



## Article

# Did the Characteristics of Kosovar Teachers Influence the Results of Students in TIMSS 2019? Findings from the Performance of Kosovar Students in TIMSS 2019

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**Abstract:** This paper aimed to explore the impact of Kosovar teachers' characteristics on the performance of fourth-grade students in TIMSS 2019. The paper addressed the characteristics of teachers, demographic, and academics, which are closely related to the overall performance of students. In this research, data from the TIMSS 2019 database were used, for which 4435 Kosovar students were tested, and 192 teachers were surveyed. The findings show that Kosovar students did not perform well in TIMSS 2019. They achieved 444 points in the field of mathematics and 413 points in science (average TIMSS 500 points) and were ranked 49th out of 56 countries participating in the test. Data from the teacher survey show that the characteristics of teachers, such as age, professional development, pre-service education, contemporary approach to teaching, etc., also played an important role in the low-scoring performance of Kosovar students in TIMSS 2019. Students who had a teacher with an average age of 30–60 years had a better performance on the test, achieving a difference of 20 points more, compared to students who had new or older teachers (under 30 years and over 60 years). The lack of professional development of teachers also had a major impact on student performance. On average, 25% of teachers in the last 2 years had attended training in certain areas, while on average 80% of them were willing to attend training programs that would improve the profile of their competencies.

**Keywords:** characteristics of teachers; Kosovo; performance; TIMSS 2019; professional development

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## 1. Introduction

Teacher quality is extremely important for student achievement, even though there is still no standard definition for what we mean by teacher quality (Seebruck 2015; Hanushek 2011). According to Barton and Coley (2009), among the factors that influence the creation of gaps in student achievement, in addition to educational policies, curriculum design, and the use of technology in teaching, are also the pre-service preparation of teachers and their experience. There is a high theoretical correlation for the relationship between student achievement and the quality of teachers (Prince 2002). There have been debates over time about the effects that school can have on student performance. There are opinions that schools have less influence compared to the social aspect of students (Coleman et al. 1966). There are others who think that the key factors in student achievement are both the classroom (Mosteller 1995) and the teachers (Dearling 2000). The quality of teaching creates a gap that can cause irreparable damage (Seebruck 2015). Curriculum reforms, textbook revision, and teacher professional development are interlinked and provide clear guidance on the ongoing changes in educational processes (Mullis and Martin 2012). The provision of constructive feedback to students by teachers, identifying needs, and easier approaches to child learning, are just some of the elements that influence student outcomes (Shala et al. 2021b).

On the other hand, in recent decades, professional development has been a subject of particular interest for teachers, through whom new educational practices have been disseminated (Borko et al. 2010; Ponte 2010). Teacher professional development programs are an important instrument for the implementation of educational policies at practical levels in terms of transferring new knowledge, skills, and values acquired in practice by students (Sasson and Miedijensky (2020). Such programs have allowed teachers to learn from research activities and practices (Ponte 2010)). “Professional development is defined as activities that develop an individual’s skills, knowledge, expertise and other characteristics as a teacher” (OECD 2009). “How can we prepare students for jobs that have not yet been created, tackle social challenges that we can not yet imagine, and use technologies that have not yet been invented?”(OECD 2019).

Dam and Janssen (2021) have found that in recent years, many reforms have been initiated which have not had a direct impact on raising the quality of education because there has been a lack of oversight of their implementation. Rapid changes ranging from student diversity (different geographical areas where students come from) to developments in technology require teachers to be coherent and flexible in their work (Zeggelaar et al. (2020). Professional development should also be based on the motivation of teachers, their needs, and aspirations in terms of their professionalism in the field of teaching (Ungar 2020). It puts into function some of the characteristics of teachers (Zhang et al. (2021). The quality that teachers with students have to offer is essential in the implementation of the competencies and personal profile that they have built during their years of study as well as the attitude they have built towards the teaching processes in general (Karlberg and Bezzina (2020). In reflective teaching, the profile of teacher competencies should be as high and specific as possible (Jong et al. 2011). According to Mahler et al. (2018), two of the characteristics that teachers should have are motivation and certain knowledge of the given field. Research developed by Baier et al. (2019) emphasizes that the characteristics of teachers can influence quantitative change in the quality of teaching. Professional development of teachers from narrow fields, such as mathematics and pedagogical function, is essential to maximize the impact that teachers can have during their work with students (Bolyard and Baker 2021). According to Rubie-Davies (2006), young teachers are more interested in changes in education, and they have higher expectations of students. The concept of employing teachers for the teaching and learning process is a vague process, while these concepts are crucial in providing quality teaching which has an impact on student learning (Jacobs et al. 2014). Dybowski et al. (2017) have pointed out that students who are exposed to good teachers are more likely to increase and develop their competencies.

Sanders and Rivers (1996), who conducted a study observing the results of students from the second to fifth grade, observed that student achievement was related to teacher characteristics. While there may be abundant literature in international contexts which explains the link between teacher characteristics and student achievement, the reality is that there is a lack of evidence in the case of Kosovo. Conducting international large-scale assessments in the country has contributed to the development of large databases which could be used to explain which variables mediate student achievement in the case of Kosovo. However, despite available datasets, publications on the achievement of Kosovar students are very scarce, and among those existing, no study evaluates the impact of teacher characteristics on achievement. The present study aimed to mitigate this situation by researching the link between teacher characteristics and the performance of Kosovar students in the TIMSS 2019 study.

Research on the impact of teacher characteristics is particularly important in a country such as Kosovo, which has faced major reforms and challenges.

