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Investigation of Turkey and Singapore Schools in Terms of Teacher Professional Development and Teacher Behaviors Hindering Learning Variables

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Abstract

This study compares Turkey and Singapore in terms of teachers' professional development and teacher behaviors that inhibit student learning by using PISA 2015 data. Relational survey method was used during the research design. In the PISA study, school sampling is determined by stratified random sampling method. The study was implemented on data collected from a total of 364 schools, 187 from Turkey and 177 from Singapore that participated in PISA 2015. In order to compare the two countries, t-test for independent groups was used when independent variable was continuous and chi-square test was used when the independent variable was categorical. The chi-square test was used to determine the differences between categorical data and survey results. Logistic regression analysis was used to find the significance level of the variables in the study according to the classification of the schools. The study results display noteworthy differences between the two countries in terms of variables that have been addressed. The proportion of the teachers participating in professional development program shows a significant difference according to the countries. The proportion of teachers participating in the program of professional development in Singapore is higher than in Turkey. The effect size obtained from the test result shows that this difference is very large. There was a significant difference between countries in all the responses given to the four items related to teachers' professional development. The examination of Phi coefficients shows that the effect size is the highest in the " "organization of in-service workshops which deal with specific issues that school faces". The variable contributing most to the model is "Our school organizes in-service workshops which deal with specific issues that our school faces". This variable is followed by "Our school organizes in-service workshops for specific groups of teachers (e.g. newly appointed teachers)", "Teacher absenteeism", "The percentage of teaching staff who has attended a program of professional development during the last

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three months" and "Teachers being too strict with students", respectively. The correct classification ratios of the observations are 91.4% in total. As a result, an important determinant of success between the two countries is related to meeting the needs for school-based professional development. Another important variable, according to the function that classifies between the two countries in a similar way, is organizing workshops for teachers who have special needs. Both variants emphasize the importance of school-based professional development. Teacher absenteeism and the strictness of teachers to students were found to be the determining variables in discriminating between the two countries' schools. However, the contribution of these variables to the function comes after the variables of professional development. Nevertheless, as teacher behaviors that prevent student learning can be reduced by providing teacher professional development, the most important result of the research is the necessity of ensuring school-based professional development.

Introduction

A quality education program and effective teaching are key elements in ensuring successful teaching and learning in schools. McKinsey (2007) stated that the best school systems have three determining factors. For him, the first one is finding the suitable teachers; the second one is turning them into effective teachers; and the third is establishing a system that will provide the best guidance to every child. When a general consideration is made, the driving force for making these efforts more effective is teachers. In this regard, teacher quality is the factor that makes the greatest difference on students' achievement (Angrist & Lavy, 2001; Bressoux, 1996; Borko & Puntam, 1996; Cohen & Hill, 2000; Darling-Hammond, 1996; Grosso de Leon, 2001; Jacob & Lefgren, 2004; Lee, Deaktor, Enders, & Lambert, 2008; Phillips, 2003; Tygret, 2017; Vogt & Rogalla, 2009 ; Wiley & Yoon, 1995).

This difference is due to the existence of passionate teachers at schools who strive to reach the educational goals. Increasing education efficiency and level of equality depends to a great extent on the teachers doing their best and to teachers being skilled and motivated. In this regard, one of the priorities of educational policy should be improving and maximizing teacher performance which will lead to significant gains in student learning (Organization for Economic Co-operation and Development [OECD], 2005). The fact that United Nations Educational, Scientific and Cultural Organization (UNESCO) define the professional development of teachers as the "Priority of Priorities" signifies the importance of teacher development. High professional competence of teachers will transform the learning environment into a more qualified one.

Teachers who are the most important sources in schools have critical importance for raising the education standards of a country such as Singapore which is ranked number two in the 2015 success ranking of The Program for International Student Assessment-PISA and which states that the most important factor for success is teacher quality. Singapore education system is among the best education systems in the world. When statistics of the past decade are examined, it is observed that Singapore is ranked among the top ten countries in the world in The Trends in International Mathematics and Science Study [TIMSS]), The Progress in International Reading Literacy Study (PIRLS) as well as in international large scale exams such as PISA (Mullis, Martin, Foy, &Hooper, 2015; Mullis, Martin, Foy, & Arora, 2012; Mullis, Martin, Foy, & Drucker, 2012; OECD, 2014). Similarly, the fact that 98% of the students in Singapore were successful in the sixth grade graduation examination in 2009 is an indication that the same success level has been reached in national examinations (Tan &Wan, 2009).

