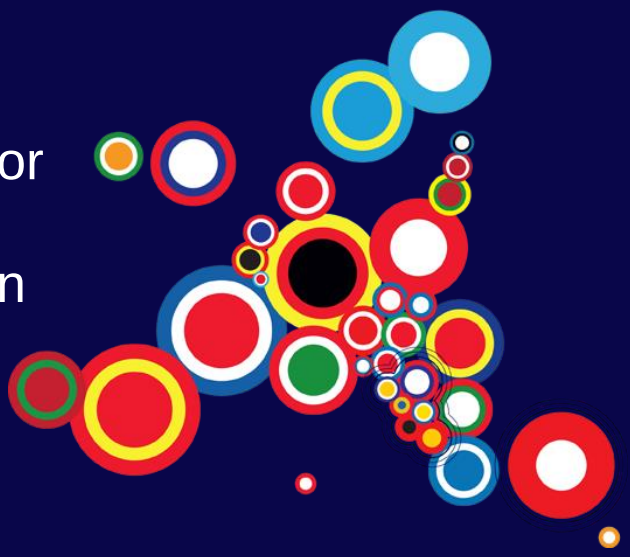
INSTRUMENT FOR PRE-ACCESSION ASSISTANCE (IPA II) 2014-2020

MULTI-COUNTRY

International assessment for mathematics and science testing in primary education (TIMSS)



Action summary

As candidate countries and potential candidates, the Western Balkans need to align with the EU *acquis*. In the area of education and training this implies cooperation with Member States for convergence on policy reforms and participation in the EU's programme in the field of education, Erasmus+. In addition the Western Balkans should follow the latest developments in EU standards and strive to meet the targets that the EU Member States have set for themselves in improving education and training. These are summarised under the Education and Training 2020 benchmarks and include the very important qualitative benchmark of fewer than 15% of 15 year-old being under-skilled in reading, mathematics and science as measured by PISA. The Western Balkans are far below this benchmark, far below the current EU or OECD average. The objective of this action is to fund participation in international testing of primary students in mathematics and science (TIMSS) so that remedial measures can be taken in time to improve the pupils learning outcomes before they reach secondary level where PISA is applied.

Action Identification	
Action Programme Title	IPA II Annual Multi-Country Action Programme 2017
Action Title	International assessment for mathematics and science testing in primary education (TIMSS)
Action ID	IPA 2017/040-009.05/MC/TIMSS
Sector Information	
IPA II Sector	9. Regional and territorial cooperation
DAC Sector	11220 – Primary education
Budget	
Total cost	EUR 1.5 million
EU contribution	EUR 1.5 million
Budget line(s)	22.020401 – Multi-country programmes, regional integration and territorial cooperation
Management and Implementation	
Management mode	Direct management
Direct management: **European Commission**	DG EAC, Unit C3 (in cross sub-delegation with DG NEAR)
Implementation responsibilities	DG EAC, Unit C3 (in cross sub-delegation with DG NEAR)
Location	
Zone benefiting from the action	Western Balkans (Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo*, Montenegro, Serbia)
Specific implementation area(s)	N/A
Timeline	
Final date for contracting including the conclusion of delegation agreements	31 December 2018
Final date for operational implementation	31 December 2021

Policy objectives / Markers (DAC form)			
General policy objective	**Not targeted**	**Significant objective**	**Main objective**
Participation development/good governance	☐	☐	X
Aid to environment	X	☐	☐
Gender equality (including Women In Development)	X	☐	☐

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence.

Trade Development	X	☐	☐
Reproductive, Maternal, New born and child health	X	☐	☐
RIO Convention markers	**Not targeted**	**Significant objective**	**Main objective**
Biological diversity	X	☐	☐
Combat desertification	X	☐	☐
Climate change mitigation	X	☐	☐
Climate change adaptation	X	☐	☐

1. RATIONALE

PROBLEM AND STAKEHOLDER ANALYSIS

The Western Balkan region consists of four candidate countries (Albania, the former Yugoslav Republic of Macedonia, Montenegro and Serbia) and two potential candidates (Bosnia and Herzegovina and Kosovo). The long term perspective of the EU is to assist the Western Balkans with their reform efforts and prepare them for European perspective including full participation in the EU's education programmes. In preparation to the European path, they need to align their laws and policies with the EU *acquis* and demonstrate fulfilment of the Copenhagen criteria. The three basic criteria set out in recent years under the Enlargement strategy, under the heading "the Fundamentals First", are rule of law, public administration reform and economic governance and competitiveness.