Since the declaration of Kosovo’s independence in February 2008, Kosovo has faced various challenges in all fields, in particular in the field of education. Poor-quality education in both the pre-university and university systems, frequent changes in the education system, a lack of training for certain areas, supervision of the implementation of new approaches adopted during training, etc., are just some of the challenges we still face.

An unsatisfactory level of education has been introduced in recent years on the occasion of the development of several international assessments. Identifying the factors that have influenced the unsatisfactory results of Kosovar students is extremely difficult (Jepsen 2005) given that Kosovo has slow economic development and an almost unsupervised education system. Numerous researchers have analyzed these results and presented research on the unsatisfactory results of Kosovar students in PISA and TIMSS (Shala et al. 2021a), but the country's institutions have not treated these results as something worrying. This paper aimed to precisely point out the above-mentioned characteristics of teachers which we consider to have had a direct impact on the performance of Kosovar students in TIMSS 2019.

TIMSS (Trends in International Mathematics and Science Study) is an international assessment that serves to measure students' knowledge in two areas, mathematics and science, as well as to compare education systems (Mullis et al. 2020). This test is organized every four years; 2019 was the seventh evaluation cycle, in which Kosovo participated for the first time. In this research, the characteristics of teachers that were taken as reference points were: age, experience, quality of studies, their approach to teaching and learning, traditional teaching methodologies, lack of training, lack of supervision during the implementation of training, frequent curricular changes, and the inability to follow the trends in technology.

An important element within all these factors is the preparation of new teachers before service, or "academic and professional potential". The "academic potential" of the graduates in Kosovo, as a number, is not lacking when it is known that there are universities in the five cities of Kosovo, where there are also faculties of education that prepare new teachers, but in Kosovo, there is a lack of professional preparation of young people to face the demands of the 21st century, namely the developments in all areas, especially in the integration of technology in teaching. Teaching in these universities generally takes place through traditional methods and forms and does not make the student part of the construction of his own knowledge. Lectures are carried out in the full sense of the word "lectures", without constructiveness, creativity, and interactivity. Such teaching cannot prepare the teacher for the future. The same fact is shown by the results of the teachers' survey, which was cross-referenced with the performance results of fourth-grade students in the TIMSS 2019 test, for which young teachers' (up to the age of 30) students had weaker results, which proves that pre-service education has not achieved its mission.

Starting from the premise that "no matter how good the pre-service teacher education is, our expectations may not be realistic if we think they can meet all the challenges of education" (OECD 2009), we noticed that in Kosovo, both pre-service education and the professional development of the teachers were not in line with the needs of the students.

In recent years in Kosovo, programs for professional development (PD) of teachers have been offered, which in many cases have had as their goal the substantive aspect of teaching or even the methodical one, but the contemporary approaches that have been offered through the contents of the training have almost never been implemented as requested.

"Effective professional development is continuous, includes training, practice, and feedback, and provides the right time and follow-up support. Successful programs involve teachers in learning activities that are similar to those they will use with their students and encourage the development of teacher-learning communities" (OECD 2009).

Middle-aged teachers (30–60 years old) usually participate in these trainings. Teachers over 60 years old are reluctant to participate in these trainings considering that they are close to retirement age (65 years old), while in certain cases young teachers (under 30) are thought to have been prepared during pre-service studies. The percentage of teachers declaring to belong to these ages was 32.1%. So, if we look at the results of students who had, for their teacher, a person under 30 or over 60 years old, which constituted approximately 1/3 of the surveyed teachers, we see that these students performed worse when they were tested (an average of 20 points less).

The participation and implementation of trainings are also legally regulated. According to the Administrative Instruction (MEST, UA-5/2017), to obtain their work license and to move from one level of license to a more advanced level, teachers need 100 h of training. This process has almost passed in formality and does not achieve its effect in practice. Differences in student outcomes based on teacher age have also been observed by TIMSS 2019 researchers in Turkey, [Sezer and Çakan \(2022\)](#), who relate student outcomes to teachers' age and experience.

According to [Hanushek \(1992\)](#), even if for only one year a child has as a teacher a person who is not effective in his work, in the future this student will find it impossible to cover these created gaps, and in this case, it is also the main variable ([Prince 2002](#)). Schools can do the most important thing for their students, and that is offering them good teachers, according to [Hanushek \(2011\)](#). Furthermore, [Clotfelter et al. \(2006\)](#) conclude that "the effect of teacher credentialing on student achievement is large and, therefore, credentialing is important enough to be considered in public policy decisions aimed at improving student achievement".

## 2. Materials and Methods

### 2.1. The Hypothesis

**H1.** *There is a link between the age of teachers and the points achieved by their students in the TIMSS 2019 test.*

**H2.** *Teachers' expectations for students' achievement in the test are higher than the real test results of students.*

**H3.** *Teachers do not implement the curriculum according to the parameters required by the central institutions.*

**H4.** *The needs of teachers for professional development are great, both in terms of mathematical and scientific content as well as for the implementation of the curriculum, the development of students' critical thinking, etc.*

### 2.2. Research Methods

This research was based on data from the TIMSS 2019 database, and only the data from Kosovo were used. TIMSS 2019 used quantitative methods, with the development of a test for fourth-grade students, as well as a questionnaire for the teachers. For the purposes of the research, we used the (TIMSS 2019 database) data from the teachers' survey as well as the average results from the students' tests in two fields, namely in mathematics and science. The data from the teacher questionnaire were cross-referenced in each case by comparing both demographic issues and the statements in the questionnaire with the average points achieved by the students on the test.

### 2.3. Respondents

In 2019, Kosovo participated for the first time in the TIMSS test. The sample work included (N) 4435 fourth-grade students and (M) 192 teachers from 145 schools. In terms of gender, 23.5% were male teachers and 76.5% were female.