One of the countries that prioritizes teacher quality is Singapore. Teachers are considered as the heart of education quality in the Singapore's educational system (Ng, 2009) and teaching is still one of the most desired professions, which is ranked number two after medicine as a profession (Shanmugaratnam, 2006). Teacher education in Singapore is based on the vision of the Ministry of Education (MOE) which strives to make Singapore an intellectual nation, contributing to the growth and welfare of Singapore while raising citizens, who are able to think creatively, carry out lifelong learning and who have the capacity to become the leaders of change. Singapore determines the quota for student acceptance to teaching programs by taking the required number of teachers into consideration. Hence, students are generally directly employed after graduating from these programs. Students enter a written exam as well as an interview for displaying their interest to the profession, their skills and whether they hold the required communication skills or not (Eurydice, 2008; Erginer, 2007). Only 20% of the candidates who enter the exams are accepted to the National Institute of Education (NIE) and only 18 % of the accepted students graduate as teachers at the end of the training (McKinsey, 2007). Education is free for the students who are accepted to the program. Additionally, all intern teachers receive a payment within the scope of the teacher preparation program that is part of NIE (NIE, 2010).

In Singapore, the follow up of teachers who graduate from NIE is done by MOE. First of all, the starting salaries of teachers are comparable with those of other professions. The purpose of these payments to teachers is to keep the status of the teachers at a high level, thus making the teaching profession a desirable one and attracting the higher-level students to it (Lee & Tan, 2010). In addition, "teachers are evaluated based on their performance via a performance management system and they receive an additional 10-30% increase annually in addition to their yearly salary raise" (Sclafani, 2008. Teachers may also demand additional payment from the Ministry at the beginning of the semester for their educational needs. The two main objectives of evaluating the teachers are; ensuring that teachers do their best to increase the learning of students and to improve the skills and the practices that the teacher possesses by identifying their strengths and weaknesses for their professional development. (Lee & Tan, 2010).

Effective follow-up and evaluation of teaching remain at the center of continuous development of teaching effectiveness at schools. At this point, it is important to know the characteristics of teachers that are strong and that need to be improved (Tan, 2012). In this context, in-service training is highly valued by the Singapore MOE and the importance of professional development is guided by strategic guidelines and priorities (Wang-Iverson, Myers, & Lim, 2009). All teachers are provided with 100 hours of in-service training in order to ensure their professional development throughout the school duration. In addition, the Ministry of Education provides graduate scholarship opportunities for ensuring that teacher development is continuous. Teachers seeking to pursue a post-graduate education in both national universities and high quality international universities in the United States, the United Kingdom, Canada and Australia have the opportunity to receive ministerial support (Lee & Tan, 2010). Teachers who have completed 12 years of service may take two and a half months paid leave of absence either for continuing their professional development or for resting. Teachers may continue their educational activities at overseas countries or they may contribute to their personal development by following various programs (Shanmugaratnam, 2006). The range and quality of support provided to teachers in Singapore keeps general rate of wearing down for teachers remains as low as 2.42% due to retirement and resigning (Goodwin, 2012).

When teacher education and the professional development of teachers in Turkey are considered; students who wish to be teachers first have to enter the central examinations and take the required scores. Afterwards, it is obligatory for teacher candidates to successfully complete four (or five for high school teaching programs) years of education and in addition, students who wish to work as teachers in the government sector have to enter the public personnel selection examination prepared by the selection and placement center. Students who receive the required score from this examination are subject to an oral examination as well. The Ministry of National Education places the students to the

open quotas following the examination according to the average scores that they receive from both examinations (Milli Eğitim Bakanlığı Sözleşmeli Öğretmen İstihdamına İlişkin Yönetmelik, 3 Ağustos 2016). The Ministry of Education is responsible for the in-service training carried out for ensuring the professional development of teachers who are part of the system (Özoğlu, Gür, & Altunoğlu, 2013); however, the central structure of the Ministry prevents the in-service training activities to reach the desired levels (Aydoğan, 2008). For example, according to Çelik (2012), teachers have indicated that the in-service training seminars organized by the Ministry of Education are insufficient. Teachers have stated that they consider the obligatory attendance enforced by the Ministry as a problem and that the instructors who coordinate these are not competent enough. In the study carried out by Özer (2004), teachers have indicated that there are not sufficient motivating factors for professional development and they do not have the freedom to choose the programs they need for professional development since their opinions are not asked during the preparation period of the in-service training programs.