Cooperation with the EU framework on education and training helps IPA II beneficiaries to enhance the quality of education and training. Innovation and job creation get a boost through mobility, and staff and students are offered opportunities to broaden their horizons through participation in EU programmes. In general, better education is the engine for economic growth. There is now empirical evidence that there is a correlation between the level of education and a country's economic state, that improving education will increase GDP and that maintaining poor levels of education cost at the personal, social, political, cultural and economic level[1]. This is the common opinion in the EU and why three[2] of the seven EU Flagship initiatives are directly or indirectly related to improving education, why the Erasmus+ programme received a 40% increase in the current EU budget and why the Member States have agreed on targets for the EU[3] and for relevant beneficiaries to be met by 2020 in the area of education and training. In addition, in these troubled times of extreme acts of violence and intolerance, quality education including tolerance and inter-cultural values is recognised as the start of the answer to the post-Paris events.

As candidate countries and potential candidates, the Western Balkans are engaged in policy dialogues in the area of education on a bilateral and regional level with the European Commission. They are all making efforts to voluntarily converge with EU standards in the field of education and training but do not have the economic and at times the human resources needed. Their efforts are reviewed at the annual sub-committees and since 2014 they are involved in a reporting system (European Semester Light) under the regional cooperation of the Western Balkans Platform on Education and Training (an initiative by the Directorate General for Education and Culture and the Directorate General for Neighbourhood and Enlargement Negotiations at the region's request). Also as of 2014, there has been increased participation in the Erasmus+ programme beyond cooperation in higher education to include the Western Balkans in the networks and working groups of the Open method of coordination (OMC). The latter has greatly strengthened the capacity of the Ministry staff and given them a window by which to cooperate bilaterally with their counterparts in the Member States. However, as high as their interest is in converging with EU standards and their intentions to reform their education systems, they are faced with restricted, often reduced budgets to spread over many and varied needs.

As with the EU Member States, improving the quality of educational provision is of vital importance to the Western Balkans. Among the Education and Training 2020 benchmarks, a key measurement is PISA (*Programme for International Student Assessment*) results of student skills in reading, mathematics and science. Not all of the Western Balkans have participated in PISA and there is therefore no "official", comparable data on the level of these skills in their 15-year-olds. Others have participated sporadically claiming participation costs as too high. The PISA results for the beneficiaries which have participated in

[1] European Expert Network on Economics of Education (EENEE) Report, *the Economic Case for Education*, December 2014
[2] Youth on the Move, Skills for Jobs and Innovation Union
[3] Education and Training 2020 Benchmarks

PISA 2015, that is Kosovo, the former Yugoslav Republic of Macedonia, Montenegro and Albania, as well as Serbia (2012 round) are far below EU average and even further from the ET 2020 target. A World Bank study which analysed Serbia's results (the best in the region, in 43rd place out of 65 countries) claimed that 50-70% of the student population is functionally illiterate. It is therefore extremely important to have all of the Western Balkans participate in PISA so as to track their own progress over time and to be able to make comparisons among them and with the EU Member States.

Besides PISA, there are other well-known international assessments of pupil and student achievements. The International Association for the Evaluation of Educational Achievement (IEA) tests primary students in 4th and 8th grade among others on math and sciences under the *Trends in International Mathematics and Science Study* (TIMSS). The results of these tests at an earlier age would be most valuable for the teachers and policy-makers who would have several years in which to improve the educational provision, hopefully resulting in better student skills and better PISA results. Furthermore, the testing of primary students via TIMSS and later assessing secondary students via PISA will provide invaluable insight into the trends and evolution of students and the effects of the educational programmes and educators which implement them. That is, the comparison of the different international assessments at different grades will show strengths and weaknesses to learn from.

OUTLINE OF IPA II ASSISTANCE

Making sure that citizens have the necessary skills to succeed in the labour market is key to improving economic growth and employment. Education and training can also help to prevent poverty and social exclusion, ensure human and civic values are maintained and help tackle all forms of discrimination. The starting point to any improvement is having a baseline of where you stand and this is missing in most of the Western Balkans. Therefore, it can be said that their efforts to converge with the EU targets require participation in international, well accepted assessments which can provide such a baseline.

The participation costs for these assessments are twofold. One part are the international costs which have a fixed price tag, and the other part are the costs at beneficiary level which vary depending on the salaries and capacity of available staff. The international organisation which conducts the testing estimates that the costs at beneficiary level are more or less equal to the international costs. With this intervention, the EU will assist the Western Balkans in obtaining valuable data and information of their pupils along with supporting the international costs of TIMSS while the IPA II beneficiaries themselves bear their costs in terms of staff and other resources needed to conduct the testing.

Armed with their results in TIMSS, the Western Balkans can proceed to analyse them and make policy and programme changes in order to improve their student skills. This will tie in well with one of the priorities identified under the Western Balkans Platform on Education and Training, which is the education and training of teachers for primary and secondary schools. The results from TIMSS will also help prepare the participation and results of PISA testing later in secondary school. Better PISA results are one of the key indicators of ET 2020 which the Western Balkans are trying to meet. By improving the PISA results of their students, they are coming closer to convergence with the EU Member States on educational targets. Beyond this however, their educational systems will be producing more functionally literate young people equipped with the skills needed to survive in life and in a changing labour market.

