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## **RESEARCH APPROACH AS MODERN TEACHING OR A MERE DEVIATION FROM TRADITIONAL TEACHING? TEACHERS' OPINIONS ON THE RESEARCH APPROACH IN TEACHING THE SUBJECT NATURE AND SOCIETY**

***Abstract:** The research approach in teaching Nature and Society is considered a new approach in learning and teaching in primary school. However, we wonder if this is really so? For this reason, research was conducted with the aim of examining the educational practice of early primary school teachers in the implementation of the research approach in teaching Nature and Society. The research was conducted using a qualitative methodology on a sample of 24 primary school teachers. For the purposes of the research, a semi-structured interview was constructed. The results of the research indicate the teachers' familiarity with the research approach and their motivation for its implementation in teaching Nature and Society. The obtained results also indicate that teachers largely believe that they have certain competencies for its implementation, while in the implementation they use teaching methods and teaching forms that allow greater pupil activity. It is concluded that it is necessary to further educate teachers, because, although this is a modern approach, its implementation is still not at the expected satisfactory level and is, therefore, only the first step towards more modern teaching in schools.*

***Keywords:** competencies, curriculum, educational practice, motivation, research approach*

## INTRODUCTION

Pursuant to the Decision on the adoption of the Curriculum for the school subject Nature and Society for primary schools in the Republic of Croatia (Official Gazette, 7/2019-147), the teaching curriculum for the school subject Nature and Society began with its implementation in the school year 2019/2020 for first-grade pupils. In the document, Nature and Society is defined as an interdisciplinary subject that connects scientific knowledge of several different areas, such as natural sciences, social sciences, and humanities, and as a subject that introduces pupils to research and knowledge of the world around them. In addition to the natural sciences and social sciences, in the process of learning and teaching Nature and Society, and in accordance with new modern requirements, the subject includes the technical-computer science field that allows pupils to properly use various forms of information-communication technology in the process of acquiring knowledge, developing skills, abilities, and attitudes (Ministry of Science and Education (MSE), Curriculum for the school subject Nature and Society for primary schools, 2019). As a new document in the Croatian educational system, the Curriculum for the school subject Nature and Society for primary schools (2019) brought a new, more modern approach to learning and teaching the subject Nature and Society. This more modern approach refers to the inclusion of the research approach in the teaching of Nature and Society based on the research activities of younger school-age pupils. Although the need to include the research approach has been discussed for years, a comprehensive reform of Croatian education is finally leading to its inclusion in the teaching process. Numerous studies have shown the positive effects of using the research approach in teaching, but also certain shortcomings. Due to the fact that, in Croatian schools, the research approach has been officially applied only recently in teaching Nature and Society, the aim of this paper is to examine the educational practice of early primary school teachers in the implementation of the research approach in teaching Nature and Society, which includes their knowledge of the research approach, competencies, and motivation for the preparation and implementation of the research approach, the frequency of implementation, and the teaching forms and teaching methods they use.

## RESEARCH APPROACH IN LEARNING AND TEACHING

The Curriculum for the school subject Nature and Society for primary schools (2019) emphasizes the acquisition of competencies important for pupils' entire life, which are acquired by connecting learning with pupils' experiences and their active participation in the teaching process. The Curriculum includes four basic concepts: Organization of the world around us, Change and relationships, Individual and society, and Energy. During the teaching of Nature and Society, the basic concepts are intertwined and upgraded, and in the

process of learning and teaching, a methodological approach called the research approach is used that meets the human need to explore the world around us (MSE, Curriculum for the school subject Nature and Society for primary schools, 2019). Furthermore, the Curriculum emphasizes the human need to explore and discover cause-and-effect relationships in nature and the society that surrounds it. Exploratory learning consists of a series of activities in which pupils think critically and analytically in order to seek and find their own answer to a problem. Such an approach is built on the assumption that people have an innate need to explore and discover their own knowledge (Sanjaya, 2006, according to Septa Andriani, 2016). Therefore, the task of this subject is to meet those needs. “Through the research approach, the pupil develops skills that he or she will later apply in everyday life and, based on a critical consideration of valid evidence and arguments, make relevant decisions. The research approach contributes to the development of curiosity, creativity, observation skills, comparison, classification, asking questions, predicting, analyzing, generalizing, evaluating, communicating, gathering information, etc.” (MSE, Curriculum for the school subject Nature and Society for primary schools, 2019, p. 8). This approach allows pupils to systematically acquire the core values, knowledge, and skills they will need in their daily lives. By including the research approach in teaching from the first grade, pupils get used to a different and more interesting way of work that leads to the realization of a greater number of learning outcomes. This approach to learning allows pupils to find and solve problems, and in this process of active learning, pupils construct new ideas or concepts based on previous and existing knowledge and experiences (Septa Andriani, 2016). Pupils’ experience plays an important role in the learning process. By connecting the content with previous experiences, pupils are able to better understand the content and upgrade it with new knowledge. Incorporating a research approach into teaching is the first step in involving pupils in science education, and it is defined as a key concept of basic science education (Harlen, 2009, according to Löfgren et al., 2013). Scientific education is one of the requirements of modern society and involvement in the active life of the community. In the research approach, learning is active and based on research, i.e., various research models and research activities. The emphasis is placed on work forms in which pupils are presented with a challenge. This challenge may be answering a question, observing and explaining a phenomenon, and interpreting or testing hypotheses. In the process of solving challenges, pupils achieve a goal, which is learning (Prince & Felder 2007). Guided by the inductive way of teaching, the challenge is achieved through research, not by conveying ready-made facts. Prince and Felder (2007) emphasize that the information needed to respond to a challenge should not be previously theoretically stated because the goal is to draw conclusions independently. In doing so, new information should upgrade previously known content (Prince & Felder, 2007). The research approach in

teaching is much more effective than the traditional teaching with ready-made facts. In addition, it influences the development of thinking and problem solving, motivation, and leads to the achievement of pupils' better academic achievements (Princ & Felder, 2007). Thinking and motivation are developed along the way, and this ultimately leads to the achievement of educational goals, i.e., learning outcomes. It is important to emphasize that, after the entry into force of the Curriculum for the school subject Nature and Society for primary schools (2019), we no longer discuss pupils' educational achievements as was the case in the Curriculum for Primary Schools (2006), but rather learning outcomes, which are realized with each teaching unit. It was also emphasized that it is advisable to link the implementation of research activities with situations close to pupils' experience, while being challenging enough to develop their skills (Colburn, 2006, according to Prince & Felder, 2007). The need to connect with close situations is also emphasized by the teaching principles of regionality or regional proximity, systematicity, and gradualness. According to Bayram et al. (2013), pupils are challenged, they identify the underlying problem that needs to be solved, collect data to help them find solutions, test hypotheses, and draw conclusions by analyzing the data obtained (Domin, 1999, according to Bayram et al., 2013). In this case, pupils take an active role in the process of coming to a solution to the problems posed (Hodson, 1990, according to Bayram et al., 2013).

