implementation of the technique, we can conclude that focus quality was one of the factors that affected within-group and between-group dynamics. More precisely, the inadequately created focus used during the first implementation did not sufficiently cognitively engage students. Otherwise, it could have mitigated students' disruptive behaviour at the beginning of the class (Yang *et al.*, 2021). However, Andrea's subsequent experience with the implementation of the technique as well as Barbara's experience proved the opposite. Students were motivated to cooperate both within and between groups because the high-quality focus led them to exchange thoughts, actively listen to one another and jointly select questions and make decisions. These insights that teachers shared showed that they valued a supportive, working atmosphere in class, which was a characteristic they shared with their professional profile (Traditional Teacher Who Focuses on the Atmosphere).

Barbara did not reflect on the characteristics of a quality focus and she did not link students' question production to focus content. However, Barbara realized that in the first steps of technique implementation, students formulated questions by the model they learned from her, which is in line with previous research (Almeida & Neri de Souza, 2010; Chin & Kayalvizhi, 2002). The creators of the QFT (Rothstein & Santana, 2011; Rothstein, Santana & Minigan, 2015) emphasize that students' authentic and research questions are among the last open-ended and closed-ended questions they formulate during the implementation of the technique in class, as noted by Barbara in our study. Furthermore, Barbara highlighted another key point in the implementation of the technique from the teacher's perspective, which pertains to reflection and systematization and takes place during Step 6 of the QFT (Reflection). Although this step was missing from Barbara's implementation of the technique, due to students' reactions, she realized the importance of reflection and systematization in the learning process.

The results showed that teachers were differently motivated for the same domain of behaviour (professional learning on the implementation of the QFT), their motivation stemmed from different sources, and the quality of their motivation changed during the process of professional learning, which is in line with the theory of self-determination (Chiu *et al.*, 2021; de Wal *et al.*, 2014; Ryan & Deci, 2017). Andrea's statements showed that she entered the process with introjected motivation, stimulated by a sense of duty and obligation to facilitators. In other words, since she was motivated by the need to honour her agreement with facilitators, her engagement in professional learning was not entirely internalized and self-determined (introjected motivation). In professional learning situations in which teachers experience lower levels of autonomy (task given by facilitators) but simultaneously establish relations with other participants in the process (relatedness to facilitators), motivation for a certain form of behaviour is more introjected (Koestner & Losier, 2002).

After experiencing an aha moment during the implementation of the QFT (focus quality significantly shaped the process of creating questions), Andrea felt compelled to experiment in another class by introducing changes to the focus that helped cognitively engage students with her pedagogical intention. This led to a change in motivation quality (from introjected motivation to identified motivation) since the change of focus allowed Andrea to experience a higher level of autonomy and competency. By relying on a newly internalized goal, an individual's motivation changes and gains an additional quality, becoming more self-determined (Koestner & Losier, 2002; Ryan & Deci, 2000, 2002). Teachers who demonstrate identified regulation and intrinsic motivation tend to be more engaged in professional learning activities (de Wal *et al*., 2014).

Unlike Andrea, Barbara started applying the QFT without motivation (amotivation), emphasizing that she was unprepared for testing the technique in practice and that she felt and behaved quite leisurely. Other studies have confirmed that the least motivated and engaged teachers most often belong to the externally regulated profile in professional learning activities, as their engagement hinges on the encouragement of others (de Wal *et al*., 2014). In the context of our research, researchers' demands and connection with them might have led to the impression that the technique was successfully applied (an increase in the sense of competency), which contributed to a shift in the quality of motivation along the continuum (from amotivation to external motivation). Likewise, due to self-confidence, a sense of self-efficacy and openness, and improvisation skills during the implementation of the QFT, Barbara encouraged positive forms of behaviour and motivation among students in class, which, in turn, contributed to a change in the quality of her motivation. This finding confirms the dialectic nature of student-teacher relations: students' autonomous behaviour in class (e.g., high levels of engagement in asking questions and expressing opinions) transforms teachers' behaviour in the same way that teachers' behaviour contributes to changes in the quality and quantity of student engagement (Reeve, 2013). Finally, the results showed that Barbara's personal characteristics (self-confidence, efficacy) proved equally important for encouraging students to produce quality research questions during the implementation of the QFT, as suggested by other authors (Stokhof *et al*., 2017).