The comparison of Singapore and Turkey displays both similarities and differences with regard to the selection of students to teacher training programs, the education and learning activities of teacher candidates, and the moral and material support spared for the professional development of teachers (Abazaoğlu & Taşar, 2016; Aslan & Kaplan, 2007; Erbilgin & Boz, 2013; Göçen Kabaran & Görgen, 2016).

Aslan and Kaplan (2007) related the changes in science education programs with teacher training programs and compared them for Turkey and Singapore. According to the study results, science teachers in Singapore have more cultural knowledge than the science teachers in Turkey. Furthermore, science teachers in Turkey receive less in-service training than science teachers in Singapore.

Erbilgin and Boz (2013) compared the mathematics teacher training programs of Turkey and Singapore. According to the study results, whereas students are placed in teacher training programs according to only their exam scores in Turkey; additional examinations and interviews are used in Singapore during the placement. With regard to curriculum, the ratio of pedagogical content knowledge of the programs in Turkey is low; whereas this ratio is higher for Singapore. There are differences between the two countries with regard to school experience. Whereas there is a time frame for teacher candidates in Singapore that they only spare for school experience; teacher candidates in Turkey have to attend courses at their universities in addition to school experience.

Göçen Kabaran and Görgen (2016) examined the teacher training systems in Turkey and Singapore comparatively. The study results show that in-service training is mandatory in both countries. However, there are significant differences between the two countries with regard to the primary school teacher salaries calculated in accordance with the purchasing power parity determined by the OECD. Teacher salaries in Singapore are higher than Turkey. In addition to teacher salaries, the duration of education, distribution of courses, application courses and conditions for graduation have also been compared for teacher training undergraduate programs. Education duration is four years in both countries; however, there are differences with regard to the weight of professional teaching knowledge. Professional teaching knowledge courses form 25% of the programs in Turkey, whereas they make up more than half of the programs in Singapore. While, pedagogical certificate training programs also open the way for teaching in Turkey, there are no such programs in Singapore.

Abazaoğlu and Taşar (2016) examined science teacher characteristics for Turkey and Singapore along with their relationship with science literacy of the students according to TIMSS data. They found that the education level of teachers in Singapore, their job satisfaction and the index for bringing material to the classroom are related positively with the science achievement of students. The index for the main field of the teacher being science was determined to be negatively related with the science achievement scores of the students. In Turkey, job satisfaction of teachers, the use of computer by the teacher in the classroom and the indexes for in-service training received by the teachers on information technologies are positively related with science achievement. Even though the education level and the professional education on science program received by the teacher are not related with the science

achievement grades of the students, they have caused a significant increase in the science achievement grades of students.

These studies focus on teacher characteristics in Turkey and Singapore as well as their relationship with student achievement. Using PISA 2015 data that enables a comprehensive comparison, this study examines teacher characteristics separately and compares the professional development of teachers and the teacher behavior that hinders the learning of students in Singapore and Turkey. Thus, the study aims to answer the following sub questions:

1- Is there a meaningful difference between Turkey and Singapore schools in terms of the following professional development variables?

- The percentage of teaching staff who has attended a program of professional development during the last three months
- Teacher cooperation in terms of exchanging ideas or material when teaching specific units or series of lessons
- Invitation of specialists to conduct in-service training for teachers
- Organization of in-service workshops which deal with specific issues that a school faces
- Organization of in-service workshops for specific groups of teachers (e.g., newly appointed teachers).

2- Is there a meaningful difference between the schools in Turkey and Singapore in terms of the following teacher behavior variables that hinder student learning?