### 2.4. Instruments

The paper used data from the 2019 International Trends in Mathematics and Science Study (TIMSS), which contained two observations for each student, one in mathematics and one in science. The main outcome variable was students' math and science test scores compared to teachers' questionnaire statements about their characteristics. Then, the teachers' statements regarding their characteristics were cross-referenced with the students' achievements in the test to see the impact of these characteristics. The test was conducted on a hard copy, even though 50% of students at the general state level were tested in computer form ([Mullis et al. 2020](#)).

### 3. Results

#### 3.1. The Performance of Kosovar Students in TIMSS 2019

Since 2015, Kosovo has participated in five international assessments. The published results of assessments such as PISA 2015, PISA 2018, and TIMSS 2019 show the serious situation in Kosovar education. The performance of Kosovar students in these evaluations was very low. Out of 56 participating countries, Kosovo ranked 49th in the TIMSS 2019 test. The findings show that there were many factors that influenced this result, and one of these factors was the teachers' characteristics. Some of these characteristics were related to the age of teachers, the preparation of students before the service, the professional preparation of teachers through training in different fields, the frequent changes in the education system, etc.

A total of 4435 students from 145 schools in Kosovo participated in the TIMSS 2019 test. On this occasion, 192 teachers who taught these classes were surveyed. From the data obtained from the TIMSS 2019 database and presented in Table 1, it can be noticed that the majority (F, 76.5%) of the surveyed teachers were female, while the minority (M, 23.5%) were male. Male teachers achieved better success with their students in the test in the field of mathematics (M, 453.4 points), while female teachers' were more successful with their students in science (F, 416.3 points). The data show that teachers had an average teaching experience of 16.3 years of work experience in teaching, while the most frequent frequency was 10. The majority of teachers (76.6%) were qualified and had completed bachelor studies or a similar 4-years program (240 ECTS), while a significant percentage (7.6%) completed master's studies.

**Table 1.** Teacher demographic data cross-referenced with student test scores.

	Male	Female
Teacher's valid sample (N 192)	23.5%	76.5%
Math ( <i>Average scores of students on the test</i> )	453.3	447.0
Science ( <i>Average scores of students on the test</i> )	402.1	416.3
Years of teaching (Mean)	16.3	
Years of teaching (Mode)	10	
Highest formal level of education completed by teachers		
1. No upper secondary	0.0%	
2. Upper secondary	6.1%	
3. Post-secondary, non-tertiary	0.6%	
4. Short-cycle tertiary	9.0%	
5. Bachelor's or equivalent	76.6%	
6. Master's or equivalent	7.6%	
7. Doctor or equivalent	0.0%	

The data in Table 2 show that the majority of teachers were between the ages of 30 and 59 years old (67.9% of them). When we crossed the data of the age of the teachers and the average number of points the students achieved on the test, we noticed that it was exactly this age of teachers (30–59 years old) that managed to better prepare their students, who achieved more points on the test. Data from Table 2 show that students who had a teacher between the ages of 30 and 59 had a better performance in mathematics (average 452 points) and in science (average 422 points) compared to students who had young teachers (under 30) or those over 60 years old, performing worse in mathematics (on average 25 points lower) and in science (on average 28 points lower).

**Table 2.** Teachers' calendar age compared to students' TIMSS 2019 scores.

Student scores on TIMSS 2019	Age of Teachers					
	Under 25 (6.4%)	25–29 (11.8%)	30–39 (28.0%)	40–49 (24.4%)	50–59 (15.5%)	60 or more (13.9%)
Students' scores in mathematics (average)	426.4	439.3	452.5	451.2	451.6	424.2
Students' scores in science (average)	394.2	406.8	420.0	423.7	421.6	388.4

Knowing that Kosovar students in total achieved 444 points in mathematics and 413 points in science, we noted that students scoring above this average had as a teacher a person who was older than 30 years and younger than 60 years. They managed to accumulate an average of 451 points in mathematics and 421 points in science. Looking at the differences between the generations of teachers (young teachers without experience, as well as older teachers), we could estimate that there were a large number of factors that affected these ages, starting from the impossibility of implementing the new educational system, quality in universities regarding the preparation of new teachers, the small amount of training for new teachers, lack of teaching experience, lack of energy needed for successful work by older teachers, older teachers' approach to educational reforms, the use of technology in teaching at scale, etc.

### 3.2. How Much Influence Do the Teachers' Characteristics Have on the Students' Results?

Table 3 combines the opinions of teachers regarding the content and methodological aspects of teaching with the results achieved by students. The results show that the percentage of teachers stating they had implemented the curriculum at a *very high* level (18.2%) was insufficient, while a more favorable percentage of teachers implemented it at a high level (52.3%). The data in the table below show that teachers who had a high degree of success in implementing the curriculum achieved better results in both mathematics (450.7) and science (418.0).

**Table 3.** TIMSS 2019 scores according to teacher characteristics.

How Would You Characterize Each of the Following within Your School?		Students' Scores in Math and Science (TIMSS 2019)	
		Math	Science
My degree of success in implementing the school's curriculum	Very high	450.7	418.0
	High	441.2	409.8
	Medium	444.1	414.8
	Low	416.4	383.6
	Very low	-	-
I understand the curricular goals of the school	Very high	450.5	418.4
	High	440.3	408.0
	Medium	445.7	416.9
	Low	416.4	383.6
	Very low	-	-
My expectations for student achievement	Very high	437.6	403.2
	High	447.2	416.4
	Medium	446.1	418.1
	Low	-	-
	Very low	-	-

Although the percentage of teachers who understand the goals of the curriculum very well was low, this percentage still made a difference in student outcomes. Their

students achieved a total average of 434.3 points in math (450.5) and science (418.4) with a difference of 34 points compared to the students of teachers who did not understand the curricular goals.

