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TRENDS IN EVALUATION OF GEOGRAPHIC KNOWLEDGE AND SKILLS IN THE REPUBLIC OF CROATIA

Biljana VRANKOVIĆ[1], Ružica VUK[2], Zoran CURIĆ[2]

[1]National Centre for External Evaluation of Education, Zagreb
[2]University of Zagreb, Faculty of Science, Department of Geography, Republic of Croatia
email: biljana.vrankovic@ncvvo.hr

Abstract

The primary objective of this paper is to explore new approaches in evaluation of geographic pre-tertiary education, which, in addition to changing the paradigm of learning and teaching, is the major challenge of curricular changes. Feedback about the realization of the purpose and objectives of learning and teaching of geography is gained through internal and external evaluation processes. The approaches to internal evaluation imply evaluation *of* learning, evaluation *for* learning and evaluation *as* learning. Since it results in a numerical grade, the interest of all participants in the educational system is focused on evaluation *of l*earning. Evaluation elements are geographical knowledge, geographical research and skills and cartographic literacy. Different methods and techniques are used in the evaluation *for* learning that result in relevant feedback for students on results and progress in work, in order to improve and plan learning and teaching. It does not result in a numerical grade. Evaluation *as* learning is integrated in the learning process. Basic trends in internal evaluation are also reflected on external evaluation. The external evaluation in Republic of Croatia are national exams and state matura. National exams from Geography in primary school were conducted in 2007/2008, and in secondary school from 2005/2006 to 2007/2008 school year. The paper analyzed the results of all conducted exams of external evaluations and determined the impact of different evaluation approaches on the results.

Key words: internal evaluation, external evaluation, geographic knowledge, geographic skills, student achievement

Introduction

Students in Croatia at first acquire geographical knowledge and skills integrated in the subject of Nature and Society (first educational cycle) and later through the compulsory and separate teaching subject Geography (from the fifth to the eighth grade of primary school and in secondary school). The purpose of learning and teaching Geography is to acquire geographical knowledge and skills and positive ethical attitudes (geographic literacy) so that students become trained, responsible and active members of the community. Through internal and external evaluation processes, students, teachers and other stakeholders in the education system receive feedback on the achievement of the purpose and goals of learning and teaching geography, as well as on the level of adoption of educational outcomes.

The primary objective of this paper is to analyze trends in the evaluation of geographic pre-tertiary education. A major trend in (geographic) education in Croatia is the paradigm shift in learning, teaching and assessment, initiated in the first decade of this century (Cur-

riculum for Primary Schools, Ministry of Science, Education and Sports, 2006), guided by by-laws (Rule book on ways, procedures and elements of student evaluation in primary and secondary schools, Official Gazette 112/2010), continued with the introduction of national exams and state matura, and intensified by the processes initiated by the implementation Strategy for Education, Science and Technology (Official Gazette 124/2014). New approaches to internal evaluation, in addition to the evaluation *of* learning, include evaluation *for* learning and evaluation *as* learning. As it results in a numerical grading, the interest of all stakeholders in the education system (and beyond) is focused on evaluation *of* learning.

Considering the fact that education as a whole, and especially all segments of teaching, are practical and research-theoretical phenomens (Topolovčan, 2017), we consider the evaluation of geographical knowledge and skills as one of the essential issues for improving the adoption of geographical educational outcomes (but also the outcomes and expectations of all other subjects, cross-curricular topics, curriculum areas, levels and types of education). How often and effectively geography teachers will apply new evaluation approaches depends on a number of factors, from motivation, initial competencies in the field of evaluation to the type of content on which particular outcomes are achieved, then the equipment of the schools, the effects of education for the implementation of new subject curricula and and other curricula. This paper analyzes the paradigmatic and legal foundations for implementing new approaches in evaluating geographical knowledge and skills, as well as the attitudes of geography teachers about their readiness for the process.