The key activities under this action are the participation of the Western Balkans in the international assessment described above. This participation will be organised directly between them and the IEA which will inform and train the beneficiaries for their tasks. The EU will conclude a contract with IEA to which it will pay the international costs for the beneficiaries' participation in TIMSS.

RELEVANCE WITH THE IPA II MULTI-COUNTRY STRATEGY PAPER AND OTHER KEY REFERENCES

Improvement of the quality of education in the Western Balkans is a high priority which is found in all strategic documents, either directly or indirectly. In order to track improvements in statistics (including

baseline figures) international and widely recognised assessments are absolutely necessary for an objective evaluation of progress on the path to improving educational provision.

The three basic criteria set out in recent years under the **Enlargement strategy**, under the Fundamentals First, are **Rule of Law, Public Administration Reform and Economic Governance and Competitiveness**. Better education is the backbone for improving the above sectors and a necessary component for economic growth. Three[4] of the seven EU Flagship initiatives are directly or indirectly related to improving education, the Erasmus+ programme received a 40% increase in the current EU budget and Member States have agreed on targets for EU[5] and for IPA II beneficiaries to be met by 2020 in the area of education and training. These are important targets which the Western Balkans should also aim to achieve in order to come closer to EU standards.

The **South East Europe (SEE) 2020 strategy** developed with the region's governments under the coordination of the Regional Cooperation Council (RCC) mirrors to a great extent the Europe 2020 strategy. One of the main pillars in SEE 2020 strategy is **Smart Growth** and quality education is at its foundation. Furthermore, the flagships of *Skills and Mobility* and *Competitiveness* under the SEE 2020 strategy are directly linked to improving the quality and relevance of education in the region as stated in the SEE 2020 Programming Document 2016-2018: *Flagship "Skills and Mobility" is developed on a premise that the development of education and the improvement of labour force skills is a key factor that will underpin future economic recovery, growth of the SEE economies and the restructuring towards knowledge driven economies.* The Flagship for Competitiveness recognises the need related policies in human capital development through education and employment and that productivity growth is strongly related to the capacity to innovate. The development of this capacity starts with education.

The Western Balkans were asked to develop **Economic Reform Programmes** starting in 2015 and to list their priorities for the following years. The need to improve the quality of their educational provision figures in the Joint conclusions of the Economic and Financial Dialogue between the EU and the Western Balkans and Turkey[6]. Among the recommendations, *inter alia* Bosnia and Herzegovina was asked to *improve the co-operation between the education system and labour market institutions*; Kosovo to *set up an action plan for tackling youth unemployment based on an assessment of the challenges and focussing on improving education outcomes including through improved teacher training and supporting school-to-work transitions*; and Montenegro to *implement strategies to align education and skills policies with labour market needs*.

Finally during the Ministerial meeting of **the Western Balkans Platform on Education and Training** in July 2015, the Ministers responsible for education in the region agreed to cooperate regionally on 11 projects/activities. One of the **conclusions of the Ministerial meeting** was to participate in international assessments for education such as PISA, TALIS[7], PIRLS[8] and TIMSS with the financial support of the EU, using IPA funds. The deadlines for registration in the next PISA and TALIS rounds have passed. However, support can be provided in time *inter alia* for registration to the next TIMSS round of assessment in 2019.

LESSONS LEARNED AND LINK TO PREVIOUS FINANCIAL ASSISTANCE

Links to similar financial assistance can be made to the reimbursement of entry tickets for the participation of the Western Balkans in EU programmes. This type of assistance has proven to be problem-free with only the odd delay encountered in the payment of some of the relevant IPA II beneficiaries before they receive

[4] Youth on the Move, Skills for Jobs and Innovation Union
[5] Education and Training 2020 Benchmarks
[6] http://www.consilium.europa.eu/en/press/press-releases/2016/05/25-conclusions-dialogue-eu-western-balkans-turkey/
[7] Teaching and Learning International Survey
[8] Progress in International Reading Literacy Study

IPA support. However, as this action is centralised and payment will be made directly by the EU to the responsible organisation conducting the testing, i.e. the IEA, no such problems are foreseen.