Löfgren et al. (2013) highlight essential teaching methods in research-oriented teaching. The authors point out that research-based methods encourage pupils to be critical and engage in discussions from an early age and emphasize the importance of practical work thus influencing the development of scientific thinking (Crawford, 1997, according to Löfgren et al., 2013). Pupils who participate in research activities are often motivated to learn and develop a positive attitude towards learning, which is the goal of the research approach. In addition, the goal is to create a stimulating environment for learning with understanding (Brown, 2000, according to Löfgren et al., 2013). Developing positive attitudes in pupils will enable self-regulated learning of pupils who, encouraged by their inner motivation, will be enthusiastic to learn and strive for lifelong learning.

Harlen and Allende (2006) deal in detail with the research approach in teaching, which we will explain in more detail below. The authors state that the research approach encompasses experiences that enable pupils to understand the scientific aspects of the world around them. Research-based science education includes experiences that enable pupils to develop understanding and cognition of scientific knowledge in the world around them through the use of research skills. The authors also list basic research skills, such as observation, asking questions, studying books and other sources of information, planning research, reviewing already known content, using tools, analyzing and interpreting data,

proposing answers, and explaining, predicting, and presenting results (Harlen & Allende, 2006). From the above, it can be concluded that the skills advocated by the research approach do not differ from the skills required to conduct scientific research. Therefore, the introduction of the research approach in primary education means laying the foundations for the scientific education of all pupils. The authors also emphasize the fact that these skills are not used together every time. In other words, they develop the skills required by a teaching unit that are useful in that case. In addition, it is important to achieve the goal of developing understanding (Harlen & Allende, 2006). The authors (2006, p. 12) also pose the question “What is important in the learning process?” This is a question that pupils themselves often ask themselves. All participants in the teaching process, including pupils, should be familiar with what is important in the entire learning process. Primarily, they should be aware of the fact that memorizing concepts from textbooks or those transmitted in teachers’ lectures, without their deeper understanding, is not the goal of the learning process. Nonetheless, pupils need to adopt large amounts of knowledge to live in a world that is changing and becoming more technologically and scientifically advanced. Pupils need to learn to organize and regulate their own learning and overcome difficulties in the process (Harlen & Allende, 2006, p. 12) and thus acquire certain prerequisites for successful learning in the future.

Harlen and Allende (2006) see the importance of teaching pupils how to learn in general, placing emphasis on metacognitive skills and self-regulated learning. In this way, they determine it as an essential component of the development of lifelong learning competencies. The authors also emphasize the importance of developing ideas. As the authors state, some of the ideas, in conversation with others, the pupil will eliminate due to the participants’ different experiences in the teaching process, and some will require seeking additional information. The authors also add the possibility of searching for alternative ideas if the evidence collected by the pupil does not agree with his or her predictions and does not support the hypothesis. Ultimately, the authors explain this whole process of developing ideas and thinking about them as a major contribution to the learning process and one of the more important learning experiences (Harlen & Allende, 2006). The same authors, in explaining the process, ask why it is important to start with the research approach at the earliest stage of education. According to the authors, the introduction of the research approach develops pupils’ understanding, research skills, and attitudes. Key research activities of primary school pupils include: collecting data by observing real events or using other sources, working on questions asked by pupils or questions asked by the teacher, asking additional questions, making predictions based on what they find, talking to each other and talking to the teacher about what they are observing or researching, expressing with understanding and using appropriate terms, suggesting ways to test their own and others’ ideas to determine the

existence of evidence to support those ideas, participating in research planning to answer specific questions, using measuring instruments and other equipment in an appropriate manner, attempts to solve problems, use of various sources of information to gather facts necessary for their research, assessing the validity and usefulness of different ideas in relation to evidence, considering ideas that are not theirs and critical review of the procedure and results of their research (IAP, 2006, according to Harlen & Allende, 2006, p. 15). Based on this, it can be concluded that the research approach greatly contributes to the development of pupils' different skills. All of the above skills imply that pupils take an active role in the teaching process and participate to a large extent in it.

The research approach in primary education is still insufficiently represented, as evidenced by some studies (Alagić, 2021; Anđić et al., 2020; Letina, 2016). Change is needed in order for education to become effective and for the education system to prepare new generations for life in an increasingly advanced world. A good way to do this is to prepare from an early age, i.e., to expose pupils to an educational model in which they themselves will be part of the teaching process. Information that is constructed to satisfy children's curiosity needs to be supplemented or clarified, and this is precisely the task of the education system. In doing so, communication between teachers and pupils must not be reduced to the transfer of existing information in books or other sources of knowledge. Such a way of teaching reduces pupils' motivation, and such a lesson leaves a bad impression on pupils, extinguishes curiosity, and distances pupils from content that may be in their field of interest. In order to prevent this, it is necessary to make teaching as interesting as possible for pupils, and this can be achieved by using a research approach in teaching, especially in teaching Nature and Society. The teacher should be the one who will stimulate children's curiosity, guide pupils, and help them develop experimentation skills so that they can independently clarify doubts through experiments using simple and well-structured teaching materials that will facilitate teaching and lead to the expected learning outcomes. Although, in the research approach, pupils are increasingly working independently, and the teacher is in that case a moderator, their role is also very significant.

## RESEARCH APPROACH AS THE FIRST STEP TOWARDS MODERN TEACHING

The inclusion of the research approach is considered one of the basic requirements of modern teaching. We, therefore, ask ourselves: Is the research approach only the first step towards moving away from traditional teaching or is it in itself a modern approach? Previous research indicates that research forms of work, as a form of active learning within pedagogical concepts, existed in the time of free schools, alternative and reform directions from J. Dewey, Freinet,

in the theories of Piaget and Vygotsky, and further developed to modern research models such as the models of Banchi and Bell (2008), Milne's model (2010), etc. Research forms of work in learning and teaching are, therefore, not new; they have existed before, but in the context of introducing this approach in teaching Nature and Society, we can conclude that it is only the first step towards modern teaching, as other authors conclude. According to Perković Krijan (2016), "Research teaching in Nature and Society is one of the answers to the needs of the modern school because numerous studies have confirmed its positive effects..." (2016, p. 1), emphasizing the fact that the research approach to learning and teaching is part of a large number of modern curricula in Europe and around the world. The same author argues the terminological ambiguity of the concepts related to research teaching, but also gives a detailed historical overview of this approach, work forms and methods, citing the lack of terminological consistency and specificity. The question therefore arises: What makes it contemporary? According to Perković Krijan et al. (2017), numerous studies have proven its effect on pupil achievement, socialization, improvement of science literacy, etc. An important feature of this approach is the constructivist approach to learning and teaching, with a strong positioning of pupils as active researchers rather than passive recipients, which signals a step back from traditional forms of learning and teaching (Perković Krijan, 2016) and lays the foundations, i.e., makes the first steps towards modern teaching.