Methodology

„The issues of education are often phenomenological and idiographic and focused on case studies and fostering change“ (Topolovčan, 2017). Due to the above, as well as the fact that „… gnoseological and epistemological it is not appropriate to generalize the results, but to direct them precisely to specific cases and phenomens” (Topolovčan, 2017), we have used grounded theory as a qualitative method and approach. The basic characteristics of this theory are discovering the theory about the explored phenomenon from the empirical data of research and constant comparative analysis of the data. In this paper, an abbreviated version of this approach was applied (Willig, 2008 according to Topolovčan 2017). This means that facts, concepts and relationships among them are obtained through an inductive approach, without mapping the theoretical and methodological aspects of some other theories, concepts and practices.

Data for research were collected by analyzing the contents of the following documents: Strategy for Education, Science and Technology (Official Gazette 124/2014), Geography curriculum (Official Gazette 7/2019), curriculum for cross- curricular topics (Official Gazette 7/2019 and 10/2019), Experimental Program „School for Life“ - reports about teaching in virtual classrooms, reports from regional meetings, live meetings and counseling visits[1], as well as conducted state matura from Geography in the Republic of Croatia from 2009/2010 to 2018/2019 school year[2]. The data at first were coded openly (initially), then axially and finally selectively in order to contextually and substantively formed codes integrate into concepts, and these into subcategories and categories. The obtained categories were

1 https://skolazazivot.hr/

2 https://www.ncvvo.hr/kategorija/drzavna-matura/

compared with the categories obtained by quantitative research in the field of evaluation of geographical knowledge and skills in the Republic of Croatia. The results of this study can serve as a basis for theoretical sampling in new or longitudinal studies of teaching geography and geographic literacy in the Republic of Croatia and comparative studies of geographic literacy in other countries.

Results and discussion

Feedback about the realization of the purpose and objectives of learning and teaching of geography is gained through internal and external evaluation processes.

Internal evaluation – new approaches

Although various forms of formative evaluation in teaching geography have existed in practice for decades, new approaches to internal evaluation have been established through the adoption of the Curriculum of the subject Geography for Primary Schools and Gymnasiums (Grammar Schools) (Official Gazette 7/2019). The proposal of the subject Geography curriculum was applied as part of the experimental program „School for Life“ in 2018/2019 school years in fifth grades of primary schools and first grades of gimnasium, and the subject curriculum adopted in 2019 will be applied in the same grades of all primary schools and gymnasium from 2019 to 2020 school year. New approaches to internal evaluation imply evaluation for learning and evaluation as learning that does not result in numerical grade.

In the subject Geography, the elements of evaluation are geographical knowledge, geographical research and skills and cartographic literacy. The first element covers factual, conceptual and procedural knowledge, with a clear recommendation (instruction) to place emphasis on conceptual and procedural knowledge to determine the ability to apply knowledge in new situations and creatively address spatial problems. The second element includes geographical observation skills, questions asked, research planning; data collection; recording, evaluating and presenting data; interpreting and analyzing data and concluding; communicating results and research procedures and reflecting on the conducted research. In addition to the above, graphic, statistical, mathematical and orientation skills are also valued. Cartographic literacy involves knowing the elements and content of all types of geographical maps and interpretation of spatial organizations and processes by reading the content of geographical maps. The level of acquisition of geographical knowledge is determined by oral examination, written examination and evaluation of the student folder (student portfolio), and cartographic literacy by oral examination and written examination, which includes blank maps. In evaluation for learning, different methods and techniques are used that result in relevant feedback for students on their learning outcomes and advancements, in order to improve and plan their learning and teaching. It does not result in a numerical grade. Evaluation as learning is integrated into the learning process. The teacher by talking with students, collecting reflections on learning, and analyzing the student folder (student portfolio), allows students to monitor their own progress and achievement of learning goals.