2. INTERVENTION LOGIC

LOGICAL FRAMEWORK MATRIX

OVERALL OBJECTIVE	**OBJECTIVELY VERIFIABLE INDICATORS (*)**	**SOURCES OF VERIFICATION**	
To improve the educational provision in math and sciences in primary schools in the Western Balkans.	Education and Training 2020 benchmarks, including the qualitative benchmark of fewer than 15% of 15 year-old being under-skilled in reading, mathematics and science as measured by PISA. Scores in mathematics and science in exams	Results of TIMSS and PISA assessments over coming years. They will provide analysis of individual beneficiary progress and comparison within region and to EU ET 2020 benchmark.	
SPECIFIC OBJECTIVE	**OBJECTIVELY VERIFIABLE INDICATORS (*)**	**SOURCES OF VERIFICATION**	**ASSUMPTIONS**
To engage the Western Balkans in taking part in the international assessment of primary students in math and science as measured by TIMSS, by covering the international costs of their participation in this assessment.	Students attitude and average achievement in mathematics	The reports published by IEA after next rounds of TIMSS assessment.	The Western Balkans will actively engage in the international assessment and will dedicate the human and other resources needed at beneficiary level.
RESULTS	**OBJECTIVELY VERIFIABLE INDICATORS (*)**	**SOURCES OF VERIFICATION**	**ASSUMPTIONS**
Result 1: • Records for each relevant IPA II beneficiary on their pupils' performance in TIMSS (testing of math and sciences in 4th graders) including scores and analysis available • Maximised performance of pupils; Increased development needs analysis **Result 2**: • Enhanced educational policy and strategy in the area of mathematics and science • Strengthened capacity of Ministry of education staff, teachers and directors via participation and training therein for this international assessment **Result 3**: • More students to enter higher education in the fields of natural and applied sciences.	TIMSS Average achievement/Confident percentage Number of training programmes for teachers targeting development of problem solving Number of students to enter higher education in the fields of natural and applied sciences	TIMSS reports produced after the testing.	The Western Balkans will continue their participation in international assessments, and apply lessons learned from experience. The Western Balkans will review results and adjust their educational provision in math and sciences accordingly via strategies, curricula and teacher training.

DESCRIPTION OF ACTIVITIES

Main activities

Improving the educational provision is crucial to improving the economy but also society at large in the Western Balkans ranging from increased capacity in various professions (including in ministry staff) to better civic participation and civil society. The starting point to any improvement is having a baseline of where you stand and this is missing in most of the Western Balkans. Therefore, it can be said that their efforts to converge with the EU targets require participation in international, well accepted assessments which can provide such a baseline.

The IEA will test primary students in the Western Balkans in 4th grade primary on math and sciences under the *Trends in International Mathematics and Science Study* (TIMSS). The results of these tests at an early age will be most valuable for the teachers and policy-makers who will have several years in which to improve the educational provision, hopefully resulting in better student skills and better PISA results. Funding the international costs of TIMSS was one of the priorities agreed to at the 2015 Western Balkans Platform on Education and Training.

With this intervention, the EU will support the international costs of TIMSS while the relevant IPA II beneficiaries themselves bear their costs in terms of staff and other resources needed to conduct the testing. This participation will be organised directly between the relevant IPA II beneficiaries and the IEA which will inform and train the beneficiaries for their tasks. The EU will conclude a contract with the IEA to which it will pay the international costs for the beneficiaries' participation in TIMSS.

Expected results

- Records for each relevant IPA II beneficiary on their pupils' performance in TIMSS, including scores and analysis available.
- Maximised performance of pupils; Increased development needs analysis.
- Enhanced educational policy and strategy in the area of mathematics and sciences.
- Strengthened capacity of Ministry of education staff, teachers and directors via participation in and training for this international assessment.
- More students to enter higher education in the fields of natural and applied sciences.

Participation in the testing of math and sciences as measured by TIMSS will provide the following results: knowledge of pupil attainment at primary school level according to international standards and comparisons with other countries; baseline information for comparisons to PISA results at secondary level; data to diagnose the transition from primary to secondary school in terms of teaching and learning; experience with international testing which expects more analytical skills from students, not usually the case with home-made exams.

Expected impact is: a) repeated participation in international assessment will focus on efforts to improve teaching and learning (this has been the case for PISA), b) change in the classrooms in terms of what is taught and how in order to improve educational provision, c) improved results in TIMSS and PISA over time (a decade) and d) more students to enter higher education in the fields of natural and applied sciences.

RISKS

As the IEA carries out TIMSS assessments since 1995, there is no risk foreseen at the organisational level. The only possible risk would be the capacity from the beneficiary side to dedicate the needed resources to run the tests and correct them. As the Ministers of Education themselves gave their engagement during the 5th Ministerial meeting of the Western Balkans Platform in July 2015, this risk seems to be minimal. In addition, the relevant Ministry departments are very keen on participating in the exercise.

CONDITIONS FOR IMPLEMENTATION

The action will fund the international costs (see below) of the participation of the Western Balkans in the TIMSS 2019 assessment. The adoption of the Commission implementing decision, however, is foreseen beyond the usual IEA deadline for registration.

IEA is willing to allow participation of the Western Balkans as of the beginning of 2017 so that the participating IPA II beneficiaries understand the tasks ahead and prepare accordingly. This activity is to be part of the costs of each IPA II beneficiary (see below) and is not reflected in the contract with the EU.

After the cross-delegation procedures planned by DG NEAR and DG EAC are completed, DG EAC can proceed with contacting IEA for their services. The relevant IPA II beneficiaries will be asked to sign an agreement with IEA to confirm their commitment. This agreement needs to be annexed to the contract between EAC and IEA for the payment of the international costs for participation.