- Teachers not meeting individual students' needs
- Teacher absenteeism
- Resistance of the staff to change
- Teachers being too strict with students
- Teachers not being well prepared for the classes

3- In what accuracy level do teacher behavior variables that prevent student learning categorize the schools that attend PISA from Turkey and Singapore according to the countries?

Method

The study was designed via relational survey method. The relational survey model is a research model that is used to determine the existence of interchanges or the degree between two or more variables (Karasar, 2003).

Population and Sample

In the PISA study, school sampling is determined by stratified random sampling method. PISA 2015 application in Turkey, Statistical Region Units Classification (NUTS) Level 1, schools were determined using type of school, school location and administrative forms of schools by stratified random sampling method. According to NUTS Level 1, 187 schools representing twelve regions participated in PISA 2015 (MEB, 2016). In Singapore, randomly selected students, mainly in Secondary 3 and 4, from all 166 public and nine private schools participated in PISA 2015. Consequently, the study was implemented on data collected from a total of 364 schools, 187 from Turkey and 177 from Singapore that participated in PISA 2015.

Data Collection Instruments

As a means of data collection in the study, school questionnaire that includes variables in relation to teacher professional development and teacher behaviors that hinder students learning filled by the school administrator related to PISA 2015 was used. Table 1 shows items selected from the school questionnaire.

Table 1. Variables Included in the Survey and Related Survey Items

Variable	Survey Items
Professional Development	i) The teachers in our school cooperate by exchanging ideas or material when teaching specific units or series of lessons. ii) Our school invites specialists to conduct in-service training for teachers. iii) Our school organizes in-service workshops which deal with specific issues that our school faces. iv) Our school organizes in-service workshops for specific groups of teachers (e.g., newly appointed teachers). v) The percentage of teaching staff who has attended a program of professional development during the last three months
Teacher Behaviors That Hinder Students Learning	i) Teachers not meeting individual students' needs ii) Teacher absenteeism iii) Resistance of the staff to change iv) Teachers being too strict with students v) Teachers not being well prepared for classes

When Table 1 is examined, it is seen that two variables were considered, namely teacher professional development and teacher behaviors that hinder students learning. These variables were obtained from the survey items shown in the second column of Table 1. Questionnaire items related to professional development were answered as "yes" and "no" and teacher behaviors that hinder students learning as "not at all", "very little", "to some extent" and "a lot".

Data Analysis

In order to compare the two countries, t-test for independent groups was used when independent variable was continuous and chi-square test was used when the independent variable was categorical. The chi-square test is used to determine differences between categorical data and survey results (Baş, 2001). In other words chi-square is most commonly used for nonparametric statistics (Özdamar, 1999) that test whether two categorical variables are independent of each other (Büyüköztürk, Çokluk, & Köklü, 2010). The significant level was determined based on the value .05.

Logistic regression analysis was used to determine the significance level of the variables in the study according to the classification of the schools.

Logistic regression analysis technique was used because the dependent variable (countries) in the study was categorical. The purpose of the logistic regression analysis is to estimate the value of the categorical dependent variable, hence the "membership" estimate for two or more groups actually being tried. The logistic regression does not require any assumptions of the distributions of the independent variables involved in the analysis (Çokluk, Şekercioğlu, & Büyüköztürk, 2010).

Along with that some requirements must be met in order to perform logistic regression analysis. The first of these requirements is dependent variable should be measured on a dichotomous scale. In this study, since the countries participating in PISA 2015 are independent variables, this requirement is met. Second requirement is examining the ratio between the number of schools included in the study and the independent variables. Hosmer and Lemeshow (2000) suggest that the number of valid subjects for independent variables for binary logistic regression analysis should be at least 10 to 1. In this study, the number of valid schools included in the analysis is 347, and the number of independent variables is 10. Therefore, the study meets the requirement for binary logistics analysis.

Another requirement to be provided logistic regression analysis is sensitive to the high correlation between the predictor variables, thus ensuring that there is no multicolinerality problem between independent variables. It has been determined that there is no multicollinearity problem ($r < 0.90$) as a result of simple correlation analysis between variables.

Results

In this part of the study, the findings are presented on the basis of sub-problems.

Findings Related to the First Sub-Problem of the Research

T test results for the proportion of teachers who participated in program of professional development during the last three months are shown in Table 2.