By incorporating the research approach into teaching, pupils are posed with a challenge that is realized through research, study, observation, and connection of phenomena and processes within Nature and Society. By changing and advancing the teaching process, diversity is achieved, which makes the whole process interesting for pupils. This ultimately leads to the development of satisfaction, creativity, and creative production, and thus the realization of modern curriculum approaches. Such a new form of teaching and learning makes a departure from the traditional and introduces us to the modern form of the teaching process focused on the pupil and their overall development (Boras, 2009). "The offered contents 'invite' pupils to experience the richness of the world, to search for their own answers, challenge them to understand the complexity of the human-nature-society process" (Boras, 2009, p. 46). The contents of the subject Nature and Society are in themselves interesting to pupils who have a curiosity about the nature around them. Pupils need to be able to connect with nature and, therefore, the teaching of the content of Nature and Society should not be reduced exclusively to lecture-style teaching.

In order to achieve the educational goals of teaching Nature and Society set by the new Curriculum, certain steps need to be taken. One of them is to awaken the motivation in pupils by creating a positive learning environment combined with challenging activities that will stimulate their curiosity and desire to learn and discover. "When pupils feel motivated, they are willing to

receive data or information that, when linked to other relevant associations, will create meaning and shape, which is called learning” (Jensen, 2003, according to Boras, 2009, p. 41). The significance of motivation in the teaching process is indisputable. Everyone needs motivation, especially pupils who very often have negative attitudes towards learning. In order to avoid the development of negative feelings towards learning, it is necessary to pay a lot of attention to motivating pupils. The pupil should be motivated to be ready to receive new information and actively adopt the teaching content. Therefore, every lesson should start with pupil motivation. If pupils lack motivation, it will not be possible to achieve predetermined outcomes. Due to the lack of motivation, pupils do not devote themselves to learning with the same enthusiasm as when they are highly motivated. When pupils are motivated, they receive data much easier and their knowledge is longer lasting. Pupils are motivated when they show interest in the content and when they can actively participate in teaching activities. When motivating pupils, it is important to take their interests into account. “In an active school, the starting point is the child’s interest. The goal of teaching is the development of the child’s personality and individuality. Active learning methods are used in such a school. The pupil researches, asks, and learns to learn, and progress, motivation, personality development, and performance are evaluated” (Omerović & Džaferagić-Franca, 2011, p. 173). By making a quality choice of content, teaching methods and forms of work, in a way that makes teaching and learning harmonized with the abilities and fields of pupil’s interest, learning becomes more motivating for the pupil. Pupils thus create connections between the existing and new knowledge and gain experience by applying their own knowledge in everyday life situations (Curriculum of the Subject Nature and Society for Primary Schools, 2019). Pupil motivation is influenced by a number of factors that a teacher can influence. By choosing interesting contents, appropriate methods, and forms of work, pupils can be encouraged to learn and progress. In the whole process, it is important that the pupil is activated, i.e., that he or she has a role in the teaching process, and this can be achieved through research-oriented teaching that meets modern requirements. As stated in the Curriculum of the Subject Nature and Society for Primary Schools (2019, p. 6): “Experiential, research-oriented, and problem-based teaching in which the pupil is at the center of the learning process ensures their active role in learning and teaching.” Using the research approach, pupil passivity is avoided, and placing pupils at the center of the teaching process is one of the main goals of the modern school. In this way, the entire teaching is enriched, and the teaching contents are connected with the pupils’ real life.

Many authors cite the shortcomings of the traditional way of teaching. Bognar and Matijević (2002) believe that this form of teaching does not benefit the pupil’s knowledge or the development of his or her skills and abilities. Due to the pupils’ passivity in the traditional form of teaching, their skills, critical

thinking, and problem-solving abilities are not developed (Bognar & Matijević, 2002). According to Jensen (2003), the traditional school is an institution in which pupils become passive recipients of information shared by teachers. Moving away from traditional teaching, the quality of learning and teaching comes to the fore, which encourages pupils to active and systematic learning, which develops various skills such as observation, judgment, critical thinking, and drawing conclusions (Števanić-Pavelić and Vlasac, 2006, p. 156). In the modern approach, the emphasis is on pupil activities that lead to the development of not only knowledge but also pupils' skills and abilities. Bognar (2011) conducted a study in which differences are visible in traditional content-oriented teaching and contemporary pupil-centered teaching. The most important change is the use of active learning methods where the pupil ceases to be a passive participant in the teaching process (Bognar, 2011). Active learning is another term that we associate with modern teaching and the research approach. Nikčević-Milković (2004) understands active learning as effective learning, critical thinking, and creating the need for learning as lifelong learning. Therefore, this form of learning satisfies the needs of the modern school, and, with its introduction, it is possible to achieve the set goals of the school subject. Active learning also appears in the literature as a synonym for the modern approach in which pupils are active builders of their own knowledge. Therefore, the goal is not the acquisition of content, but learning with understanding and connection with everyday life, which acquires lasting knowledge and acquires lasting skills and abilities for life (Lalović, 2009). The authors agree that traditional teaching does not lead to progress but rather hinders pupils because of their passivity in the teaching process. They see the solution in moving away from traditional teaching and adopting new, more modern approaches in which the focus will be on the quality of learning, rather than the amount of memorized facts. In doing so, each pupil has the opportunity to be an active participant, whose activities can contribute to the teaching process, and ultimately, by building his or her own identity, and the whole society. In this process, the role of the teacher is crucial.