Regardless of differences in teachers' implementation of the QFT, they both highly valued the effects this technique had on students in terms of their motivation and cognitive engagement in class. Both teachers stated that students produced numerous research questions in cooperation with their peers, which is in line with the finding that students in groups, after being shown an example, produce a significantly greater number of quality questions than when working individually (Chin & Kayalvizhi, 2002). Another significant effect observed during the implementation of the QFT was the cognitive engagement of students of different levels of academic achievement, along with students who were often "invisible" in class. Specifically,

teachers stated that almost all students in the three classes in which the QFT was applied showed agency, curiosity, and interest in participating in the class, regardless of their academic achievement and knowledge level. A practice in which students actively ask questions, which is the essence of QFT, constitutes an indicator of autonomy-supportive teaching, which, in turn, positively affects students' motivation and engagement (Assor *et al*., 2005; Reeve & Cheon, 2021; Reeve & Shin, 2019; Reeve *et al*., 2020). The findings of the current study are consistent with previous research on the positive effects of QFT on student engagement in class (LeBlanc, Nepal & Mowry, 2017).

CONCLUSION

The interpretative phenomenological analysis (IPA) confirmed that the process of school-based professional learning was shaped by teachers' personal and professional beliefs and values during their experimentation with the implementation of the QFT. Personal beliefs and values identified in teacher discourse included self-efficacy, self-confidence, conscientiousness, openness to learning, and motivation. The implementation of the QFT somewhat disrupted teachers' traditional professional beliefs and values, such as the belief that learning takes place in the controlled process of asking questions in which the teacher has the dominant role and the conviction that individual learning is more efficient than group learning.

The condensed experiences of teachers are shaped by their personal and professional beliefs and values, which profoundly influence their motivation and behaviour during school-based professional learning. Our results showed that the quality, intensity, and source of teachers' motivation changed during the process of professional learning. On the one hand, teachers used the QFT to encourage students to act autonomously in class (ask questions, decide on questions, and interact with peers). On the other hand, this positively influenced their motivation. Teachers emphasized that students were more behaviourally, cognitively, and socioemotionally engaged in class.

Future Research and Pedagogical Implications

This research showed that the function of the QFT was greatly fulfilled in Mathematics and Geography teaching at the participating school. However, it would be useful for future studies to explore modes of focus creation during the implementation of the QFT in the teaching of different school subjects. Moreover, it would be crucial to determine the quality of student questions during the implementation of the QFT.

Research results cannot be generalized due to the limited sample size. Hence, future research should further explore the relationship between teachers' personal and professional beliefs and values in the context of adopting the QFT on larger samples, using mixed-method models. Furthermore, our findings speak in favour of the usefulness of the QFT method in research on education and the need to further advocate its implementation. It would also be purposeful to examine the roles of self-efficacy and self-confidence in the elaboration of teacher profiles obtained from previous research.

The QFT contributes to the development of questioning skills in both teachers and students. These skills are most significant in inquiry-based learning and project-based learning, which constitute the basis for the development of critical and logical thinking. Likewise, creating a classroom atmosphere in which asking questions is valued in itself contributes to a stronger sense of autonomy in both teachers and students. Furthermore, teachers and students are given the opportunity to voice their perspectives and ask questions about the problem at hand as well as choose questions and make decisions about what to explore next and how. For these reasons, we consider the QFT to be highly beneficial to teaching practice in schools.