Table 2. T-Test Results

Country	N	$\overline{X}$	S	df	t	p	d
Turkey	176	23,86	32,24	350	18,19	.00	1,96
Singapore	176	82,79	28,39				

When the t-test results of the proportion of teachers participating in the program of professional development are examined according to the countries, the proportion of the teachers participating in professional development program shows a significance difference ($t_{(350)}$=18,19, p<.05) according to the countries. The proportion of teachers participating in the program of professional development in Singapore ($\overline{X}$= 82,79) is higher than in Turkey ($\overline{X}$= 23,86). This result reveals whether there is a meaningful difference between the two rates compared, but it does not give information about the magnitude of this difference. Therefore, the statistical significance as well as the effect size have been calculated and reported. Independent samples were obtained by Cohen's d formula (Cohen, 1988). The effect size obtained from the test result (d = 1.96) shows that this difference is very large. Chi-Square results for the differentiation of professional development of teachers according to the countries are given in Table 3.

Table 3. Chi-Square Results

Survey Items			Turkey		Singapore					Effect Size	
			f	%	f	%	x^2	df	p	Phi	p
Professional Development	Teacher cooperation in terms of exchanging ideas or material when teaching specific units or series of lessons	Yes	174	93,5	175	100	11,679	1	.18	.001	.001
		No	12	6,5	0	0					
	Invitation of specialists to conduct in-service training for teachers	Yes	92	49,2	158	90,8	73,276	1	.451	.000	.000
		No	95	50,8	16	9,2					
	Organization of in-service workshops which deal with specific issues that school faces	Yes	55	29,4	172	98,3	183,374	1	.712	.000	.000
		No	132	70,6	3	1,7					
	Organization of in-service workshops for specific groups of teachers (e.g. beginning teachers)	Yes	85	45,5	167	96,5	111,640	1	.557	.000	.000
		No	102	54,5	6	3,5					

Table 3 shows that there was a significant difference between countries in all responses to the four items related to teacher professional development (p <.05). The Phi coefficient was calculated to determine the power of this relationship between the variables because the degree of freedom is 1 (2x2 is the case) (Can, 2017; Kotrlik & Williams, 2003). When the Phi coefficients are examined, it is seen that

the effect size is the highest (.712) in the " "organization of in-service workshops which deal with specific issues that school faces". The other variables are low (.18) and moderate (.451 and .557) effect size (Cohen, 1988; Rea & Parker, 1992).

The percentage of teachers who cooperated with other teachers in terms of exchanging ideas or material when teaching specific units or series of lessons is higher in Singapore (100 %) than in Turkey (93,5 %). When the responses given to the item, "Invitation of specialists to conduct in-service training for teachers" are examined, almost half of the teachers in Turkey responded "yes" to this item, while about 90% of Singapore responded "yes" to it. In Singapore, 98% of the administrators of schools participating in PISA 2015 responded "yes" to "Organization of in-service workshops which deal with specific issues that school faces" item, which appears to be quite low in Turkey. Finally, while 96.5% of the participants responded "yes" to "in-service workshops for special needs teachers" item, the percentage of "yes" responses for the same item was 45,5% in Turkey.

Findings Related to the Second Sub-Problem of the Research

Chi-Square results for the differentiation of teacher behaviors that hinder students learning according to the countries are presented in Table 4.

Table 4. Chi-Square Results

	Survey Items		Turkey		Singapore					Effect Size	
			f	%	f	%	x^2	df	p	V	p
Teacher Behaviors That Hinder Students Learning	Teachers not meeting individual students' needs	Not at all	22	11.8	23	13	9.719	3	.02	.163	.021
		Very little	95	50.8	105	59.3					
		To some extent	59	31.6	48	27.1					
		A lot	11	5.9	1	0.6					
	Teacher absenteeism	Not at all	26	13.9	79	44.6	42.617	2	.00	.342	.000
		Very little	148	79.1	93	52.5					
		To some extent	13	7	5	2.8					
		A lot	0	0	0	0					
	Resistance of the staff to change	Not at all	52	27.8	37	21	10.816	3	00	.173	.013
		Very little	95	50.8	102	58					
		To some extent	32	17.1	37	21					
		A lot	8	4.3	0	0					
	Teachers being too strict with students	Not at all	90	48.1	46	26	29.066	2	.00	.283	.000
		Very little	92	49.2	105	59.3					
		To some extent	5	2.7	26	14.7					
		A lot	0	0	0	0					
	Teachers being not well-prepared for classes	Not at all	49	26.2	32	18.1	11.336	3	.01	.176	.010
		Very little	104	55.6	124	70.1					
		To some extent	29	15.5	21	11.9					
		A lot	5	2.7	0	0					