### TEACHER'S ROLE IN IMPLEMENTING THE RESEARCH APPROACH

With the introduction of the research approach, teacher's role begins to differ significantly in relation to traditional teaching. According to Bognar's research (2004), the development of creativity in pupils largely depends on how much teachers are aware of the importance of creativity for child development. The author writes that teachers, in order to encourage creativity, need to know the ways in which they can achieve this during the teaching process. Teachers need to be prepared to change traditional ways of work and introduce new,

more modern ways, such as the research approach (Bognar, 2004). According to the already mentioned authors Harlen and Allende (2006), significant activities of teachers in conducting the research approach in teaching are: “providing pupils with the opportunity to encounter materials and specific phenomena so they can explore them, organizing discussions on procedures planned or used as identify ways to improve access to research, fostering tolerance, mutual respect, objectivity, and discussion, providing access to alternative actions and ideas through discussion, referring to books and other resources, setting more challenging and complex tasks with provided support to help pupils be able to experience work at a more advanced level, teaching the techniques needed to advance skills, including the safe use of equipment, encouraging pupils through comments and quizzes to test their ideas, helping pupils record their observations, encouraging critical thinking, and using questions to encourage research skills” (IAP 2006, according to Harlen & Allende, 2006, p. 15). Based on this, it can be concluded that the teacher’s role is very important when conducting the research approach. Although the research approach emphasizes the greatest possible pupil activity, the teacher’s activity is by no means negligible. Therefore, the teacher’s activities should create a favorable environment for work in which pupils will develop different skills and acquire new knowledge. Pritchard and Woollard (2010) list some more teacher’s roles. According to their reflections, the teacher should explain to pupils the importance of learning content, give them a sense of control over their own learning, provide situations of active involvement, use previous pupil experiences, design learning experiences based on curriculum understanding, involve pupils through dialogue and questioning, keep in mind the emotional component of learning experiences, and link activities through real-life examples (Pritchard & Woollard, 2010). According to the above, there is a difference with regards to the role of teachers in traditional teaching, which was usually reduced to the role of lecturers. Löfgren et al (2013) explain the challenge faced by primary education teachers due to the fact that scientific content in primary education is most often descriptive in nature. The authors, therefore, emphasize the importance of the teacher’s role, which is crucial in the context of quality teaching and learning (Löfgren et al., 2013). The teacher is responsible for selecting the content and adapting it to the class in which the pupils are learning through research. This means that teachers need to choose appropriate strategies for teaching content in the best possible way. This includes the selection of methods and forms of work as well as teaching aids and tools, all with the use of the research approach. The research approach cannot be implemented in learning and teaching in primary school if sufficient knowledge of its preparation, planning, and implementation in teaching is not possessed and if teachers do not know how to encourage such forms of work that will activate pupils. According to the research of Perković Krijan et al. (2017), the level of teachers’ methodological knowledge about

research teaching is very good; however, the results of testing their knowledge indicate a very low level of methodological knowledge about research teaching in Nature and Society. Furthermore, their research showed that only 32% of the variance in the implementation of research strategies can be explained by assessments of methodological knowledge and assessments of experience in research teaching during schooling, and that the same predictor variables explain 38% of the variance in research activities (Perković Krijan et al., 2017, p. 136). The authors themselves wonder what the unexplained variance with is the remaining 65% and emphasize that there is an obvious deficit of teachers' methodological knowledge about research teaching. When implementing the research approach, it is important that teachers possess the basic skills of different branches of science in order to be able to implement this approach in modern teaching. Therefore, teacher education and professional development are even more emphasized, as well as the role of teachers as key "agents of change" in the implementation of curriculum requirements and in the process of creating the modern school (Rajić, 2019).

## RESEARCH AIM

The research aim was to examine teachers' educational practice in the implementation of the research approach in teaching Nature and Society, which includes their knowledge of the research approach, competencies, and motivation for the preparation and implementation of the research approach, the frequency, and the teaching forms and teaching methods used.

Based on the defined research goal, the following research questions were set:

1. Are early primary school teachers familiar with the concept of the research approach in teaching Nature and Society?
2. How do early primary school teachers self-assess their own competencies for planning and implementing the research approach in teaching Nature and Society?
3. Are early primary school teachers motivated to implement the research approach in teaching Nature and Society?
4. How often do early primary school teachers conduct the research approach in teaching Nature and Society?
5. What teaching forms and teaching methods do early primary school teachers use when conducting the research approach in teaching Nature and Society?

In accordance with the tasks, the following outcomes, that is, hypotheses, were set:

1. Early primary school teachers are familiar with the concept of the research approach.
2. Early primary school teachers highly value their own competencies for planning and implementing the research approach in the teaching of Nature and Society.
3. Early primary school teachers are motivated to plan and implement the research approach in teaching Nature and Society.
4. Early primary school teachers do not implement the research approach in the teaching of Nature and Society frequently.
5. Early primary school teachers, when implementing the research approach in the teaching of Nature and Society, use teaching methods and teaching forms that enable active learning.

## **RESEARCH METHODOLOGY**

This paper raises five basic research questions related to the inclusion of the research approach in the educational practice of early primary school teachers in the Primorje-Gorski Kotar County. The research problem was focused on early primary school teachers' knowledge of the research approach, competencies, and motivation to plan and implement the research approach, the frequency of implementing the research approach in teaching Nature and Society, and the teaching forms and teaching methods used.

### **SAMPLE OF PARTICIPANTS, METHODS, AND RESEARCH PROCEDURE**

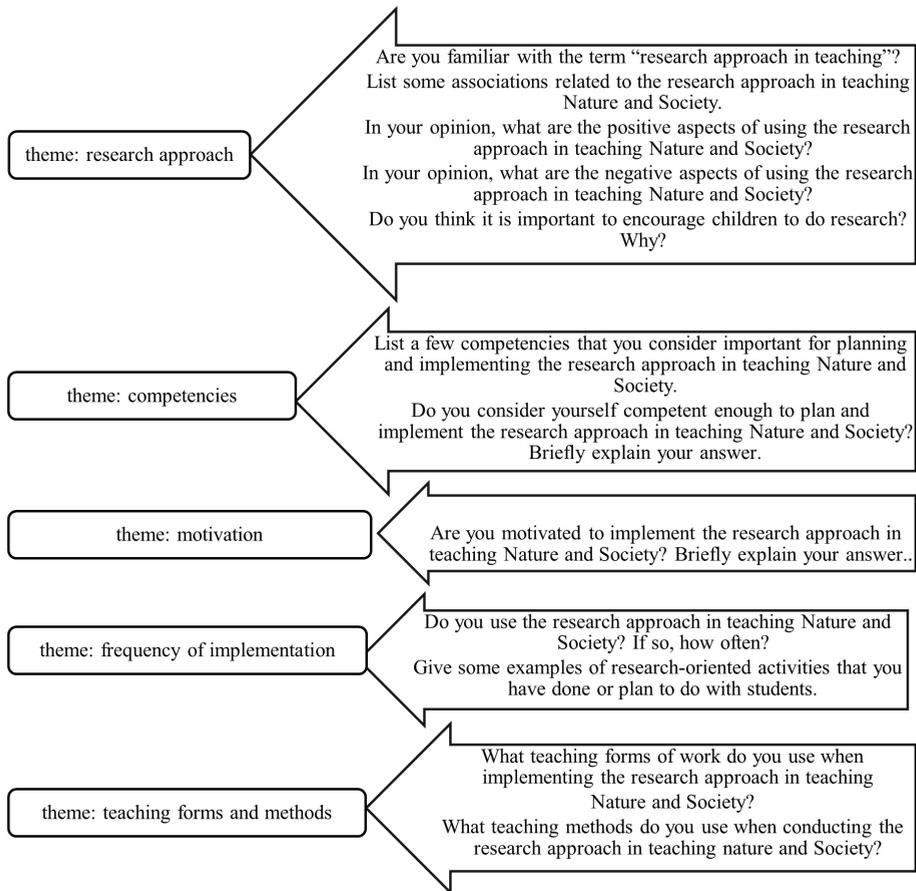
The research involved 24 first-, second-, third-, and fourth-grade teachers in two primary schools in the Primorje-Gorski Kotar County. The research was conducted at the Ivan Rabljanin Elementary School in Rab on the island of Rab and the Nikola Tesla Primary School in Rijeka. Data were collected using the interview method, i.e., the interview procedure. The research was conducted during June and July 2020 in two primary schools in the Primorje-Gorski Kotar County. For the purposes of the research, a semi-structured interview was constructed that included eleven questions: four questions related to the acquaintance of early primary school teachers with the concept of the research approach and their thoughts on the positive and negative sides of the research approach; two questions related to teachers' competencies for planning and implementing the research approach in teaching Nature and Society; one question examined teachers' motivation to implement the research approach in the teaching of Nature and Society; the frequency of conducting the research approach in teaching Nature and Society and examples of conducted research-oriented