Determining of student achievement at school is considered by many authors as a core teaching competences (e.g. Jurčić, 2012). Evaluation, teachers (geography) are considering to be the biggest challenge in their profession. Therefore, special attention has been paid to the

evaluation already in preparation for the introduction of the experimental program „School for Life“, within the so-called First counseling visit to schools[3], as well as year round education for all teachers, as part of the preparation for introduction of subject and curriculum of inter-subject topics in all first and fifth grades of primary school, for introduction of curriculum of Physics, Chemistry and Biology in all seventh grades of primary school, and introduction of subject and curriculum inter-subject topics in all first grades of gymnasium and curriculum for Croatian, English, German and Mathematics in the first grades of four-year vocational schools. Year-round teacher education took place in virtual classrooms through the Loomen platform[4]. In January and February and in June and July 2019 live meetings were organized.

In first survey of teachers involved in experimental program „School for Life“, in an instrument by which self-assessment competence for conducting curricular aproach were examined, in statement *I know how to apply new ways of monitoring and evaluating student achievement*, on a five-degree Likert scale, 49 % surveyed were choosing *mostly agree*, and only 17 % were choosing *agree completely*. In an instrument for assessing satisfaction with teacher training, in the statement *Educations helped me in understaning of new methods of evaluation and assessment*, 38 % surveyed were choosing *mostly agree*, and 14 % were choosing *agree completely*. In an instrument that examined the self-assessment of teaching and assessment, in the statement *I observe the students as they perform certain tasks and immediately give them feedback* on the five-degree Likert scale, 42 % surveyed were choosing *mostly agree*, and 45 % were choosing *completely agree*, while in the statement *The feedback I give to students also contains information about achievement and how to move forward*, 45 % and 41 %, respectively. From the aformetioned we can conclude that two thirds of teachers included in the experimental program are ready for the implementation of new approaches in evaluation, that half of the surveyed on the trainings have further improved their personal competences in the field of evaluation and that the majority of those surveyed apply the evaluation *for* learning in teaching practice. In the final examination of teachers there is more satisfaction with education (degree *mostly agree* has chosen 10 % more of surveyed, while in degree *completely agree* there was no diference), better self-assessment of competence to implement the curricular approach (in the statement *I know how to apply new ways of monitoring and evaluating student achievement* on the five-degree Likert scale, degree *mostly agree* has chosen 5 % more of surveyed, and the degree *completely agree* has chosen 4 % more of surveyed), but there is no significant progress in self-assessment of teaching and evaluation (in the statement *I observe the students while performing certain tasks and immediately I give them feedback*, degree *mostly agree* has chosen 10 % more of surveyed, but the degree *completely agree* has chosen 8 % less of surveyed; in the statement *The feedback I give to students also contains information about achievement and how to move forward* degree *mostly agree* has chosen 10 % more of surveyed, and degree *completely agree* has chosen 7 % less of surveyed) [5].

According to the report of the first live meetings for the frontal application of the Geography curriculum in the questionnaires for the evaluation of expert meetings, the participants

3 https://www.slideshare.net/Skolazazivot/prvi-savjetniki-posjet

4 https://www.slideshare.net/Skolazazivot/prvi-savjetniki-posjet

5 Evaluation of the experimental program" School for Life" - Results of the initial analysis of the questionnaire, NCEEE, May 2019; Evaluation of the experimental program "School for Life" (school year 2018/2019) - Results of the application of the questionnaire in the final measurement, NCEEE, July 2019.

stated that in the continuation of the professional development, "… they expect additional education on learning outcomes, use of ICT in teaching, inclusion (especially students with difficulties), but above all about evaluation, which is recognized as the most complex part of the teacher job"[6]. And after the second cycle of live meetings, geography teachers in the school year 2019/2020, expect „additional support and education ... on research work in Geography teaching, the use of ICT, inclusion (especially students with difficulties), but above all about evaluation, which is recognized as the most complex part of the teacher job".[7] A report on the work of the virtual classroom Geography at the „ School for Life", in which three topics were dedicated to evaluation, confirms that a small number of teachers have successfully completed their education in the field of evaluation by obtaining a badge[8], which means that it is necessary to provide support and complement to competences in the field of evaluation geographic educational outcomes as soon as possible and at all levels (from school to national), so that all approaches to internal evaluation are successfully implemented. The so far conducted analysis of external evaluation from geography provides important guidelines for the conception of education as well as examples of creating tasks for checking the development of geographical literacy.