The data from Table 3 show us that about 21% of the teachers had high expectations for their students regarding their assessment with the TIMSS test. The students of these teachers achieved poorer results (on average 12 points less) compared to the students of teachers who had lower expectations. The percentage of teachers who had average expectations (3.0%) for their students was lower compared to other statements, but it was noted that these students had achieved higher points in mathematics (446.1) and science (418.1), with a mean of 439.8 points.

According to the teachers' statements regarding the students' inspiration for work, it seems that such an inspiration did not happen, because the teachers who circled the average alternative had better results with their students. Based on the teachers' statements, they felt very enthusiastic and inspired about the work they do. When we compared these two elements (enthusiasm and inspiration) as a percentage of the statement in all the participating countries, Kosovo had the highest percentage of all the participating countries (87.4% and 90.7%), despite the fact that the students did not manage to reach the average score determined by TIMSS of 500 points.

From the data collected and presented in Tables 3 and 4, in some cases, we noticed a discrepancy between the teachers' statements and the students' actual results. This made us understand that the theoretical part (the statements in the questionnaire) did not coincide with the practical part (the test results). These elements encourage us to further expand the field of research regarding the TIMSS assessment in the future.

**Table 4.** TIMSS 2019 scores according to teacher characteristics.

How Would You Characterize Each of the Following within Your School?		Students' Scores in Math and Science (TIMSS 2019)	
		Math	Science
I inspire my students to learn	Very high	442.2	408.8
	High	446.9	417.2
	Medium	451.4	428.2
	Low	450.6	426.9
	Very low	-	-
I am content with my profession as a teacher	Very high	444.5	419.2
	High	442.2	412.5
	Medium	-	-
	Low	-	-
	Very low	-	-
I am enthusiastic about my job	Very high	446.3	432.0
	High	415.5	397.5
	Medium	-	-
	Low	-	-
	Very low	-	-
My work inspires me	Very high	445.2	414.4
	High	434.1	400.8
	Medium	-	-
	Low	-	-
	Very low	-	-

### 3.3. Professional Development of Teachers Compared with Average Scores of Students in Mathematics and Science

Post-war Kosovo (1999) has found the education system in a miserable state. From the year 2000 onwards, many international organizations have assisted with training education in various forms. Valuable help is also provided in terms of training, which is organized for teachers of different levels and in various fields. The programs offered through these

training have enabled a change in teachers' approaches to teaching and learning in general. What has been lacking during these 20 years, and what is lacking today, is the systematic oversight of the entire teaching process as well as responsibility and accountability. In the statements of teachers (Table 4), it was noted that they were enthusiastic about work, adored their profession, and were very inspired, but, despite these facts, the results of international evaluations were not good. Out of 56 countries participating in the TIMS 2019 test, Kosovo ranked 49th with 444 points in mathematics and 413 points in science. Additionally, in the TIMSS 2019 test, Kosovo ranked last among the countries in the region. Teacher training plays an extraordinary role in raising the quality of teaching. If we look at the data in Table 5, it can be seen that in the last two years, teachers attended very little training in the field of mathematics and (Table 5) science (Table 6). Based on their statements, only 23.5% had attended any training in mathematics during the last two years, while the percentage was even lower for science training (15.9%). The percentage of teachers did not increase even when asked if they had attended training related to the pedagogical aspect (math, 20.5%. science, 16.0%).

**Table 5.** The professional development of teachers compared with the average scores of students in mathematics.

Teachers' Declarations about Professional Development	During the Past Two Years, Have You Participated in Any Professional Development (PD) Training in Math?	
	Yes	No
	Student scores in TIMSS 2019 compared to teachers' statements about PD	
Mathematics content	447.5	443.7
Mathematics/pedagogy instruction	452.9	442.8
Mathematics curriculum	445.6	444.4
Integrating technology into mathematics instruction	441.7	445.5
Improving students' critical thinking or problem-solving skills	447.2	443.1
Mathematics assessment	446.0	444.0
Addressing individual students' needs	448.4	443.2

**Table 6.** The professional development of teachers compared with the average scores of students in science.

Teachers' Declarations about Professional Development	During the Past Two Years, Have You Participated in Any Professional Development (PD) Training in Science?	
	Yes	No
	Student scores in TIMSS 2019 compared to teachers' statements about PD	
Science content	418.8	413.5
Science/pedagogy instruction	414.2	412.6
Science curriculum	419.3	413.9
Integrating technology into mathematics instruction	415.6	413.3
Improving students' critical thinking or problem-solving skills	419.3	415.1
Science assessment	415.7	413.4
Addressing individual students' needs	415.3	413.0

Approximate percentage values were obtained if we noticed other statements of teachers regarding curriculum training, integration of technology in mathematics and



science, improving critical thinking or problem-solving skills of students, student assessment, or even addressing the individual needs of students. The highest average of training-related statements was 39.4% for teachers who had attended training to improve critical thinking skills.

If we analyze the data from Table 4 based on the training that the teachers had attended in the last 2 years and compared their professional development with the students' test scores, we can see that the students who were lucky enough to be part of classes taught by teachers stating they had attended training were more successful in the test. When teachers stated that they attended training in mathematical content, students achieved approximately 4 points more. In the case where the teachers participated in pedagogical and methodical instruction training, the students achieved 10 points more compared to their peers, who were in classes taught by teachers that did not attend pedagogical and methodical training.