REFERENCES

- Almeida, P., & Neri de Souza, F. (2010). Questioning profiles in secondary science classrooms. *International Journal of Learning and Change*, *4*, 237–251.
- Argyris, C., & Schon, D. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.
- Assor, A., Kaplan, H., Kanat-Maymon, Y., & Roth, G. (2005). Directly controlling teacher behaviors as predictors of poor motivation and engagement in girls and boys: The role of anger and anxiety. *Learning and Instruction*, *15*(5), 397–413.
- Burt, P., & Duker, P. (2021). Student-driven music theory: How the question formulation technique can promote curiosity, agency, and creative course design. *The college of music society.* https://scholarworks.uttyler.edu/cms-sc-2021/conference/papers/9
- Capps, D. K., Crawford, B. A., & Constas, M. A. (2012). A review of empirical literature on inquiry professional development: Alignment with best practices and a critique of the findings. *Journal of Science Teacher Education*, *22*(3), 291–318.
- Carlsen, W. S. (1991). Questioning in classrooms: A sociolinguistic perspective. *Review of Educational Research*, *61*(2), 157–178. DOI:10.3102/00346543061002157.
- Chin, C., & Kayalvizhi, G. (2002). Posing problems for open investigations: What questions do pupils ask? *Research in Science & Technological Education*, *20*(2), 269–287.
- Chiu, T. F. K, Chai, C. S, Williams, P. J., & Lin, T-J. (2021). Teacher Professional Development on Self-Determination Theory–Based Design Thinking in STEM Education. *Educational Technology & Society*, *24*(4), 153–165.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative Inquiry & Research Design: Choosing among Five Approaches.* Los Angeles, CA: Sage Publications.
- de Wal, J., Den Brok, P. J., Hooijer, J. G., Martens, R. L., & Van den Beemt, A. (2014). Teachers' engagement in professional learning: Exploring motivational profiles. *Learning and Individual Differences* 36, 27–36. DOI:10.1016/j.lindif.2014.08.001.
- Degener, S., & Berne, J. (2016). Complex questions promote complex thinking. *The Reading Teacher*, *70*(5), 595–599. International Literacy Association.
- Dillon, J. T. (1988). The remedial status of student questioning. *Journal of Curriculum Studies*, *20*(3), 197–210. DOI: 10.1080/0022027880200301.
- Džinović, V. i Đerić, I. (2012). Nova paradigma profesionalnog razvoja nastavnika – podsticaj za inicijativu, saradnju i stvaralaštvo [New paradigm of professional development of teachers – An encouragement of initiative, cooperation, and creativity]. U J. Šefer i J. Radišić (ur.), *Stvaralašvo, inicijativa i saradnja. Implikacije za obrazovnu praksu. Drugi deo* [*Creativity, initiative and collaboration. Implication for educational practice*, second part] (str. 113–135). Beograd: Institut za pedagoška istraživanja.
- Džinović, V. (2016). Podsticanje grupnog profesionalnog učenja [Facilitating group professional learning]. U S. Maksić i I. Đerić (ur.), *Razvoj istraživačke prakse u školi* [*Development of research practice in school*] (str. 55–74). Beograd: Institut za pedagoška istraživanja.
- Đerić I., Malinić, D., & Đević, R. (2021). Project-based learning: Challenges and implementation support. In N. Gutvajn, J. Stanišić, & V. Radović (Ed.), *Problems and Perspectives of Contemporary Education* (pp. 52–73). Belgrade: Institute for Educational Reserach, Faculty of Philology, Peoples' Friendship University of Russia (RUDN University), Moscow, Russia, Faculty of Teacher Education, University of Belgrade, Belgrade, Serbia.

- Đerić I., Malinić, D. i Šefer, J. (2017). Kako unaprediti proces inoviranja školske prakse [How to improve the process of innovating school practices.]. *Inovacije u nastavi – časopis za savremenu nastavu*, *30*(4), 1–13. DOI: 10.5937/inovacije1704001D
- Emery, A., & Anderman, L. H. (2020). Using interpretive phenomenological analysis to advance theory and research in educational psychology. *Educational Psychologist* https://doi.org/10.1080/00461520.2020.1787170
- Felstead, I. S., & Springett, K. (2016). An exploration of role model influence on adult nursing students' professional development: A phenomenological research study. *Nurse Education Today, 37,* 66–70.
- Garibay, C. T., Kerby, J., & Minigan, A. P. (2020). *Implementation of the question formulation techniqueas a teaching strategy in renewable energy engineering education*. Paper presented at 2020 ASEE VirtualAnnual Conference Content Access, Virtual Online. DOI: 10.18260/1-2--34777
- Gauntlett, L., Bickle, E. Thomas, G., Collins, B., Heaslip, V., & Eccles, S. (2017). Interpretative phenomenological analysis: A means of exploring aspiration and resilience amongst widening participation students. *Widening Participation and Lifelong Learning*, *19* (2), 63–86.
- Guihen, L. (2020). Using interpretative phenomenological analysis (IPA) to explore the career experiences of women deputy headteachers. *International Journal of Research & Method in Education, 43*(5), 526–540.
- Hayes, M. T. (2002). Elementary preservice teachers' struggles to define inquiry-based science teaching. *Journal of Science Teacher Education*, *13*(2), 147–165.
- Hill, J. B. (2016) Questioning Techniques: A Study of Instructional Practice. *Peabody Journal of Education, 91*(5), 660-671. DOI: 10.1080/0161956X.2016.1227190
- Hooper, A., Potts C., & Walton, M. (2022). Novice early childhood teachers' perceptions of their professional development experiences: an interpretive phenomenological approach. *Journal of Early Childhood Teacher Education*, Published online: 25 Feb 2022.
- Janssen, T. (2002) Instruction in self-questioning as a literary reading strategy: An exploration of empirical research. *Educational Studies in Language and Literature*, *2*(2), 95–120. DOI:10.1023/A:1020855401075.
- Jiang, Y. (2020). Teacher classroom questioning practice and assessment literacy: Case studies of four english language teachers in Chinese universities. *Frontiers in Education, 5*(23). DOI: 10.3389/feduc.2020.00023
- Koellner, K., Jacobs, J., Borko, H., & Nanette Seago, N. (2023). Current trends, tensions and unresolved issues in research on teacher professional learning. In Tierney, R. J, Rizvi, F., & Erkican, K. (Eds.), *International Encyclopedia of Education* (Fourth Edition) (pp. 550-561). Elsevier Science.
- Koestner, R., & Losier, G. F. (2002). Distinguishing three ways of being highly motivated: A closer look at introjection, identification, and intrinsic motivation. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 101–121). University of Rochester Press.
- Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education, 19*, 149-170.
- LeBlanc, H. J., Nepal, K., & Mowry, G. S. (2017). *Stimulating curiosity and the ability to formulate technical questions in an electric circuits course using the question formulation technique (QFT).* 2017 IEEE Frontiers in Education Conference (FIE). DOI:10.1109/fie.2017.8190460
- Malinić, D., Stanišić, J., i Đerić, I. (2021). Iskustva nastavnica u realizacije projektne nastave zasnovane na interdisciplinarnom pristupu [The experience of teachers in realisation of project-based learning based on interdisciplinary approach]. *Zbornik Instituta za pedagoška istraživanja*, *53*(1), 67–120.