3. IMPLEMENTATION ARRANGEMENTS

ROLES AND RESPONSIBILITIES

The action will be cross sub-delegated to DG EAC for contracting and implementation. DG EAC will be responsible for signing a contract with IEA which will specify the financial contribution for the international costs of the participation of the Western Balkans in the assessment (EUR 1.5 million for all 6 relevant IPA II beneficiaries).

The **international costs** will cover the:

- Development phase: revision and finalisation of TIMSS frameworks and specifications, developing new items and scoring procedures for those items, preparing field test, revising and streamlining the questionnaires (for student, teachers and school), preparing them for field testing, developing procedures for instruments translation verification, developing sampling plans for each participating beneficiary, monitoring the sampling procedures in each relevant IPA II beneficiary.
- Field test phase: developing operations and data collection manuals for the field test, training in field test data collection and scoring procedures, translation verification for field test instruments, conducting field test data analysis, preparing final versions of the survey instruments.
- Assessment and analysis phase: developing operations and data collection manuals, and training beneficiaries in data collection and scoring procedures for the assessment, translation verification of main data collection instruments, conducting quality assurance of field operations during data collection, and documenting the results, constructing an international database and checking and rechecking the accuracy and comparability of the datasets at beneficiary level, conducting a variety of data analyses, including item analysis, differential item functioning, scaling, estimating sampling error, and deriving variables for reporting.
- Reporting phase: preparing and publishing the TIMSS Encyclopaedia, writing and publishing the international reports, producing a thoroughly documented database and accompanying TIMSS User's Guide, conducting training seminars in using TIMSS database.

- After completion of the project works: publishing the technical report; producing a thoroughly documented database and accompanying user's guide; conducting training seminars in using the TIMSS 2019 database.

As the Western Balkans (except for Serbia) will be first-time participants in this assessment, the international costs will cover additional regional meetings to ensure full understanding and quality implementation, increased quality assurance measures (such as more invigilators and IT security for test questions) to ensure transparency, as well as joint qualitative reports to be produced for each educational system/ministry.

DG EAC will be responsible for the managing of this contract including payments, reporting and monitoring that the activities related to the testing do indeed take place in the Western Balkans.

The participating IPA II beneficiaries are expected to budget for and cover the costs occurring at the beneficiary level . The budget for implementing the TIMSS study is very beneficiary specific and depends on each beneficiary's financial capacity. However, there are tasks that are mandatory for all participating IPA II beneficiaries that require certain equipment and staff. These are:

- A TIMSS "National Study Centre" (NSC)
- Equipment
- Travelling
- Sampling
- Assessment Instrument Preparation, Printing, and Packing
- Shipping/Mailing Costs
- Scoring
- Data Entry
- Scanning
- Reporting

The first step (completed in January 2017) is for the Authorities to appoint an experienced member of staff to take on the role of a "National Research Coordinator" (NRC). The NRC is responsible for:

- Organising the "National Study Centre" (NSC) to perform the TIMSS tasks;
- Employing and/or supervising staff;
- Ensuring availability of required hardware and software and other necessary equipment and materials;
- Communicating with the TIMSS & PIRLS International Study Centre, the IEA Data Processing and Research Centre, the IEA Secretariat, and Statistics Canada;
- Participating in the international NRC meetings;
- Contributing to the TIMSS Encyclopaedia by providing a chapter for the beneficiary;
- Contributing to the International Reports by participating in the review process and making sure the beneficiary's data are accurate; and
- Preparing and disseminating a report for TIMSS in synchronisation with the release of the International Report.

IMPLEMENTATION METHOD(S) AND TYPE(S) OF FINANCING

The action will be implemented on a direct management basis through a grant with the IEA to be signed in Q3 2017 for an indicative amount of EUR 1.5 million. The EU grant will be 100% of the total costs. The direct award is based on Article 190 (1)(f) of the Rules of Application, since a particular type of body on account of its technical competence and its high degree of specialisation is required. The IEA's knowledge of the methodology and its mandate, strengths and previous technical expertise on this specific type of activity constitutes a valuable advantage for the implementation of the action.

4. PERFORMANCE MEASUREMENT

METHODOLOGY FOR MONITORING (AND EVALUATION)

The European Commission may carry out a mid-term, a final or an ex-post evaluation for this Action or its components via independent consultants, through a joint mission or via an implementing partner. In case a mid-term or final evaluation is not foreseen, the European Commission may, during implementation, decide to undertake such an evaluation for duly justified reasons either on its own decision or on the initiative of the partner. The evaluations will be carried out as prescribed by the DG NEAR Guidelines on linking planning/programming, monitoring and evaluation. In addition, the action might be subject to external monitoring in line with the European Commission rules and procedures.

DG EAC and the EU Delegations on the ground will contribute to the monitoring of the action.