activities were examined with two questions, as well as the use of teaching methods and teaching forms used by early primary school teachers in implementing the research approach in teaching Nature and Society. The research relies on the qualitative approach and methodology, and the data obtained by interviewing participants were analyzed with the method of thematic analysis according to Maguire and Delahunt (2017, according to Braun and Clark, 2006), using coding in accordance with the research questions (pre-set coding) According to the above, a thematic analysis was conducted in six phases or steps, which include: Step 1: Become familiar with the data (reading transcripts and recording); Step 2: Generate initial codes (coding was carried out in accordance with the research questions as pre-set coding, but also with generating new codes if they could be identified); Step 3: Search for themes (in accordance with research questions, but also merging topics if similar topics appear within the codes); Step 4: Review themes (discovering primary topics, linking and aligning with research issues); Step 5: Define themes (generating primary and subtopics in relation to research questions), and Step 6: Write-up (recording and describing research results) (Maguire & Delahunt, 2017, according to Brown & Clark, 2006).

The research was conducted by Karmen Vidas (September, 2020) for the purpose of her diploma thesis entitled “The research approach in teaching Nature and Society,” in accordance with the approval of the Faculty of Teacher Education and respect for all ethical principles in the implementation of research. The participants were introduced to the research aim, and participation was voluntary and anonymous. The interview was audio- and video-recorded, transcribed, and then data processing was performed based on the pre-set coding (research questions). In addition to the main topics obtained from the research, the participants’ typical statements and direct and indirect “connections” between the research questions or codes are presented. The results are presented by thematic categories.

## **RESULTS AND DISCUSSION**

The obtained results isolated the themes/thematic categories that correspond to the research questions. The results of this research yielded five thematic categories, which corresponded to the research questions, and which we used as codes in conducting the thematic analysis. They are presented in Figure 1.



**Figure 1** Thematic map of analysis: thematic categories and research questions

## RESEARCH RESULTS OF EARLY PRIMARY SCHOOL TEACHERS' FAMILIARITY WITH THE CONCEPT OF THE RESEARCH APPROACH IN TEACHING NATURE AND SOCIETY

The first thematic category related to the *research approach* and contained four questions. In the interview, the first question in the thematic category referred to whether early primary school teachers are familiar with the concept of the research approach in teaching Nature and Society and to list the associations (as an implicit technique) related to the research approach in teaching Nature and Society. All participants answered that they were familiar

with the concept of the research approach, and the associations related to the research approach they cited were: *research/independent research; cognition/independent reaching of cognition; independence/self-discovery and problem solving; active learning/active pupil/greater pupil engagement; pupil creativity/encouraging creativity; observation/observation of nature/observation by seasons; direct observation/immediate reality; interest; thrill; interesting teaching; ideas; comparing; demonstrations; experiments; experiments; problem tasks; critical thinking; reasoning; teamwork; coping; experiences/experiential learning; extracurricular teaching and self-evaluation.*

The results obtained on the acquaintance of early primary school teachers with the concept of the research approach in teaching Nature and Society based on their provided answers indicate that the obtained associations related to the research approach in teaching Nature and Society correspond to the definition of the research approach referred to in the Curriculum for the school subject Nature and Society for primary schools. When comparing the definition of the research approach, which reads: “Through the research approach, the pupil develops skills that he or she will apply later in everyday life and based on critical consideration of valid evidence and arguments make relevant decisions. The research approach contributes to the development of curiosity, creativity, skills of observation, comparison, classification, asking questions, predicting, analyzing, generalizing, evaluating, communicating, gathering information, etc.” (Curriculum for the school subject Nature and Society for primary schools, 2019, p. 8) and the obtained research results, it is concluded that early primary school teachers are familiar with the concept of the research approach and describe it accurately with the help of associations. Furthermore, in the second question in the thematic category *research approach*, the participants were asked to list the positive aspects of the research approach in teaching Nature and Society. The obtained results indicate that early primary school teachers agree that there are many positive aspects of the research approach, which is in line with previous research (Letina, 2016, 2020). The participants mentioned various positive aspects of using the research approach in teaching Nature and Society, such as acquiring more long-term knowledge, easier adoption of teaching materials, greater pupil motivation, developing abilities and skills important for pupils’ daily lives, developing a positive attitude towards learning, developing pupils’ independence and creativity, developing a critical way of thinking, socializing, and gaining experiences. Some examples of the participants’ views are expressed in the statements below:

*“The concepts that are adopted through research remain in the pupils’ memory longer and are generally better remembered, and this way of working mostly makes them happy.”*

*“The positive side of the research approach is that pupils can learn the material much more easily through research, in a way that they get to know*

*nature not only through dull materials, but also through the experience they gain during the research.”*

*“By introducing the research approach to the teaching of Nature and Society, the pupil develops abilities and skills based on his experience and research, and thus contributes to his or her own personal development and the acquisition of knowledge.”*

*“During the implementation of the research approach, pupils’ creativity and independence come to the fore. The pupil independently notices and gains knowledge about changes in the environment and draws conclusions. In addition, the socialization of pupils due to the use of group work is pronounced.”*

In the third question in the thematic category *research approach*, the participants were asked to list the negative aspects of the research approach in teaching Nature and Society. The results indicate that early primary school teachers agree that there are fewer negative aspects of the research approach. As the negative aspect, the participants most often cite the lack of time and schools’ lack of technical equipment, which includes insufficient research materials and equipment. To a lesser extent, they cite the problem of more challenging maintenance of discipline during the implementation of the research approach in the teaching of Nature and Society. Here are their key statements:

*“The only thing that is possible is that there are no funds and materials for research work, although everyone manages with what they have.”*

*“Such an approach in teaching usually requires more time, so sometimes it cannot be implemented to the extent that we would normally do it.”*

*“The negative aspects of conducting the research approach are the unavailability of certain tools and aids for work and the difficulty of maintaining discipline.”*

The last question in the thematic category *research approach* was aimed at expressing the participants’ opinions on the importance of encouraging children to engage in research. The results show that all participants agree that it is important to encourage children to do research. In most cases, the participants stated that encouraging children to do research is important for encouraging critical thinking and logical reasoning, developing skills and abilities needed for everyday life, and acquiring more lasting knowledge and thus the foundation for lifelong learning (Letina, 2020). Some examples of the participants’ views are expressed in the statements below:

*“It is very important to encourage children to do research. Through research, they develop all the senses, think critically, and draw conclusions based on what they have observed. Research is very interesting for pupils and this form of teaching motivates them for further work.”*

*“It is certainly important to encourage children to do research. In this way, children develop imagination, make connections and draw conclusions*

*faster, and sometimes come up with new research ideas on their own. I also think that sometimes they feel more useful because they participate more actively in teaching and become more independent.”*

*“It is important to encourage children to engage in research because it enables them to work independently. Children research, discover, and acquire lasting knowledge ... Research, and especially experiments, connects theory with practice.”*

Based on the obtained research results, it is possible to conclude, in relation to the obtained thematic category *research approach*, that early primary school teachers are well acquainted with the concept of the research approach. When listing the positive and negative sides of the research approach, the participants mentioned those positive and negative sides which are in line with the current knowledge about the research approach as one of the key features of modern teaching. In this way, the participants additionally showed their knowledge of the concept of the research approach. The obtained results also indicate that teachers agree with the fact that the research approach in teaching Nature and Society has more positive than negative sides. Also, the results indicate that teachers agree that it is important to encourage pupils to do research because of the positive effects of these forms of work on further learning and teaching, especially educational, but also child-rearing effects. The research results suggest that the participants describe the features of the modern teaching or the research approach as a form of modern teaching that activates the pupils' role in the teaching process, encourages forms of collaborative learning, and focuses pupils' creativity on the development of science literacy (Letina, 2016, 2020; Pećar et al., 2020). However, it is clear that, although, on the one hand, teachers clearly recognize the importance of the research approach as a modern form of teaching, the impossibility of its implementation is associated with lack of material resources and time, which, on the other hand, indicates a lack of knowledge that these obstacles can be effectively bridged and solved with the use of various digital tools (Anđić et al., 2020).

## RESEARCH RESULTS OF EARLY PRIMARY SCHOOL TEACHERS' COMPETENCIES FOR PLANNING AND IMPLEMENTING THE RESEARCH APPROACH IN TEACHING NATURE AND SOCIETY

The second thematic category called *competencies* contained two questions. The first question referred to listing early primary school teachers' competencies which the participants consider important for planning and implementing the research approach in teaching Nature and Society. The obtained results indicate that early primary school teachers consider the following competencies important for planning and implementing the research approach in teaching

Nature and Society: knowledge of the profession, subject knowledge, ability to plan and prepare a research-oriented lesson, creating a stimulating environment and guidance, the ability to monitor and verify, and digital competency. In addition, the participants typically cite desirable teacher traits such as patience, research spirit, openness to new ideas, resourcefulness, perseverance, organization, and the like. All of the above does not fall under the research scope of this paper, but it is certainly favorable when implementing the research approach in teaching Nature and Society.

In the second question in the thematic category *competencies*, the participants were asked to answer whether they consider themselves competent to plan and implement the research approach in the teaching of Nature and Society. The participants offered answers on the basis of which the following results can be derived: Most participants consider themselves competent to plan and implement the research approach in teaching Nature and Society on account of the years of work experience and early primary school teaching as well as having attended professional development programs. A small number of participants consider themselves partially competent to plan and implement the research approach in teaching Nature and Society. The smallest number of participants does not feel competent to plan and implement the research approach to teaching Nature and Society. Those participants who feel insufficiently competent or do not feel competent at all believe that a lot of experience and knowledge is needed to gain a sense of competency to plan and implement the research approach in teaching and stress the importance of additional education. Some examples of participants' views are expressed in the statements below:

*"I consider myself competent in terms of years of experience and continuous training."*

*"I consider myself competent, and I personally like a lot of practical work in teaching, which I try to pass on to pupils."*

*"I believe that I am competent to plan and implement the research approach in teaching Nature and Society because of the experience of working with pupils."*

*"I consider myself competent enough, but unfortunately, our entire curriculum often forces us to process new teaching content at a fast pace, so it often happens that there is not enough time for such a form of teaching."*

*"I consider myself competent enough to plan and implement the research approach in teaching Nature and Society because I have been applying it in my work for a long time and my pupils enjoy it. Their results are the best proof of competencies."*

*"I do not consider myself competent enough. I think I need a lot more experience and knowledge."*

Based on the above research results, it is possible to conclude that early primary school teachers largely feel competent to plan and implement the

research approach in teaching Nature and Society, and attribute this to their own experience in working with children and participation in professional development. On the other hand, a smaller number of teachers consider themselves insufficiently competent to plan and implement the research approach in teaching Nature and Society and believe that they need more work experience and additional education to acquire the necessary competencies to implement the research approach in teaching Nature and Society. However, such results can be attributed to years of teaching experience, which means that teachers who have fewer years of work experience in early primary school teaching may have a sense of possessing fewer competencies. Such results agree with the research results obtained by Pavin et al. (2003). The results of this research showed that university studies have enabled teachers to acquire knowledge of school subjects, application of teaching methods, lesson planning and setting teaching goals, but that they did not provide the teachers with other competencies needed to conduct more complex forms of work (Pavin et al., 2005). Therefore, younger teachers may feel less competent. Because the organization and implementation of more complex forms of work such as the research approach often poses a problem for teachers, it is important to provide them with a support system. Based on the research results, it is clear that additional education should be provided to teachers to help them acquire new competencies. Therefore, Letina (2012) emphasizes the need to provide in-service training programs for early primary school teachers that will enable them to acquire new and develop existing competencies. As the author points out, in this way, teachers can meet the requirements of new modern curriculum requirements (Letina, 2012, 2019).