There are small but substantial differences in student results, offering evidence for a correlation between the training attended by teachers and the students' results on the test.

Students of teachers who attended training for the pedagogical aspect of teaching achieved better results in mathematics (10 points more) as opposed to those of teachers who stated that they had not attended any such training.

When we analyzed the data from Table 6 based on the training that the teachers had attended in the last 2 years and compared their professional development with the students' test results, we could see that the results of the students who had the trained teacher were several points higher. When teachers stated that they attended training in science content, students achieved approximately 5 points more. In the case where the teachers participated in pedagogical and methodical instruction training in science, the students achieved 2 points more compared to their peers, who were in classes taught by teachers who did not attend pedagogical and methodical training. There were also such differences in the teachers' statements about other areas, such as evaluating and addressing students' needs.

If we look at Figure 1, the part where teachers evaluated professional development, it can be seen that they were willing to attend training in the above areas. Teachers' identification of these training needs means that they may potentially have difficulty addressing certain issues with students. Each of the statements given in the questionnaire, which required teachers to declare whether or not they needed a different kind of training, reached a very high percentage, even going up to 87% in certain cases (addressing the individual needs of students). All the facts prove that there is a close connection between the professional development of teachers and the results achieved by students. The more programs we have for the professional development of teachers, the higher the student results will be.

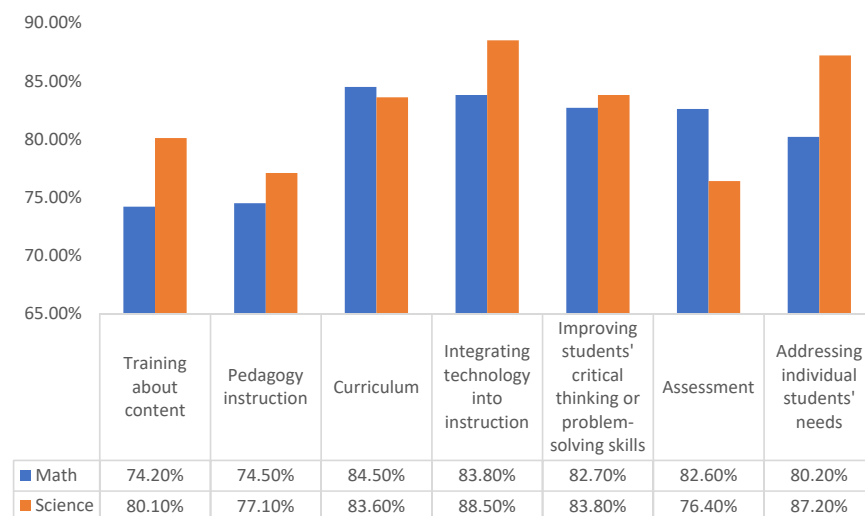


Figure 1. Teachers' needs.

#### 4. Discussion

The results of the paper show that the characteristics of teachers are of great importance in increasing the performance of students and achieving higher results in both local and international assessments. According to [Hanushek \(2011\)](#), the quality of teaching and teacher characteristics are decisive factors for student learning. [Ribers et al. \(2021\)](#), among others, have emphasized that the practice of lifelong learning by teachers gives teachers the “right mastery”. Pedagogical practices cannot be improved other than through professional development ([Tang et al. 2022](#)). Data from the literature show that for a student who spends 1 year with an ineffective teacher, this time can never be compensated for, while when spending 1 year with an active teacher, the student’s benefits are doubled ([Seebruck 2015](#)). According to [Grajcevcic and Shala \(2021\)](#), although it is known that the characteristics of teachers play a decisive role, it is still not so clear what the characteristics of a good teacher are. The analysis conducted in this study revealed that when teachers had an overall positive outlook regarding professional development, students also performed higher in mathematics and science. In addition, students tended to perform higher when teachers were at least in their 40s, which may also underline the importance of not only pedagogical knowledge but also teaching experience. Hence, future studies should focus more in depth on the impact that teacher experience has on student performance and possibly what variances in student performance this factor accounts for. Finally, in terms of professional development, TIMSS results reveal that Kosovar students benefited from any type of professional development teachers attended; however, it should be kept in mind that these improvements were not large enough to be significant, which is why they need to be reported cautiously.

Lifelong learning enables teachers to learn the best skills and practices in this area ([Ribers et al. 2021](#)). [Tang et al. \(2022\)](#) have emphasized that professional development is needed to improve teachers’ pedagogical approaches. The experiences of teachers that are passed on to them through professional development can dramatically affect students ([Didion et al. 2020](#); [Fischer et al. 2018](#); [Piper et al. 2018](#)). Education is an ongoing process that does not end with graduation. Teachers are constantly improving their skills and becoming more proficient and agile in teaching ([Quins University Charlotte n.d.](#)). We cannot imagine the contemporary teacher without professional and sustainable development. This development goes beyond the teaching content while also ensuring professional sustainability (Washington, 17 September 2019). Although the skills that teachers gain during their schooling are related to methodological and evaluative aspects, teacher training still plays a key role in curriculum implementation ([Burgess et al. 2016](#)).

[Baumert et al. \(2010\)](#) have emphasized that the teacher’s pedagogical knowledge is one of the determining characteristics of a favorable student result. During the analysis of the results, it was observed that the pedagogical aspect was not one of the strengths of Kosovar teachers. They had major setbacks in understanding the curriculum as well as in its implementation in practice. The lack of basic knowledge, both from the pedagogical and methodological aspects, leads us to failure. Some of the characteristics of teachers that can have a direct impact on student achievement were the qualification of teachers, their age, teaching experience, knowledge and understanding of basic documents from the pre-university education system, lack of training in certain areas both in terms of content and pedagogy, lack of integration of technology in teaching, methodical approach regarding the development of students’ critical thinking, student assessment, addressing students’ individual needs, etc. Teachers’ training needs were generally oriented towards the use of technology in teaching, curriculum implementation, assessment, and addressing the individual needs of students—individualized teaching. It is almost impossible to increase student success in international assessments without the professional development of teachers. The more quality training programs are offered to teachers in certain areas, the higher the student outcomes will be.