When Table 4 is examined, it is seen that the opinions of the school administrators related to the teacher behaviors that hinder students learning have a significant difference according to the countries in all the answers given to the six items ($p<.05$). In order to determine the power of this relationship between the variables, Cramer's V coefficient is calculated and presented in Table 4. When the coefficients obtained were examined, the variables were found to have low (.163, .176 and .173) and moderate (.283 and .342) effect sizes (Cohen, 1988; Rea & Parker, 1992).

It is seen that the first of these items, " Teachers not meeting individual students' needs" is 37.5% in Turkey who express alot and to some extent. This ratio increased to 63.6% of those who expressed not at all and very little. Similarly, in Singapore, it is observed that this ratio has increased from 27.6% to 72.3%. Thus, in both countries, there is a great effort by teachers to respond to the individual needs of each student separately. This effort is higher in Singapore than in Turkey. In relation to "teacher absenteeism", while 97.1% of the teachers in Singapore have very low or null rates of absenteeism, this percentage is 93% in Turkey.

Findings Related to the Third Sub-Problem of the Research

In this part of the study, findings obtained as a result of logistic regression analysis are presented in stages. Firstly, findings of the first classification prediction are given in Table 5.

Table 5. Initial Classification Estimate Obtained as a Result of Logistic Regression Analysis

Observed Value		**Predicted Value**		**Percentage Correct**
		Singapore	**Turkey**	
School Success	Singapore	0	172	.000
	Turkey	0	175	100.0
			Overall Percentage	50.4

The results on Table 5 show that the accurate classification percentage is 50.4% according to the initial classification status obtained as a result of logistic regression. In order to test the logistic regression model, the model square statistic was calculated and the findings are presented in Table 6.

Table 6. Hosmer and Lemeshow Chi-Squared Goodness of Fit Test

Chi-Square	**df**	**P**
5.892	8	.659

As shown in Table 6, the level of significance obtained (0.659) shows that the model data are good fit. If the significance value of the Hosmer and Lemeshow test is less than 0.05, this is a poor fit (Albayrak, 2006). After testing the model's goodness of fit, the intended model summary findings were examined and presented in Table 7.

Table 7. Intended Model Summary

-2 LogLikelihood	**Cox&Snell R^2**	**Nagelkerke R^2**
152.034	.613	.817

The results on Table 7, Cox & Snell R^2 value shows that there is an approximately 61% relationship between dependent variable and independent variables. On the other hand, according to Nagelkerke R^2 value, this relationship is approximately 82%. Cox & Snell R^2 and Nagelkerke R^2 values indicate the amount of variance explained by the logistic model and express 1 excellent fit (Çokluk et al., 2010). Table 8 shows contribution of each independent variable to the model and its statistical significance.

Table 8. Coefficient Estimates of Model Variables

Survey Items	B	S.E.	Wald	df	p	Exp(B)
The percentage of teaching staff who has attended a program of professional development during the last three months	-,036	,006	36,807	1	,000	,964
Teachers in our school cooperate by exchanging ideas or material when teaching specific units or series of lessons	18,144	10086,615	,000	1	,999	7,584E7
Our school invites specialists to conduct in-service training for teachers	,921	,569	2,616	1	,106	2,512
Our school organizes in-service workshops which deal with specific issues that our school faces	3,404	,740	21,134	1	,000	30,085
Our school organizes in-service workshops for specific groups of teachers (e.g. newly appointed teachers).	2,229	,758	8,644	1	,003	9,287
Teachers not meeting individual students' needs	,275	,356	,597	1	,440	1,317
Teacher absenteeism	2,014	,488	17,044	1	,000	7,494
Resistance of the staff to change	,081	,394	,042	1	,838	1,084
Teachers being too strict with students	-1,457	,466	9,764	1	,002	,233
Teachers not being well prepared for classes	-,787	,448	3,085	1	,079	,455
Constant	-24,370	10086,616	,000	1	,998	,000