### RESEARCH RESULTS OF TEACHER MOTIVATION FOR IMPLEMENTING THE RESEARCH APPROACH IN TEACHING NATURE AND SOCIETY

The third thematic category called *motivation* contained one question. The question referred to teachers' motivation to plan and implement the research approach in teaching Nature and Society. The obtained research results indicate that all participants are motivated to plan and implement the research approach in the teaching of Nature and Society. As the reason they stated greater motivation of pupils when using the research approach, acquiring more lasting knowledge, encouraging critical thinking and logical reasoning in pupils, more creative approach to learning, interesting teaching, better learning outcomes, and the fact that pupils like research activities. Some examples of participants' views are expressed in the statements below:

*“I am motivated to implement the research approach in teaching Nature and Society. Successful and satisfied pupils and the achievement of outcomes are a great motivation for me in implementing this approach.”*

*“I am motivated because I notice that pupils like this form of teaching.”*

*“I am motivated because I think that this form of teaching is much more creative and interesting to pupils, and the most important thing for me is that through the research approach, pupils achieve better learning outcomes and become more motivated themselves.”*

Based on the results, it is concluded that early primary school teachers connect their motivation to implement the research approach in teaching Nature and Society with the positive aspects of the research approach. In addition, teachers stated that regardless of their motivation, they are often unable to conduct the research approach in teaching Nature and Society due to certain limiting factors such as the lack of time and resources.

Such results can be related to the research results obtained by Borić et al. (2010). Namely, Borić et al. (2010), in the conclusion of their research, prove that the connection between the perceived advantages of research teaching and teacher motivation is statistically significant. In addition, they conclude that more competent and motivated teachers are the more likely they will be to cite more advantages of research-oriented teaching. Furthermore, in her doctoral dissertation, Perković Križan (2016) touches on the problem of job satisfaction and concludes that teachers with more expressed methodic knowledge and more satisfaction apply research activities more often than teachers with more expressed methodic knowledge but less satisfaction. Therefore, it can be concluded that teachers who show more job satisfaction are also more motivated and, therefore, more often conduct the research approach in teaching Nature and Society.

## RESEARCH RESULTS OF THE FREQUENCY OF IMPLEMENTING THE RESEARCH APPROACH IN THE TEACHING OF NATURE AND SOCIETY

The fourth thematic category was called *frequency of implementation* and contained two questions. In the first question in the thematic category, the frequency of implementation, the participants had to answer how often in teaching Nature and Society they conduct the research approach. The results of the research indicate the existence of different practices among primary school teachers, and the answers of the participants differed greatly. Participants offered answers on the basis of which the following results can be derived: Most participants conduct the research approach in teaching Nature and Society several times a year. A small number of participants conduct the research approach in the teaching of Nature and Society several times a month. Only one participant uses the research approach in teaching Nature and Society in each teaching topic. Some of the examples of participants' answers are given in the statements below:

*“I rarely use it in the first and second grade, and several times a year in the third and fourth grade.”*

*“I use the research approach less often in the first and second grade, but several times a month in the third and fourth grade.”*

*“I often use the research approach in teaching Nature and Society inside the classroom, several times a month, but, in terms of extracurricular teaching, less often than before because of the many consents that parents have to sign, so teaching comes down to paperwork.”*

*“I use the research approach in teaching Nature and Society in every teaching topic because I see great importance in pupils’ practical work.”*

In the second question in the thematic category of *frequency of implementation*, the participants were asked to give some examples of research-oriented activities that they have conducted or plan to conduct with pupils. The results of the research indicate that early primary school teachers most often carry out the following activities: experiments with water, planting and observing plant growth, herbarium, experiments related to living conditions, researching habitats, determining the sides of the world, monitoring weather conditions in one’s region, learning about cultural heritage, ancestors, keeping records of activities from the daily life of pupils, water properties, water aggregate states, making compasses, and measuring air temperature. Some of the examples of participants’ answers are given in the statements below:

*“The pupils observed water boiling and evaporating.”*

*“The pupils sowed the seeds and monitored the progress of plants. One plant was exposed to light, the other was kept in the dark. One was watered, and the other was not.”*

*“The pupils researched the dishes of our ancestors and the way they were prepared.”*

*“While learning about healthy eating, I did an activity with pupils – My best smoothie.”*

*“In the future, I plan to conduct some form of research with pupils in which they will choose what to research and make a short presentation about it ... However, I plan to do it when pupils are more independent and when they adopt the skills needed to reach creative solutions and make independent presentations.”*

Based on the obtained results, it can be concluded that most participants still implement the research approach in teaching Nature and Society to a very small extent, only a few times in the school year. The participants associate the implementation of the research approach in the teaching of Nature and Society to a large extent with the shortcomings of the research approach. Based on the research results, in most cases, the reason for the less frequent implementation of the research approach in teaching Nature and Society is the lack of time and lack of funds needed for research. Also, the results of the research indicate that

teachers use the research approach more often in the third and fourth grade, and less often in the first and second grade. Such results partially coincide with the results of research conducted by Borić et al. (2010). The results of that research show that the largest percentage of teachers, as many as 42%, state that the research form of teaching is conducted only once a month, and only 10% of teachers do it once a week. The results of the research by Borić et al. (2010) point to the fact that an insufficient number of teachers implement this form of teaching regardless of all its advantages. In addition, the authors also come to the conclusion that research-oriented teaching is more often conducted in the third and fourth grades, and less so in the first and second grades. In this case, too, the research results coincide, although the exact reason why the research approach is more often conducted in the third and fourth grade is unknown, but we can assume that the reason is simpler organization and implementation of research activities with older pupils. In this case, space is left for some future research that could indicate the reasons for obtaining such results. Based on the research results, it is concluded that when conducting the research approach, although teachers rarely conduct it, use research activities that enable them to engage the pupils more actively.

#### RESEARCH RESULTS OF THE SELECTION OF TEACHING FORMS AND TEACHING METHODS DURING THE IMPLEMENTATION OF THE RESEARCH APPROACH IN TEACHING NATURE AND SOCIETY

The last thematic category referred to the *teaching forms and methods* and included two questions. In the first question, the participants were asked to list the teaching forms they use when conducting the research approach in teaching Nature and Society. Based on the participants' answers, the following results can be derived: The participants most often use pair work and group work when conducting research activities. A small number of participants use individual work when conducting the research approach in teaching Nature and Society. The smallest number of participants use frontal work in combination with pair work and group work when conducting the research approach.

In the second question of this thematic category, the participants were asked to list the teaching methods they use when conducting the research approach in the teaching of Nature and Society. The results indicate that early primary school teachers most often use methods of practical work, experimentation, conversation, oral presentations, and observation when conducting the research approach in teaching Nature and Society. Based on the obtained results, it is concluded that the participants use active work methods that enable pupils to actively participate in teaching when conducting the research approach in teaching Nature and Society. Also, the research results show that teachers, when



## RESEARCH CONCLUSIONS

The results of qualitative research conducted with teachers (N = 24) of first, second, third and fourth grades in primary schools in Primorje-Gorski Kotar County indicate that the research approach remains insufficiently implemented, which to a certain extent was to be expected.