- Morse-Harding, C., & Hibbler, L. (2019). Sparking curiosity and research questions in the archives through the question formulation technique. *LOEX Conference Proceedings 2019*. 27.
- Paramore, J. R. (2017). *Undergraduate primary education students' experience of assessment: an interpretative phenomenological analysis* (Doctoral dissertation, Nottingham Trent University).
- Phillips, N., & Duke, M. (2001). The questioning skills of clinical teachers and preceptors: A comparative study. *Journal of Advanced Nursing*, *33*(4), 523–529.
- Postholm, M. B. (2018). Teachers' professional development in school: A review study. *Cogent Education*, *5*(1). https://doi.org/10.1080/2331186X.2018.1522781
- Radišić, J., & Baucal, A. (2015). Portrait of high school math teachers: Critical analysis of dominant practice. *Primenjena Psihologija*, *8*(1), 25–46.
- Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, *105*(3), 579–595.
- Reeve, J., & Shin, S. H. (2019). How teachers can support students' agentic engagement. *Theory into Practice*, *59*(2), 150–161.DOI: 10.1080/00405841.2019.1702451
- Reeve, J., Cheon, S. H., & Yu, T. H. (2020). An autonomy-supportive intervention to develop students' resilience by boosting agentic engagement. *International Journal of Behavioral Development*, 1–14. DOI: 10.1177/0165025420911103
- Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist*, *56*(1), 54–77, DOI: 10.1080/00461520.2020.1862657
- Roehrig, G. H., & Luft, J. A. (2004). Research report: Constraints experienced by beginning secondary science teachers in implementing scientific inquiry lessons. *International Journal of Science Education*, *26*(1), 3–24.
- Rothstein, D., & Santana, L. (2011). *Make just one change: Teach pupils to ask their own questions*. Harvard Education Press.
- Rothstein, D., Santana, L., & Minigan, A. P. (2015). Making questions flow. *Educational Leadership*, *73*(1), 70–75.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. DOI:10.1037/0003-066X.55.1.68.
- Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). University of Rochester Press.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory. Basic psychological needs in Motivation, Development, and Wellness*. New York: Guilford Press.
- Sellappah, S., Hussey, T., Blackmore, A. M., & McMurray, A. (1998). The use of questioning strategies by clinical teachers. *Journal of Advanced Nursing*, *28*, 142–148. http://dx.doi.org/10.1046/j.1365-2648.1998.00776.x
- Smith, J. A., & Osborn, M. (2003). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to methods* (pp. 53–80). London: Sage.
- Smith, J. A., Flowers, P., & Larkin, M. (2009). *Interpretative phenomenological analysis*. London: Sage.
- Smith, J. A. (2017). Interpretative phenomenological analysis: Getting at lived experience. *The Journal of Positive Psychology*, *12*(3), 303–304. https://doi.org/10.1080/17439760.2016.1262622