## 5. Conclusions

Teachers and the activities they conduct with students are very important, but even though their education in terms of duration is the same, they are different. This variability has to do with some of the characteristics they have built up over time. Researchers [Jordan et al. \(1997\)](#), while conducting research in Texas, observed that students who had more effective teachers achieved better results in assessments, reaching over 35 points in reading and about 50 points more in mathematics. Such effectiveness is also missing among Kosovar teachers, although this conclusion relies on data from international research. The education of pre-service teachers is lacking; seeing that teachers do not follow the trends of developments in education through professional training, we can conclude that Kosovo should take the findings so far seriously and design educational policies that foresee in-depth reforms of university and pre-university education. The ranking of Kosovar students in the TIMSS 2019 test in 49th place out of 56 participating countries (444 points in mathematics and 413 in science) is not accidental. Several factors led to this unsatisfactory result. It is very difficult to identify all the factors that caused Kosovar students to have such a low performance in this international assessment. According to [Gjelaj et al. \(2018\)](#), the key factor in the low quality of education is the small number of children attending preschool institutions, as we know that only 10% of children attend these institutions. Research shows that teachers are about 90% qualified, but ([OECD 2009](#)) pre-service education does not mean that teachers are ready to face all challenges. It reflects the aspirations, enthusiasm, and commitment of teachers ([Ungar 2020](#)). Research data show that the surveyed teachers have an average age of 16.3 years. Although a very young average age, the intersection of information between the calendar age of teachers and the points achieved by students in the TIMSS 2019 test proves that teachers under the age of 29 and those over 60 had lower scores by contrast with teachers aged 30–49. The difference between these two categories of teachers grouped by age was observed in the points that students accumulated on the test, and significant differences were recorded with an average of 20 points in mathematics and 22 points in science. Teachers' expectations regarding the results of their students were extremely high, but this was not reflected in the scores of their students. According to [Rubie-Davies \(2006\)](#), young teachers have higher expectations of their students. Teachers who had lower expectations (19.4%) for student testing were shown to be more accurate in the international ranking, while achieving better results with their students domestically. Research data show that teachers expressed that they can inspire students to learn, were very satisfied with their work (87%), were very enthusiastic at work (87.4%), and that working as teachers inspired them (90.7%). Research data show that the percentage of teachers very enthusiastic about work was over 87% (*the first in the list compared to the statements of the 56 countries participating in the test about enthusiasm*), over 90% were inspired, and 80% had high expectations for their students. Despite the enthusiasm and inspiration of the teachers, the students' results show the opposite. Out of 56 countries participating in the test, Kosovar students achieved 444 points in mathematics and 413 points in science, ranking in 49th place. The average score set by TIMSS 2019 was 500 points. Poor results of Kosovar students in international measurements, especially in the TIMSS 2019 test, are an alarm for researchers. Based on data from the TIMSS 2019 test, the professional development of teachers is an immediate need. Only 23.5% of teachers stated that they had attended training for mathematical content, while 15.9% had attended training for content in science. Approximate percentages are also given for other areas in which teachers had attended any training. Regarding pedagogical instructions, approximately 20% had attended training in mathematics and 16% in science, and regarding the integration of technology in teaching, 16.3% had attended training in mathematics and only 9.3% in science. Teachers expressed full readiness to attend training in certain fields. In each field, the percentage of teachers who stated they would attend training ranged from 74% to 88%.

All the data presented in this paper allow us to understand that the characteristics of teachers, such as quality education before service, the age of teachers, teachers' professional development, pedagogical and methodical preparation, and knowledge and implementa-

tion of the curriculum, are some of the factors that influenced the poor results of Kosovar students in TIMSS 2019. The rise and development of teachers' characteristics is largely based on the new approaches that universities in Kosovo should offer. A new approach implies teaching based on creativity and constructivity, a type of teaching dominated by responsibility and accountability. This responsibility and accountability should also pass to other levels, especially the pre-university ones, when teachers are faced with their work with students. The data from this research, as well as the data from other research related to the field of youth education, should encourage institutions to draw up long-term policies and strategies in order to get out of this vicious circle as soon as possible.