The qualitative research presented in this paper established teachers' opinions about the research approach in teaching Nature and Society. In the implementation of the research approach, teachers and their opinions on the research approach, which is one of the key features of modern teaching in Croatian schools, play an important role. The research was conducted using the interview procedure and the results were analyzed with the method of thematic analysis, i.e., coding in accordance with the research questions. Five key thematic categories were identified. The first thematic category was the *research approach*, which referred to the acquaintance of early primary school teachers with the concept of the research approach in teaching Nature and Society. The research results indicate that early primary school teachers are familiar with the concept of the research approach and agree that the research approach in teaching Nature and Society has many more positive than negative sides. In addition, the results based on the participants' answers show that all participants agree that it is important to encourage children to do research, and as reasons for it mention that it encourages critical thinking and logical reasoning, developing skills and abilities needed for everyday life, and acquiring lasting knowledge. This achieved the research outcome, according to which the teachers were expected to be familiar with the concept of the research approach.

The second thematic category was called *competencies*, and it referred to teachers' competencies for planning and implementing the research approach in teaching Nature and Society. Early primary school teachers self-assessed competencies were explored. The results indicate that the majority of participants consider themselves competent to plan and implement the research approach in teaching Nature and Society, citing years of work experience and early primary school teaching as well as attending professional development programs. A small number of participants answered that they consider themselves partially competent for planning and implementing the research approach in teaching Nature and Society, and the smallest number of participants answered that they consider themselves incompetent for planning and implementing the research approach in teaching Nature and Society. The reason for this was the need to gain additional experience and knowledge and the need for additional education. The outcome of this research was achieved, according to which early primary school teachers were expected to highly value their own competencies for planning and implementing the research approach in teaching Nature and Society.

The third thematic category was called *motivation*, and it referred to the early primary school teachers' motivation to implement the research approach in teaching Nature and Society. It was explored whether early primary school teachers were motivated to plan and implement the research approach in the teaching of Nature and Society. The results of the research indicate that early primary school teachers are motivated to plan and implement the research approach in teaching Nature and Society and that they connect their motivation with the positive aspects of the research approach, such as greater pupil motivation when using the research approach, gaining more lasting knowledge, encouraging critical thinking and logical reasoning in pupils, interesting teaching, better learning outcomes, and the fact that pupils enjoy research activities. In addition, teachers stated that, regardless of their motivation and the positive aspects of the research approach, they often do not have the opportunity to implement the research approach in teaching Nature and Society due to certain limiting factors such as the lack of time and resources. The research outcome was achieved. In other words, the results confirmed the hypothesis of this research on the motivation of early primary school teachers to implement the research approach in teaching Nature and Society due to the advantages it brings.

The fourth thematic category was the *frequency of implementation*. The results show that early primary school teachers usually conduct the research approach in teaching Nature and Society several times a year, which is too little to achieve the goals of modern teaching of Nature and Society. This confirmed the hypothesis of this research, according to which teachers were expected to apply to a lesser extent this type of teaching.

The fifth thematic category was *teaching forms and teaching methods*, and it referred to those teaching forms and methods that teachers use in implementing the research approach in teaching Nature and Society. The results indicate that early primary school teachers use active work methods that enable pupils to actively participate in teaching when conducting the research approach in teaching Nature and Society. Also, the research results indicate that teachers, when conducting the research approach in teaching, most often use desirable forms of work such as pair work and group work in which pupils can actively learn, collaborate, and develop skills. The last outcome was achieved, i.e., the hypothesis of this research was confirmed, according to which teachers were expected to answer that, when conducting the research approach in teaching Nature and Society, they use teaching methods and teaching forms that enable active learning.

Aligned with this are the limitations of this research, which relate to the small sample and the specificity of the sample and, based on that, the impossibility of a general conclusion based on the obtained results. However, it is important to emphasize that the conclusions are interpreted and should be accepted with caution and only as indicative indicators. The obtained research

results are largely positive and confirm the results of individual research so far. Early primary school teachers are familiar with the concept of the research approach and are motivated to implement the research approach in teaching Nature and Society. In addition, primary school teachers largely believe that they possess certain competencies needed to plan and implement the research approach in teaching Nature and Society and use those teaching methods and teaching forms that enable greater pupil activity. However, the research approach is not sufficiently implemented in the teaching of Nature and Society. When the obtained results are considered as a whole, it is concluded that a lack of time and teaching aids needed for research prevents early primary school teachers from a more frequent inclusion of the research approach in the teaching of Nature and Society. This indicates that there are still obstacles in its significant implementation based on insufficient teacher competencies, but also the lack of recognition of the many and varied opportunities offered by modern multimedia methods, aids, and tools in implementing the research approach in primary schools.

Finally, and in this context, the question of the research approach itself remains unresolved: Is it just a departure from the traditional or are we actually discussing modern teaching? This question remains difficult to answer for several reasons. On the one hand, the research approach is a new approach in teaching Nature and Society, and, on the other hand, it is possible to conclude that, given the methodics in the teaching of Nature and Society, it has always been an integral part of it. The research approach or its forms of work existed before and it was part of the conceptions of members of alternative pedagogical and didactic directions throughout history. De Zan (2010), Matijević (2005), Letina (2015), and other authors place the research approach in the context of teaching Nature and Society, and pupils' research work is part of learning and teaching Nature and Society. At the same time, the research approach emphasized in the new Curriculum for the school subject Nature and Society, as a methodological approach, gives it a new meaning and forms of work, so it can be considered a feature of modern teaching, because, among other things, it improves pupils' competencies and self-regulates their learning (Harvest, 2020). However, is that enough to call the teaching modern? We estimate that this is certainly a good start, but the curriculum is still "new" and the implementation of the research approach as a modern form of teaching largely depends on the teachers themselves, their competencies, but also other factors, as shown in this research. Therefore, it may be a bit too premature to discuss truly modern teaching.

This research certainly opens room for the implementation of new research on a larger sample of participants, with the guideline that, in the future, more attention be paid to this topic. It is expected that new research, due to the contribution of the New Curriculum, will show more positive results in the future

in terms of more frequent implementation of the research approach in teaching Nature and Society, but also in more modern teaching in general. Given that the concept of the research approach is relatively new in the Croatian curriculum, it will take some time, but also additional teacher education in the form of various forms of professional development, in order for it to be fully implemented as a form of modern teaching in the teaching of Nature and Society, and to make it a more abundant and stimulating experience for the pupil.

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