- Sprott, R. A. (2019). Factors that foster and deter advanced teachers' professional development. *Teaching and Teacher Education*, *77*, 321–331. 10.1016/j.tate.2018.11.001
- Stevenson, H. (2017). The "datafication" of teaching: Can teachers speak back to the numbers? *Peabody Journal of Education, 92*(4), 537–557.
- Stokhof, B., De Vries, R., Martens, L., & Bastiaens, T. J. (2017). How to guide effective student questioning: A review of teacher guidance in primary education. *Review of Education*, *5*(2), 123-165.
- Šefer, J. (2018). *Evaluacija pristupa Trolist: stvaralaštvo, inicijativa i saradnja učenika [Evaluation of Trifoil approach: Creativity, initiative and collaboration]*. Beograd: Institut za pedagoška istraživanja.
- Ševa, N. i Đerić, I. (2019). Analiza priručnika za učitelje o projektnoj nastavi: gde su nestali istraživački elementi iz projekata [An analysis of teacher's guide-books on project-based teaching: Where have the research elements disappeared]. U J. Stanišić i M. Radulović (ur.), Knjiga rezimea sa 24. međunarodne naučna konferencije Pedagoška istraživanja i školska praksa *Obrazovanje u funkciji modernizacije društva* [Pedagogical research and school practice *Education as a function of modernization society*] održana 11. oktobra 2019. u Beogradu (str. 76–77). Beograd: Institut za pedagoška istraživanja; Moskva: Filološki fakultet Ruskog Univerziteta prijateljstva naroda (RUDN); Beograd: Učiteljski fakultet.
- Tallman, T. O. (2019). How middle grades teachers experience a collaborative culture: An interpretative phenomenological analysis. *RMLE Online, 42*(8), 1–16.
- Vilig, K. (2016). *Kvalitativna istraživanja u psihologiji* [Qualitative Research in Psychology]. Beograd: Clio.
- Voet, M., & De Wever, B. (2019). Teachers' adoption of inquiry-based learning activities: The importance of beliefs about education, the self, and the context. *Journal of Teacher Education*, *70*(5), 423-440.
- Wragg, E. C., & Brown, G. (2001). *Questioning in the primary school.* London: Routledge Falmer.
- Yang, Y., Yuan, Y., Tan, H., Wang, Y., & Li, G. (2021). The linkages between Chinese children's both cognitive engagement and emotional engagement and behavioral engagement: Mediating effect of perceptions of classroom interactions in math. *Psychology in the Schools*, *58*(10), 2017–2030.

Received 17.10.2022; accepted for publishing 28.2.2023.

APPENDIX 1.

The Question Formulation Technique – QFT

Right Question Institute developed the Question Formulation Technique – QFT (Rothstein & Santana, 2011) within a program aimed at helping families support their children in their learning process, in order to reduce dropout rates among secondary school students. Parents expressed a need to learn how to ask questions in order to be more involved in their children's education. This technique is not the result of academic research, but rather the result of a twenty-year effort to develop a strategy that would enable people with different educational backgrounds and functional literacy levels to express their ideas and attitudes, participate in decision-making processes, and conduct in-depth research into the topic at hand. Today, the QFT is used in a wide variety of fields, such as education, health care, family work, law, and micro-democracy (more information is available at https://rightquestion.org/rqi-resources/publications). Thus far, there have been relatively few studies to empirically validate the efficacy of the QFT and they have not covered a wide enough range of educational areas (Burt & Duker, 2021; LeBlanc, Nepal, & Mowry, 2017; Morse-Harding & Hibbler, 2019; Garibay, Kerby, & Minigan, 2020).

According to subsequent analyses of the QFT's theoretical significance, it supports divergent, convergent, as well as metacognitive thinking in students (Rothstein & Santana, 2011).

The technique encompasses several steps, including preparation, focus selection, question production, question improvement, question selection, defining the strategy, and reflection.

Step 0: **Preparation**

When the QFT is first introduced, the teacher needs to tell students what kinds of questions exist and how they differ and offer examples for each question type. Once the teacher has explained the nature and types of questions and has provided appropriate examples (and asked students to provide their own examples), it is time to proceed to subsequent steps with the goal of joint formulation of the research question(s).