INDICATOR MEASUREMENT

<table>
<tr><th>Indicator</th><th>Baseline
(2010) (2)</th><th>Target
2020 (3)</th><th>Final Target
(2025) (4)</th><th>Source of information</th></tr>
<tr><td>MCSP indicator (impact/outcome)….(1)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Education and Training 2020 benchmarks, including the qualitative benchmark of fewer than 15% of 15 year-olds being under-skilled in reading, mathematics and science as measured by PISA.</td><td>PISA scores:
<table>
<tr><td colspan="2">Albania 2015</td></tr>
<tr><td>Mathematics</td><td>413</td></tr>
<tr><td>Science</td><td>427</td></tr>
<tr><td>Reading</td><td>405</td></tr>
<tr><td colspan="2">Bosnia and Herzegovina 2015 (no participation)</td></tr>
<tr><td>Mathematics</td><td>0</td></tr>
<tr><td>Science</td><td>0</td></tr>
<tr><td>Reading</td><td>0</td></tr>
<tr><td colspan="2">Kosovo 2015</td></tr>
<tr><td>Mathematics</td><td>362</td></tr>
<tr><td>Science</td><td>378</td></tr>
<tr><td>Reading</td><td>347</td></tr>
<tr><td colspan="2">the former Yugoslav Republic of Macedonia 2015</td></tr>
<tr><td>Mathematics</td><td>371</td></tr>
<tr><td>Science</td><td>384</td></tr>
<tr><td>Reading</td><td>352</td></tr>
<tr><td colspan="2">Montenegro 2015</td></tr>
<tr><td>Mathematics</td><td>418</td></tr>
<tr><td>Science</td><td>411</td></tr>
<tr><td>Reading</td><td>427</td></tr>
<tr><td colspan="2">Serbia 2012 (no participation in 2015)</td></tr>
<tr><td>Mathematics</td><td>449</td></tr>
<tr><td>Science</td><td>445</td></tr>
<tr><td>Reading</td><td>446</td></tr>
</table></td><td>Mathematics 493
Science 490
Reading 493</td><td>Mathematics 493
Science 490
Reading 493</td><td>PISA scores</td></tr>
<tr><td>Scores in mathematics and science in exams at</td><td>Albania: N/A</td><td></td><td></td><td>Albania: National</td></tr>
</table>

beneficiary level.

Bosnia and Herzegovina: N/A

Kosovo: N/A

the former Yugoslav Republic of Macedonia:
Scores in the State Matura exams in maths and sciences (2010-2016)

	2014		2015		2016	
	number of candidates	**average score**	**number of candidates**	**average score**	**number of candidates**	**average score**
maths	2354	3,04	2508	3,20	2279	3,30
chemistry	365	3,36	347	3,51	342	3,94
biology	3106	3,42	3533	3,65	3121	3,72
physics	131	3,68	117	3,44	89	3,87

Montenegro:
Results of Gymnasium and Vocational Matura – 2011-16 (June term)

Year	**Mark**	**1**	**2**	**3**	**4**	**5**	**Total**	**Total number of students – mother tongue[9] exam**
2016	**Number of students**	31	358	331	117	64	901	6191
	%	3,44	39,73	36,74	12,99	7,10	100	
2015	**Number of students**	45	316	257	149	70	837	6496
	%	5,38	37,75	30,70	17,80	8,36	100	
2014	**Number of students**	110	385	299	200	93	1087	6900
	%	10,12	35,42	27,51	18,40	8,56	100	

** This table contains only data on results in mathematics because the Examination Centre does*

Agency of Exams

Bosnia and Herzegovina: Agency for preschool, primary and secondary education

Kosovo: Ministry of Education

the former Yugoslav Republic of Macedonia: Ministry of Education and Science

Montenegro: Examination Center

Serbia: Institute for Quality and Evaluation of Education reports of the

[9] Montenegrin language

not have information on results in other subjects.
All students are obliged to take the mother tongue exam and choose another subject out of these two: mathematics or foreign language. These exams are organized by the Examination Centre. The last column shows the number of pupils who took mother tongue, so you can get the impression of how many students take mathematics.
In addition: (a) in gymnasiums students take exam in two elective subjects, among which are chemistry, biology and physics. These subjects are chosen by a small number of students and are taken internally in front of school commissions; (b) in vocational schools students take exams in vocational-theoretical subjects and professional work.

Results in Biology, Physics and Chemistry at Gymnasium Matura exams (2015-16)

Biology					
Mark	2	3	4	5	Total
Number of students	4	10	18	81	113
Percentage	3,54%	8,85%	15,93%	71,68%	100,00%
Physics					
Mark	2	3	4	5	Total
Number of students	1	1	2	46	50
Percentage	2,00%	2,00%	4,00%	92,00%	100,00%
Chemistry					
Mark	2	3	4	5	Total
Number of students	4	4	3	61	72
Percentage	5,56%	5,56%	4,17%	84,72%	100,00%

Serbia:

School year 2013-14*: on a scale of 20 points, the average student achievement was 10.71 in mathematics and 12.21 in science.