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## References

- Baier, Franziska, Ana Theresia Decker, Tamar Voss, Thilo Kleickmann, Uta Klusmann, and Mareike Kunter. 2019. What makes a good teacher? The relative importance of mathematics teachers' cognitive ability, personality, knowledge, beliefs, and motivation for instructional quality. *British Journal of Educational Psychology* 4: 767–86. [CrossRef] [PubMed]
- Barton, E. Paul, and Richard J. Coley. 2009. *Parsing the Achievement Gap II*. Policy Information Report. Princeton: Educational Testing Service. Available online: <https://www.ets.org/Media/Research/pdf/PICPARSINGII.pdf> (accessed on 3 March 2021).
- Baumert, Jürgen, Mareike Kunter, Werner Blum, Martin Brunner, Tamar Voss, Alexander Jordan, Uta Klusmann, Stefan Krauss, Michael Neubrand, and Yi-Miau Tsai. 2010. Teachers' Mathematical Knowledge, Cognitive Activation in the Classroom, and Student Progress. *American Educational Research Journal* 47: 133–80. [CrossRef]
- Bolyard, Johnna, and Courtney Baker. 2021. Examining the practice of elementary mathematics specialists through narratives: Implications for professional learning and development. *Professional Development in Education* 2021: 1–15. [CrossRef]
- Borko, Hilda, Jennifer Jacobs, and Karen Koellner. 2010. Contemporary Approaches to Teacher Professional Development. *International Encyclopedia of Education* 7: 548–56.
- Burgess, Annete, Christine van Diggele, and Craig Mellis. 2016. Student teacher training: Participant motivation. *The Clinical Teacher* 13: 267–70. [CrossRef]
- Clotfelter, T. Charles, Helen Ladd, and Jacob Vigdor. 2006. Teacher Student Matching and the Assessment of Teacher Effectiveness. *Journal of Human Resources* 41: 778–820. [CrossRef]
- Coleman, S. James, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York. 1966. *Equality of Educational Opportunity*; Reprinted from *American Sociological Review* 32: 1967. Washington, DC: U.S. Government Printing Office. Available online: [https://www.ssc.wisc.edu/wlsresearch/publications/files/public/Sewell-Marascuilo-Pfautz\\_Review.Symposium.C.et.al.pdf](https://www.ssc.wisc.edu/wlsresearch/publications/files/public/Sewell-Marascuilo-Pfautz_Review.Symposium.C.et.al.pdf) (accessed on 15 January 2022).
- Dam, Michiel, and Fred J. J. M. Janssen. 2021. Modularity in teacher professional development—Building blocks for bridging everyday teaching practices and reform ideals centered around whole tasks. *Professional Development in Education* 2021: 1–18. [CrossRef]
- Dearling, Linda Hammond. 2000. How Teacher Education Matters. *Journal of Teacher Education* 51: 166–73. Available online: [https://www.researchgate.net/publication/249704714\\_How\\_Teacher\\_Education\\_Matters](https://www.researchgate.net/publication/249704714_How_Teacher_Education_Matters) (accessed on 11 April 2020). [CrossRef]
- Didion, Lisa, Jessica R. Toste, and Marissa J. Filderman. 2020. Teacher professional development and student reading achievement: A meta-analytic review of the effects. *Journal of Research on Educational Effectiveness* 13: 29–66. [CrossRef]