Step 1: **Focus selection**

The teacher choses a thought-provoking focus/topic/concept/phenomenon and places it in a visible spot (on the blackboard/wall/desk in front of the small groups). The selected focus should share a meaningful link with the final outcome in the implementation if this technique – the selected research question.

Step 2: **Question production**

Students are divided into groups and tasked with producing as many open-ended and closed-ended question as they can in relation to the given focus. During this associative process, students should adhere to the following rules:

a) Formulate as many questions as you can within the specified timeframe (e.g., three minutes).
b) Do not interrupt the discussion, do not evaluate questions, and do not answer questions.
c) Write down the question exactly as formulated.
d) Transforms statements into questions if they emerge during the associative process.

Step 3: **Question improvement**

a) Once students are done producing questions, they are tasked with analyzing questions in accordance with the following steps:

- Numbering questions;
- Analyzing questions and determining which questions are open-ended and which are closed-ended; each question should be marked with O (open-ended question) or C (closed-ended question).

b) Discussing advantages and shortcomings of open-ended and closed-ended questions.
c) Transforming open-ended questions into closed-ended questions and vice versa.

Step 4: **Question selection**

Students are tasked with choosing three key questions that they are most interested in contemplating and discussing further; during the selection process, students need to think about how questions relate to the focus;

Step 5: **Defining the strategy**

a) Students devise an action plan by determining which information needs to be gathered and what they need to do in order to answer the selected questions.
b) Students exchange insights regarding the action plan.

Step 6: **Reflection**

After implementing the action plan, students talk about what they have learned (from answers to the questions they formulated) and how they have learned it.

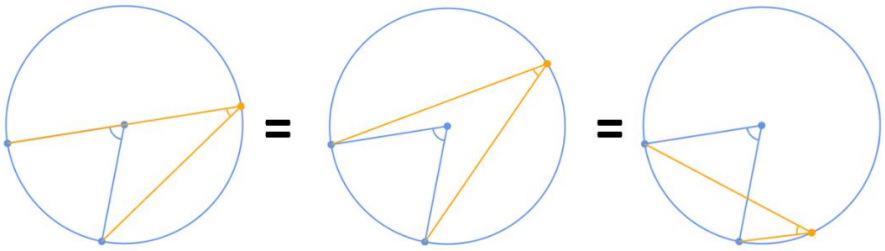
The technique can be used in an individual, pair, or group setting. Using this technique in groups provides students with the opportunity to collaborate during each step and negotiate the best solution. The technique requires students to collaborate and not evaluate or comment on other students' questions, but rather

produce associations about the given topic. This communication rule enables students to establish a circle of trust among themselves and reinforces the notion that there are no "stupid" or "smart" questions. During steps 3, 4, and 5, students collaborate on everything from selecting questions for further research to developing an action plan.

It is necessary to familiarize students with certain procedures and routines in advance and ensure that those steps are followed consistently during the implementation of QFT. Defining QFocus is the greatest challenge teachers face when implementing this technique. While traditional pedagogical practices require teachers to ask questions, when utilizing this technique, students use the focus to generate questions of varying cognitive levels, which they then attempt to answer independently and/or with the assistance of the teacher, thus gaining knowledge of the lesson's content. The creation of a focus requires consideration of the following guidelines[7]: a) the focus must be clear; b) the focus must not be formulated as a question; c) the focus should encourage new avenues of inquiry; d) the focus should not reveal the teacher's pedagogical intentions. Focus quality depends on the teacher's experience in focus creation as well as the teacher's implicit pedagogical beliefs and values. A teacher determines when, where, and how to use the focus for question production, taking into account both general and specific pedagogical objectives. This means that the more effectively the teacher defines and understands the goals that need to be accomplished during the teaching process, the clearer the focus to the students is, the more closely connected it is to the curriculum and syllabus, and the more likely students are to produce more questions.

APPENDIX 2

Figure 1: The Focus Created Using the Question Formulation Technique in a Mathematics Class



[7] A detailed description of the tools used for defining a quality focus is available at: https://rightquestion.org/resources/an-introduction-to-question-focus-design/.

Figure 2: The Focus Created Using the Question Formulation Technique in a Geography Class (Jovanović, 2018: 59[8])

[8] The presented image serves merely as an illustration of the focus used in class. Students used geographical atlases published by different publishing houses.