The Wald test is used to determine statistical significance for each of the independent variables. The Wald test is a measure of the significance of the B and each refers to the contribution of the variable to the model (Çokluk et al., 2010). When Table 7 is examined, it is understood that the " the percentage of teaching staff who has attended a program of professional development during the last three months (p = .000) ", "our school organizes in-service workshops which deal with specific issues that our school faces (p = .000)", "our school organizes in-service workshops for specific groups of teachers (p = .003)", "teacher absenteeism (p = .000)" and "teachers being too strict with students (p = .002)" added statistical significantly to the model prediction. But other variables did not add significantly to the model.

The interpretations to be derived from the logistic regression model are estimated odds ratios for model variables. Exp(B) is the odds value calculated for each variable. It indicates the change in the ratio of odds exchange from one-unit change in the predictor variable (Çokluk et al., 2010). Therefore, the variable contributing most to the model is "Our school organizes in-service workshops which deal with specific issues that our school faces". This variable is followed by "Our school organizes in-service workshops for specific groups of teachers (e.g. newly appointed teachers)", "Teacher absenteeism", "The percentage of teaching staff who has attended a program of professional development during the last three months" and "Teachers being too strict with students", respectively. Table 9 presents findings of the correct classification percentages.

Table 9. Estimation of Correct Classification Obtained as a Result of Analysis

Observed Value	Predicted Value		Percentage Correct
	Singapore	Turkey	
Singapore	161	11	93.6
Turkey	19	156	89.1
		Overall Percentage	91.4

Table 9 shows that the correct classification ratios of the observations are 91.4% in total. An additional 25% of the chance of correctness ratio gives the value to be used as a criterion for the accuracy of the classification of the model.

Discussion, Conclusion and Suggestions

Using PISA 2015 data, this study examined teacher characteristics and compared the professional development of teachers and the teacher behavior that hinders the learning of students in Singapore and Turkey.

The general examination of the study results display noteworthy differences between the two countries in terms of variables that have been addressed. There is a significant difference between the rates of teachers participating in the professional development programs. While one in every five teachers participates in the professional development program in Turkey, this rate in Singapore is about four out of every five teachers. The first thing that comes to mind about the professional development of teachers, which is given the highest priority by UNESCO, is vocational education programs. The high involvement of teachers in Singapore in vocational development programs relative to Turkey can be seen as a sign that the two countries give different levels of importance to teacher professional development. The aims of professional development programs are guiding teachers in finding ways to improve student learning, increasing their teaching performance, and influencing the ultimate goal of student success (Mizell, 2010).

Seferoğlu (2004) states that, a good teacher is an individual who continually develops himself/herself from professional and personal perspectives, explores and evaluates opportunities and possibilities for development. The common point of these explanations is the necessity for the individual to continue to develop in order to be a good teacher. Vocational development programs are an important means of this development. On the other hand, participation in vocational training programs is not the only and absolute way of professional development, nor should it be possible to provide professional development in all cases. The comparison made between the two countries in this study relates to the level of participation. It should also be noted that the training provided by vocational training programs should be functional. There are important criticisms about the functioning of in-service training programs within the scope of professional development program in Turkey. On the other hand, in Singapore these programs are considered functional for teachers. Therefore, the participation in professional development programs between Singapore and Turkey has a meaning beyond a proportional difference.

It is also possible to consider the difference between the rates of participation in the professional development programs, mentioned in the research findings, from another point of view. The difference in terms of participation in the professional development program for the two countries within the last three months under the PISA may have been due to the different definition of the professional development of the teachers of the two countries with different cultures. For example, while teachers in Singapore consider exchanging ideas with other teachers as a professional development program, teachers in Turkey may have different perceptions. However, even when the outcome is interpreted in this way, it must be emphasized that professional development is transforming into co-operation assistance with an increasing tendency in the world. In other words, it can be suggested that the philosophy of teacher development in Turkey should be treated like a micro-lab with each stakeholder's learning time or situation.