- Dybowski, Christoph, Susanne Sehner, and Sigrid Harendza. 2017. Influence of motivation, self-efficacy and situational factors on the teaching quality of clinical educators. *BMC Medical Education* 17: 84. [CrossRef]
- Fischer, Christian, Barry Fishman, Chris Dede, Arthur Eisenkraft, Kim Frumin, Brandon Foster, Frances Lawrenze, Abigail Jurist Levy, and Ayna McCoy. 2018. Investigating relationships between school context, teacher professional development, teaching practices, and student achievement in response to a nationwide science reform. *Teaching and Teacher Education* 72: 107–21. [CrossRef]
- Gjelaj, Majlinda, Ema Rraci, and Kushtrim Bajrami. 2018. Preschool Education in Kosovo. Pristina. Available online: [https://www.researchgate.net/profile/Majlinda-Gjelaj/publication/334896051\\_PRE-SCHOOL\\_EDUCATION\\_IN\\_KOSOVO/links/5d4448bc92851cd0469a6722/PRE-SCHOOL-EDUCATION-IN-KOSOVO.pdf](https://www.researchgate.net/profile/Majlinda-Gjelaj/publication/334896051_PRE-SCHOOL_EDUCATION_IN_KOSOVO/links/5d4448bc92851cd0469a6722/PRE-SCHOOL-EDUCATION-IN-KOSOVO.pdf) (accessed on 4 July 2022).
- Grajcevi, Albulena, and Arif Shala. 2021. A Review of Kosovo's 2015 PISA Results: Analysing the Impact of Teacher Characteristics in Student Achievement. *International Journal of Instruction* 14: 489–506. [CrossRef]
- Hanushek, A. Eric. 1992. The Trade-off between Child Quantity and Quality. *Journal of Political Economy* 100: 84–117. [CrossRef]
- Hanushek, A. Eric. 2011. The economic value of higher teacher quality. *Economics of Education Review* 30: 466–79. [CrossRef]
- Jacobs, Johana C. G., Scheltus J. van Luijk, Francisca Galindo-Garre, Arno M. M. Muijtjens, Cees P. M. van der Vleuten, Gerda Croiset, and Fedde Scheele. 2014. Five teacher profiles in student-centred curricula based on their conceptions of learning and teaching. *BMC Medical Education* 16: 220. [CrossRef]
- Jepsen, Christopher. 2005. Teacher characteristics and student achievement: Evidence from teacher surveys. *Journal of Urban Economics* 57: 302–19. [CrossRef]
- Jong, Mirabelle A Schaub-de, Johanna Schönrock-Adema, Hanke Dekker, Marian Verkerk, and Janke Cohen Schotanus. 2011. Development of a student rating scale to evaluate teachers' competencies for facilitating reflective learning. *Medical Education* 45: 155–65. [CrossRef] [PubMed]
- Jordan, Heather R., Robert L. Mendro, and Dash Weersinghe. 1997. Teacher Effects on Longitudinal Student Achievement: A Preliminary Report on Research on Teacher Effectiveness. In *Proceedings of the CREATE Annual Meeting, Indianapolis IN, USA, July 1997*. Kalamazoo: CREATE, Western Michigan University. Available online: <https://scholar.google.com/scholar?hl=en&q=Teacher+Effects+on+Longitudinal+Student+Achievement%3A+A+Report+on+Research+in+Progress> (accessed on 25 May 2021).
- Karlberg, Martin, and Christopher Bezzina. 2020. The professional development needs of beginning and experienced teachers in four municipalities in Sweden. *Professional Development in Education* 12: 1–8. [CrossRef]
- Mahler, Daniela, Jörg Großschedl, and Ute Harms. 2018. Does motivation matter?—The relationship between teachers' self-efficacy and enthusiasm and students' performance. *PLoS ONE* 21: e0207252. [CrossRef]
- Mosteller, Frederick. 1995. The Tennessee Study of Class Size in the Early School Grades. *The Future of Children* 5: 113–27. Available online: <https://www.degruyter.com/document/doi/10.1515/9781400851607.261/pdf> (accessed on 11 April 2022). [CrossRef]
- Mullis, Ina V. S., and Michael O. Martin. 2012. Using TIMSS and PIRLS to improve teaching and learning. *Recherches en Éducation* 14: 1–182. Available online: <http://journals.openedition.org/ree/5835> (accessed on 1 February 2022). [CrossRef]
- Mullis, Inva V. S., Michael O. Martin, Pierre Foy, Dana L. Kelly, and Bethany Fishbein. 2020. *TIMSS 2019 International Results in Mathematics and Science*. Newton: Boston College.
- OECD. 2009. The Professional Development of Teachers. In *Creating Effective Teaching and Learning Environments: First Results from TALIS*. Paris: OECD Publishing, chp. 3. ISBN 978-92-64-05605-3.
- OECD. 2019. *PISA 2018 Results (Volume I): What Students Know and Can Do*. Paris: OECD Publishing. [CrossRef]
- Piper, Benjamin, Stephanie Simmons Zuilkowski, Margaret Dubeck, Evelyn Jepkemei, and Simon J. King. 2018. Identifying the essential ingredients to literacy and numeracy improvement: Teacher professional development and coaching, student textbooks, and structured teachers' guides. *World Development* 106: 324–36. [CrossRef]
- Ponte, Petra. 2010. Action Research as a Tool for Teachers' Professional Development. In *International Encyclopedia of Education*, 3rd ed. Utrecht: Hogeschool Utrecht, pp. 540–47. [CrossRef]
- Prince, Cynthia. 2002. The Challenge of Attracting Good Teachers and Principals to Struggling Schools. American Association of School Administrators. Available online: [https://www.researchgate.net/publication/228951320\\_The\\_challenge\\_of\\_attracting\\_good\\_teachers\\_and\\_principals\\_to\\_struggling\\_schools](https://www.researchgate.net/publication/228951320_The_challenge_of_attracting_good_teachers_and_principals_to_struggling_schools) (accessed on 13 March 2022).
- Quins University Charlotte. n.d. The Importance of Professional Development for Educators. Available online: <https://online.queens.edu/resources/article/professional-development-for-educators/> (accessed on 15 July 2022).
- Ribers, Bjorn, Gitte Miller Balslev, and Christine Revsbech Jensen. 2021. Education, collaboration and pedagogical pronesis: Essential dimensions in professional learning and development. *Professional Development in Education* 2021: 1–16. [CrossRef]
- Rubie-Davies, Christine M. 2006. Teacher expectations and student self-perceptions: Exploring relationships. *Psychology in the Schools* 43: 537–52. [CrossRef]
- Sanders, L. William, and June C. Rivers. 1996. *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement*. Knoxville: University of Tennessee Value-Added Research and Assessment Center.
- Sasson, Irit, and Shirley Miedijensky. 2020. Transfer skills in teacher training programs: The question of assessment. *Professional Development in Education* 2020: 1–38. [CrossRef]
- Seebrock, Ryan. 2015. Teacher quality and student achievement: A multilevel analysis of teacher credentialization and student test scores in California High Schools. *McGill Sociological Review* 5: 1–18.
- Sezer, Elif, and Mehtap Çakan. 2022. Role of Teacher Quality and Working Conditions in TIMSS 2019 Mathematics Achievement. *Journal of Theoretical Educational Science* 15: 395–419. [CrossRef]

- Shala, Arif, Albulene Grajcevci, and Fadil Latifi. 2021a. Does Socioeconomic Status Influence Achievement? An analysis of the Performance of Kosovar Students on the 2015 and 2018 PISA Assessment. *Journal of Elementary Education* 14: 393–408.
- Shala, Arif, Albulene Grajcevci, and Fadil Latifi. 2021b. Do teacher characteristics matter? Findings from the PISA performance of Kosovar students. *International Journal of Management in Education* 15: 580–97. [CrossRef]
- Tang, AiBin, Wen Ye Li, and Dawei Liu. 2022. The impact of teachers' professional development in science pedagogy on students' achievement: Evidence from TIMSS 2019. *Journal of Baltic Science Education* 21: 258–74. [CrossRef]
- Ungar, Orit Avidov. 2020. The professional learning expectations of teachers in different professional development periods. *Professional Development in Education*, 1–12. Available online: <https://www.tandfonline.com/doi/full/10.1080/19415257.2020.1763435> (accessed on 26 July 2021). [CrossRef]
- Zeggelaar, Albert, Marjan Vermeulen, and Wim M. G. Jochems. 2020. Evaluating effective professional development. *Professional Development in Education* 2020: 1–12. [CrossRef]
- Zhang, Ling, Richard Allen Carter Jr., Jihong Zhang, Tiffany L. Hunt, Christopher R. Emerling, Sohyun Yang, and Fangjie Xu. 2021. Teacher perceptions of effective professional development: Insights for design. *Professional Development in Education* 2021: 1–21. [CrossRef]