Final exam at the end of school year 2012-13: on a scale of 20 points, the average student achievement in mathematics was 10.86.

** In Serbia, the final exam in primary education is being implemented from the academic year 2010/2011, and the first was conducted in June 2011 when students had 25% unknown and 75% of known assignments. The final exam at the end of 2013/2014 school year (realized in June 2014) was taken as an indicator, when the students for the first time had the unknown assignments of Serbian/native language and mathematics, and for the first time took the third,*

Primary school final exams

	so called combined test which assessed students achievements in sciences (biology, chemistry, physics, geography and history). Because of this, year 2014 was taken as a starting point.			
TIMSS Average achievement/ Confidence percentage	**Only Data for Serbia is available for TIMSS 2015** 1) Average score for Serbia in TIMSS 2015: Mathematics: 518 (girls 520, boys 517 – the gender difference was not significant, which can be considered as a nice target/achievement) Science: 525 (girls 526, boys 523 – the gender difference was not significant) 2) Performance of Serbian pupils in TIMSS 2015 at international benchmarks: Mathematics: - Not reaching the lowest benchmark: 9 % - Low and above: 91 % - Intermediate and above: 72 % - High and above: 37 % - Advanced: 10 % Science: - Not reaching the lowest benchmark: 5 % - Low and above: 93 % - Intermediate and above: 77 % - High and above: 40 % - Advanced: 8 %			TIMSS scores
Number of training programmes for teachers targeting development of problem solving	**Albania:** N/A **Bosnia and Herzegovina:** N/A **Kosovo:** N/A **Montenegro:** Number of seminars relating to mathematics organised by the Ministry of Education: - 03 (2010) - 11 (2015) - 03 (2016) **Serbia:** 59 (2014) **the former Yugoslav Republic of Macedonia:** Table 1. Trained lower primary teachers (grade 1 to 5) in BDE-MCEC-UNICEF Programme - **Thinking mathematics**			Montenegro: Ministry of Education Serbia: Institute for the Improvement of Education; Ministry of Education, Science and Technological Development the former

					Yugoslav Republic of Macedonia: Ministry of Education and Science

	Number of training topics: 6
	Number of training days: 8
Year	**Total trained teachers**
2010	1655
2011	1042
2012	210
2013	1250
2014	2376
2015	50
Total	**6583**

Table 1a. Additional trained lower primary teachers (grade 1 to 5) on topics for problem solving in BDE-MCEC-UNICEF Programme - **Thinking mathematics** (grade 4 and 5)

	Number of training topic: 1 Pedagogical approach in terms of numbers, algebra, geometry, and work with data processing
	Number of training days: 2
March-April 2015	**Trained teachers** (G1 to 5)
Total	**2573**

Table 2. Trained upper primary/subject teachers (grade 6 to 9) in USAID supported Programme - **Improving mathematics and science education**

Number of training topics per subject: 2			
Number of training days: 3			
Year	**Trained teachers per teaching subject**		**Total trained teachers**
	Mathematics	***Science**	
2010	1157	2135	**3292**
2011	299	770	**1069**
Total	**1456**	**2905**	**4361**

**Note: Science includes Biology, Geography, Chemistry and Physics teachers*

Table 3. Trained upper primary/subject teachers (grade 6 to 9) in BDE Programme -

Mathematics with logics (according to language of instruction and teaching subject)

Number of training topics: 2	
Number of training days: 1	
Year	**Trained teachers** *(grade* 6 *to 9)*
	Mathematics
2011/2012	1000
2013	1000
Total	**2000**

Table 4. Trained lower (grade 1 to 5) and upper (grade 6 to 9) primary/subject teachers in Cambridge - BDE Programme - **Mathematics and Science** (according to the newly adopted curricula for Math and Science)

Number of training topics: 3				
Number of training days: 2-3				
Year	**Trained teachers** *(grade* 1-*3)*	**Trained teachers** *(grade* 4-*6)*	***Trained teachers** *(grade* 7-*9)*	**Total trained teachers**
	Mathematics and Science			
2014	4500			**4500**
2015	1443			**1443**
2015		5100		**5100**
2016			2196	**2196**
Total	**5943**	**5100**	**2196**	**13239**

** Note: Science includes Biology, Chemistry and Physics teachers in G6-G9*

Table 5. Trained lower primary teachers (grade 1 to 5) according to the Cambridge Programme - Mathematics in grade 4 and 5 – **Selected topics for Problem solving in the curricula for grade 4 and 5**

Number of training topics: 1 Decimal numbers, percentage, translation and rotation	
Number of training days: 1	
Year	**Trained teachers** *(grade* 4 *to 5)*
	Mathematics
March – June 2016	2600
Total	**2600**