The study results reveal that Singapore schools have higher qualifications in terms of each variable that aims to provide professional development. In terms of these variables, there are significant differences between Singapore and Turkish schools proportionally. For example, in Singapore, 172 out of 175 schools reported that workshops were held for specific situations the school faced. Workshops were held in 132 of 187 schools in Turkey for such situations. This can give information about the general approach of both countries in terms of professional development.

While professional development in Singapore is shaped by the school's own unique needs, it is considered as a professional development center in Turkey. There is also a difference between Turkey and Singapore in favor of Singapore in organizing workshops for teachers who are in special need for particular reasons Daresh (2002) stated that teachers who are new to the profession might experience anxiety and stress and added that they might need assistance in lesson planning, recognition of the physical environment of the school, learning rules and policies. Scherer (1999) suggested that teachers who have just begun teaching have to cope with more intense problems than they had in the past, and therefore new teachers should pursue learning and find ways to solve these problems. The solutions that university education recommends to novice teachers may not be adequate in solving real classroom problems (Geuder, Lange, & Scafidi, 2011). Therefore, teachers should be supported in special situations such as new start to the profession.

The study results reveal significant differences between the two countries regarding the differentiation of teacher behaviors that prevent students from learning. This difference is generally in favor of Singapore. It can be predicted that teachers who meet individual development needs will work with a higher motivation. Ojiemhenkele (2014) points out that in-service training activity enhance teachers' productivity by raising their talents, confidence and creativity. Therefore, the fact that the level of participation of Singapore teachers in in-service training activities is higher than the teachers of Turkey can be considered as one of the reasons of this result. On the other hand, teacher and student ratios can create favorable results for Singapore in terms of teachers meeting the individual needs of learners and their being strict to their students.

In Singapore, the number of students per teacher is 16.5 in basic education and 12.5 in secondary education (MOE, 2015). This ratio is given as 18 and 13 respectively in Turkey (Turkish Statistical Institute [TUIK], 2017). However, these numbers for Turkey reflect some improvements that have been taking place in the recent years. For example, in basic education the number of students per teacher has been reduced from 30 to 18 over the last 15 years. However, studies still report an imbalance between student and teacher ratios in Turkey (Sarıer; 2010; Tezcan, 1994; World Bank, 2011). There are also regional differences in Turkey in terms of classroom population (Gök, 2004; Ferreira & Gignoux, 2010; Sarıer; 2010; World Bank, 2011). The imbalance between student and teacher ratios is one of the reasons why teachers cannot deal with students' individual needs (TEDMEM, 2016). Therefore, in order to meet the individual needs of the students, it is necessary to establish a balance between teacher and student ratios.

The findings of the study reveal that the variables studied in order to distinguish between Singapore and Turkey schools are important. Within the scope of the research, after missing schools were taken out, a total of 347 schools, including 180 from Turkey and 167 from Singapore, were included in the analysis and 3017 of these schools were classified correctly. The high value (91.4%) of correct classification demonstrates that teachers' professional development variable and the teacher behaviors' that hinder student learning variable are important sources of difference between the two countries.

The most decisive variable according to the function that classifies between Turkey and Singapore schools is the organization of workshops for special situations that the school faces. Smith, Keating, and Turner (1999) point out that school-based in-service training program are based on a deeper understanding of the technical aspects of how the national education program will be implemented to increase the level of informal relationships among teachers. However, as a more important finding, school-based in-service training programs have shown that teachers are beginning to think about their own roles within schools and their values within the school system. Therefore, the identification and elimination of professional development needs on the basis of school is seen as a deficiency when compared to Singapore. In other words, an important determinant of success between the two countries is related to meeting the needs for school-based professional development. Another important variable, according to the function that classifies between the two countries in a similar way, is organizing workshops for teachers who have special needs. Both variants emphasize the importance of school-based professional development.

Teacher absenteeism and the strictness of teachers to students were found to be the determining variables in discriminating between the two countries' schools. However, the contribution of these variables to the function comes after the variables of professional development. Nevertheless, as teacher behaviors that prevent student learning can be reduced by providing teacher professional development, the most important result of the research is the necessity of ensuring school-based professional development.

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