External evaluation in Republic of Croatia: state matura and national exams

Basic trends in internal evaluation are also reflected in external evaluation, and the results identified by external evaluation are important guidelines for internal evaluation as well as guidance for corrections in the application of learning and teaching strategies (geography). The institution for external evaluation of pre-tertiary education in the Republic of Croatia is the National Center for External Evaluation of Education, which conducts state matura, national exams and international research in education. International projects in education implemented in the Republic of Croatia are PISA (Program for International Student Assessment), PIRLS (Progress in International Reading Literacy Study), ESLC (European Survey on Language Competences) and TIMSS (Trends in International Mathematics and Science Study). External evaluation of educational achievements of students in Geography is conducted at the state matura and occasionally at national exams.

Geography – elective exam at state matura

State matura is a summative external evaluation process that tests the abilities, skills and knowledge of students acquired during primary and secondary education according to prescribed curricula (Jokić and others, 2011; Pastuović, 2013; Vuk and others 2014; Vuk and others, 2015; Tretinjak and others 2017; Vranković and others 2018). Pursuant to the Ordinance on State Matura (Official Gazette 1/2013), state matura can be taken by students of vocational and artistic programs, which last for at least four years, and students who have completed at least four years of secondary education in the Republic of Croatia prior to its introduction, and students who have completed secondary education outside the Republic of Croatia compareable to four years of secondary education in the Republic of Croatia. For

6 https://skolazazivot.hr/geografija-skupovi-uzivo-priprema-za-frontalnu-primjenu-novih-kurikuluma-sijecanj-i-veljaca-2019/

7 https://skolazazivot.hr/geografija-skupovi-uzivo-priprema-za-frontalnu-primjenu-novih-kurikuluma-lipanj-i-srpanj-2019/

8 https://www.slideshare.net/Skolazazivot/izvjesce-vu-expgeo-201819

these students the state matura is not compulsory and is solely for their enrollment in higher education institutions. There are two goals of the state matura in the Republic of Croatia: the completion of secondary education for students of gimnazium programs and the ranking of all students to higher education institutions. State matura is conducted in a standardized manner throughout the state at the same time and under the same conditions and criteria for all students, and is conducted from the school year 2009/2010. State matura consists of a compulsory and elective part. The compulsory part of the state matura consists exams from Croatian language, Mathematics and foreign language. The elective part of the state matura consists exams from all other general education subjects and is not required for any group of state matura students.

Geography is an elective subject at the state matura and is being taken by the students to whom this is one of the conditions for continuing education or enrollment in selected study programs (Vuk and others, 2015; Šiljković and others, 2018; Vranković and others, 2018). For the enrollment in all study programs in geography at the Geography Department of the Faculty of Science, University of Zagreb, as well as for enrollment in some study programs in geography at the Department of Geography, University of Zadar, the mandatory condition is passed exam from Geography at the state matura. State matura exams were taken by a different number of students, from 1104 students in the school year 2009/2010 to 315 in the school year 2018/2019 (Fig. 1).