Proportion of students newly enrolling and completing	**Proportion of students in STEM subjects (2013-14) (%)**		These data should be compared to	Higher education

higher education studies in STEM subjects (ISCED fields 05+06+07)	**Albania: Total**	**19,7**	**19,1**		the situation in the EU-28 where 25% of all graduates hold STEM qualifications (Cedefop, 2015).	database of the EU Study "From University to Employment" (2016), based on data from the ministries of education & statistics offices
	ISCED 5	5,7	6,3			
	ISCED 6	5,9	5,5			
	ISCED 7	8,1	7,3			
	Bosnia and Herzegovina: Total	**28**	**19**			
	ISCED 5	5	4			
	ISCED 6	4	4			
	ISCED 7	19	11			
	Kosovo: Total	**18**	**14,1**			
	ISCED 5	3,4	6,7			
	ISCED 6	5,8	2,9			
	ISCED 7	8,8	4,5			
	the former Yugoslav Republic of Macedonia: Total	**26,7**	**20,4**			
	ISCED 5	3,6	3,1			
	ISCED 6	9,5	7,3			
	ISCED 7	13,6	10			
	Montenegro: Total	**25,8**	**19,7**			
	ISCED 5	2,8	2,2			
	ISCED 6	6,7	6,2			
	ISCED 7	16,3	11,3			
	Serbia: Total	**31**	**29**			
	ISCED 5	4	5			
	ISCED 6	8	6			
	ISCED 7	19	18			
	ISCED 5 - Natural Sciences, Mathematics & Statistics ISCED 6 - Information & Communication Technologies ISCED 7 - Engineering, Manufacturing & Construction					

5. CROSS-CUTTING ISSUES

GENDER MAINSTREAMING

Equal participation in the assessments will be secured on the basis of equal access regardless of sex, ethnic origin, disability, age, etc. The same percentage of girls and boys will participate in the assessments as the gender distribution found in the schools. The results of the assessment are broken down by gender as it is useful for the teachers, directors and policy maker to analyse them and develop appropriate policy/practices in response to them.

EQUAL OPPORTUNITIES

Having the Western Balkans participate in the same assessment together and receiving analytical reports about their students' performance ensure to a great extent equal opportunities for them to revise and improve the educational provision in math and science in their schools, thus enabling students to acquire better skills and to increase human capacities in each relevant IPA II beneficiary.

MINORITIES AND VULNERABLE GROUPS

In these troubled times of extreme acts of violence and intolerance, education is recognised as crucial and one should start with the very young in order to effectively combat hate crime, hate speech, intolerance and discrimination. Improving and modernising education in the Western Balkans will include the component of teaching inter-cultural values and tolerance. In general, the Action will positively promote equality of opportunities, combat discrimination, etc.

ENGAGEMENT WITH CIVIL SOCIETY (AND IF RELEVANT OTHER NON-STATE STAKEHOLDERS)

Engagement with civil society is by the nature of this activity not directly applicable.

ENVIRONMENT AND CLIMATE CHANGE (AND IF RELEVANT DISASTER RESILIENCE)

Participation by the students of primary schools in the testing of math and sciences will contribute to their knowledge of sciences according to international standards and comparisons with other beneficiaries. Therefore the action has an indirect link to issues on environment and climate change, as its objective is to improve what is taught and how in order to improve educational provision also in these areas.

Climate action relevant budget allocation: EUR 0 million

6. SUSTAINABILITY

TIMSS is carried out in four-year cycles. In order to benefit from it, the Western Balkans should participate regularly to receive analysis and see their development. For the EU it is important to be able to compare progress by each relevant IPA II beneficiary over time and to compare results within the region.

7. COMMUNICATION AND VISIBILITY

Communication and visibility will be given high importance during the implementation of the action. The implementation of the communication activities shall be funded from the amounts allocated to the action.

All necessary measures will be taken to publicise the fact that the Action has received funding from the EU in line with the Communication and Visibility Manual for EU External Actions. Additional Visibility Guidelines developed by the European Commission (DG NEAR) will have to be followed.

Visibility and communication actions shall demonstrate how the intervention contributes to the agreed programme objectives and the accession process, as well as the benefits of the action for the general public. Actions shall be aimed at strengthening general public awareness and support of interventions financed and the objectives pursued. The actions shall aim at highlighting to the relevant target audiences the added value and impact of the EU's interventions and will promote transparency and accountability on the use of funds.

The IAE communication and visibility plan focuses on the results of the studies. Press release of the results TIMSS 2019 is expected in November or December 2020, and the release of the datasets in February or March 2021. In addition to the international events focusing on the general findings, there are events organised by the participating beneficiaries/systems that are focused on the particular aspects of central/local importance.

During the duration of the study cycle, IAE is usually working on and/or supporting secondary analysis and workshops based on the data obtained from the previous TIMSS cycles. There are policy briefs, in-depth reports and other outputs to come in future. Information and publications under: http://www.iea.nl/.