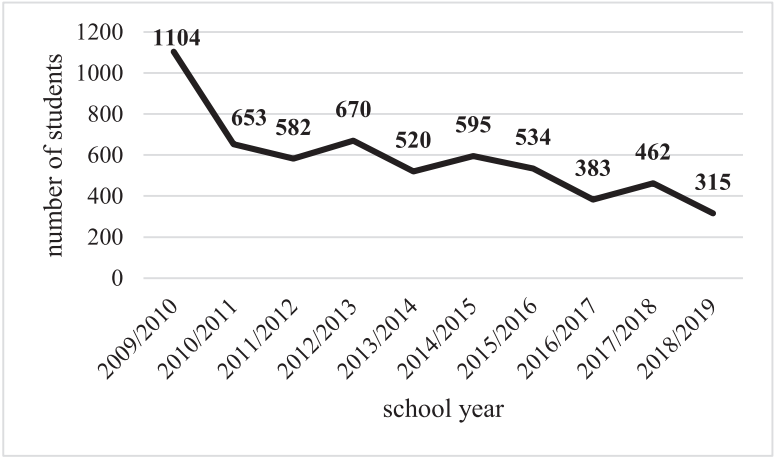

Fig. 1. Number of students on the Geography state matura exams since school year 2009/2010 to 2018/2019 in the Republic of Croatia

The exam in Geography at the state matura examines the extent to which students have acquired geographic knowledge and geographical skills during primary and secondary school geography education. The exam consists of closed-ended type of questions (multiple-choice) and open-ended type of questions (short-answer and extended-answer) that test geographic knowledge and geographic skills at different cognitive levels. Levels of knowledge and content of educational outcomes that students must know and understand in order to achieve the desired result in the Geography state matura exam are described in the Catalog for Examination. The revised Bloom taxonomy of knowledge and cognitive processes (Anderson and Krathwohl, 2001; Krathwohl, 2002) was used to define the educational outcomes expected of students at the end of the educational process. The achieved levels of geographical knowl-

edge and skills are tested in the fields of Physical Geography, Social Geography, Regional Geography of the World and Geography of Croatia. Areas (categories) of examination were obtained by coding educational outcomes into subcategories and categories. The average achievement at the state matura exams ranges from 35.6 % in the school year 2012/2013 up to 45.5 % in the school year 2010/2011 (Fig. 2).

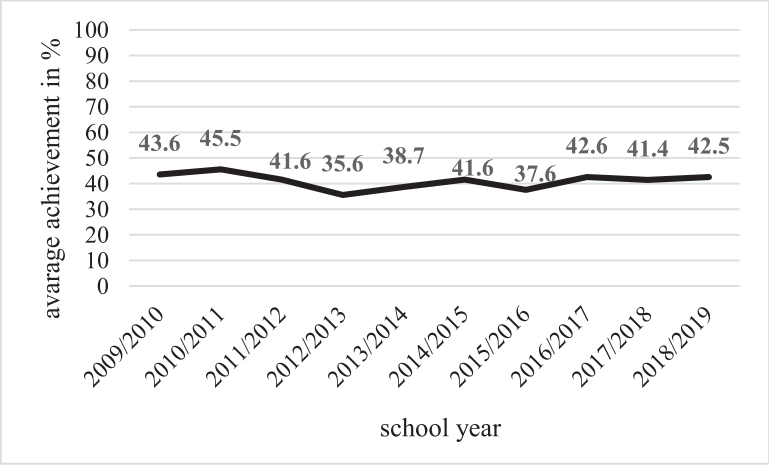

Fig. 2. Average achievements of students on the Geography state matura exams in % from school year 2009/2010 to 2018/2019 in the Republic of Croatia

In the Geography state matura exams, students are most successful in solving tasks related to geographical knowledge and geographical skills in Geography of Croatia, and least successful in solving tasks in the area of Regional Geography of World (Fig. 2).

Tab. 1. Descriptive indicators of the state matura exams in Geography and average results by content areas of the examination from school years 2009/2010 to school year 2018/2019 in the Republic of Croatia

School Year	State Matura Exam				Arithmetic means by content areas of the examination			
	Arithmetic mean	Standard deviation (σ)	Min. – maks. Achievend results in %	Cronbach's α-coefficient	Physical Geography	Social Geography	Regional Geography of the World	Geography of Croatia
2009/2010	43.6	14.45	0.0 – 95.5	-	44.3	48.2	38.2	48.0
2010/2011	45.5	13.78	0.0 – 93.5	-	38.0	49.7	32.8	45.0
2011/2012	41.6	13.20	0.5 – 81.5	-	33.7	37.6	41.6	42.0
2012/2013	35.6	29.60	11.5 – 84.5	0.92	31.0	44.2	30.8	35.4
2013/2014	38.7	29.60	0.0 – 84.5	0.94	37.4	38.0	35.3	44.0
2014/2015	41.6	30.11	0.0 – 96.0	0.93	33.2	37.8	46.7	48.3
2015/2016	37.6	27.08	7.0 – 85.0	0.92	42.9	34.4	33.5	38.1
2016/2017	42.6	15.87	7.0 – 91.0	0.93	43.1	44.6	35.9	54.5
2017/2018	41.4	16.18	5.0 – 89.0	0.93	38.1	39.9	39.0	52.8
2018/2019	42.5	15.87	0.0 – 87.0	0.93	-	-	-	-

The results of the Geography state matura exam show that students in the Republic of Cro-

atia are more successful in solving questions that test lower levels of cognitive processes (memorizing in relation to understanding and application), less successfully solve questions that test geographic skills (including cartographic literacy) than questions in which geographical knowledge is tested. In questions that examin geographical skills, the extent to which the student knows and can use geographical maps, and geographical statistical and graphical methods in interpreting spatial phenomena and processes is checked. In questions that examin geographical knowledge, the extent to which the student knows and can determine and explain geographical facts and generalizations is checked.

In Geography state matura exams, the measurement reliability estimated by the Cronbach's α-coefficient ranges from 0.92 to 0.94, while the average discrimination index of questions is about 0.38. On the basis of these indicators, it can be concluded that the exam is reliable with a satisfactory index of discrimination, which means that based on the applied exam questions can very well differentiated the knowledge of the student (Tretinjak and others, 2017). With this we can conclude that the state matura exams in geography satisfy their purpose, select the candidates well enough to continue their education and enroll in the study of geography.

National exams in geography

National Exams are formative external exams aimed at determining student achievement in basic knowledge and competencies in key parts of the educational cycle. The purpose of conducting national exams is to monitor the achievement of educational standards, provide feedback to schools on student achievement, guide teacher activities, and the like. They have an important role in the development of education policy and their results are analyzed to take appropriate measures to reduce differences in student achievement levels, to develop curricula, and to enhance the continuing professional development of teachers.

The achievements of students in primary schools in geography were checked in the school year 2007/2008 as part of the project *External Evaluation of Educational Achievements of 4th and 8th Grade Students*. „The Geograpy and Hystory exams took place in 797 scools in Republic of Croatia of the total of 842 schools which participated in the external evaluation" (Vuk and Vranković, 2009, 425). Analysis of external evaluation of educational achievement of eighth grade students (national exam) conducted in the school year 2007/2008 covered the exams of 21 485 students. The aim of the national exam was to verify the acquisition of teaching content in geography in primary school which refers to spatial structures, processes, concepts and spatial relationships from the following content areas of examination: General Geography, Regional Geography of the World and Geography of Croatia. The average resolution of the national exam was 42.7%. Vuk and Vranković (2009) concluded that in this national exam students were better solving the questions in which factual knowledge was tested while poorer results were achieved in examining higher dimensions of knowledge (Fig. 3). National exams give us valuable information about student achievement, but the evaluation of the school system must also be oriented to the quality of the teaching and learning process (Palekčić, 2007).

In the school year 2018/2019 a national exam in Geography was conducted on a sample of 34 schools (pilot). The purpose of conducting the national exam is to determine currently achieved geographic knowledge and skills of eighth grade students, according to the primary school curriculum and the new curriculum. The concepts which are learned and taught in Geography are: Spatial Organizations and Processes, Spatial Identity and Sustainability.

The fourth key concept of teaching Geography is Spatial Scale, which has an integrative character and is an integral part of the three mentioned concepts. Spatial Organizations and Processes is a complex concept that involves understanding the spatial arrangements (distributions) of the various elements of the natural base and social superstructure, understanding the possible patterns in these distributions, and changing these distributions, patterns and relationships over time. Spatial Identity is a basic geographical concept that encompasses the space (region, place) that characterizes its geographical features. It also includes the population, its structures and cultural phenomena, as well as its national identity and awareness of the importance of growing into a responsible and conscientious citizen. Sustainability means development in accordance with limited sources of energy and raw materials, and generally with nature in which man is an important factor of different ecosystems. The concept of Sustainability is viewed from three aspects: social, environmental and economic. The concepts in the exam which are planned to be implemented on a sample of primary schools in the school year 2019/2020 are propotionaly represented to the content of learning and teaching of Geography during primary education.

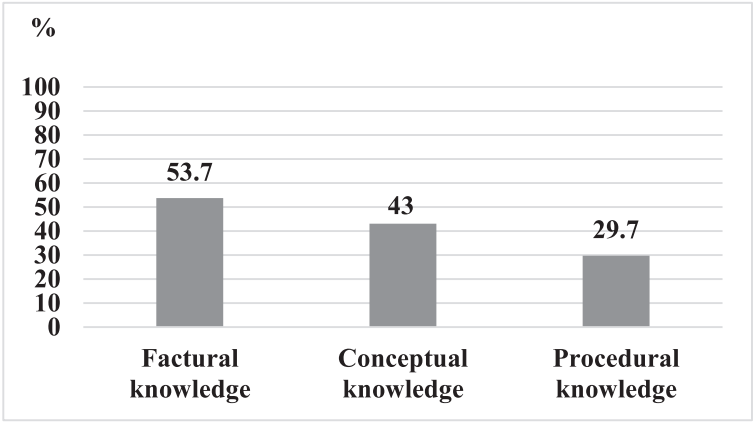

Fig 3. Solvability of test items according to dimensions of knowledge in the Geography test in the 2007/2008 school year (Source: Vuk and Vrankovic, 2008)

National exams were conducted in secondary schools since the school years 2005/2006 to 2007/2008, and they were used as preparation of students for the state matura pilot. The national exam in geography in secondary school was conducted in the school year 2008/2009 according to all the characteristics of the exams as they are conducted at the state matura.

Conclusions

With external evaluation (national exams and state matura) indirectly determines the effects of new approaches in evaluation, and directly the achievements of students in Geography at the end of certain education cycles. These cognitions are important for determining the level of understanding of geographical concepts, for changes in the learning and teaching of geography, as well as for curriculum interventions that include also evaluation approaches. The results of continuous monitoring of student achievement in the external evaluation exams in Geography show that they have a better average resolution in closed-ended type of questions than in open-ended type of questions and that the better achievements are in questions that

test geographical knowledge than geographical skills. The average resolution of the national exam was 42.7 %, and the average achievements at the state matura exams range from 35.6 % (in the school year 2012/2013) to 45.5 % (in the school year 2010/2011). In the last years of conducting of state matura in Geography, the average results are about the average of the national survey in primary school 2007/2008. With continuous monitoring of student achievement it was proven that students are most successful in answering questions related to geographical knowledge and geographical skills in Geography of Croatia, and least successful in answering questions in the area of Regional Geography of the World.

Analysis of student responses in open-ended type of questions on state matura exams and national exams (Vuk and others, 2015; Vranković and others, 2018; Vuk and others, 2014; Šiljković and others, 2018; Vuk and Vranković, 2009; Vuk and Vranković, 2013) resulted in knowledge about the level of adoption of educational outcomes and recommendations for learning and teaching. Curriculum of Geography subject for primary schools and gimnasium and other educational policy documents affirm new approaches to evaluation. Successfully applied evaluation for learning should also have a positive impact on the results of the evaluation *of* learning. Successful implementation of new approaches to evaluation and new methods of evaluating what is learned requires continuous support for teachers, as well as the complement to their competencies.

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