Examining Turkish Students' Views on the Reading Literacy Tasks of PISA 2018 in Terms of Different Variables

Research Article

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ABSTRACT

The study investigates possible factors affecting Turkish students' perception of task difficulty in the Program for International Student Assessment (PISA) 2018. The research data consist of the survey responses of the students who participated in the PISA 2018. The participants include 6679 15-year-old Turkish students. The dependent variable of this study is the students' views of the reading task difficulty in the PISA 2018. Independent variables are divided into two as student-level and school-level variables. The student-level variables include strategy use, reading format preference, time spent reading, perceived difficulty, and frequency of being online. The school-related variable is schools' digital capacity. Since the PISA sample has a nested structure, the data were analyzed using Hierarchical Linear Modeling (HLM). The analysis showed that the differences among schools predicted approximately 9.8% of the variation in students' perception of the difficulty of reading literacy tasks in PISA while the rest of the percentage was due to the differences among students. In the regression model, student-level and school-level variables as groups appeared to predict the dependent variable significantly. In the final interactive regression model, the interactions of student and school-level variables were examined, and the interaction appeared not to be a significant predictor of the dependent variable. Based on the HLM analysis, it can be argued that PISA tasks are perceived as easier in cases where schools' digital capacity increases, students find the use of strategy useful, the use of digital spaces in reading increases, the difficulty in reading and comprehension decreases, the time spent reading increases, and the frequency of being online increases.

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Keywords:

perceived difficulty in reading, schools' digital capacity, time spent reading, online reading.

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Introduction

OECD Program for International Student Assessment (PISA) assesses the proficiency of students aged 15 years in reading, science, and mathematics across 79 countries. In this regard, PISA is one of the largest international educational assessments so far (Harju-Luukkainen, Vettenranta, Ouakrim-Soivio, & Bernelius, 2016). PISA cycles are conducted every three years, each of which assesses a literacy area. PISA does not only focus on the results of adolescents' literacy performance. Examining the survey results of the students who have participated in PISA can depict the variables such as family, education, socio-cultural and affective conditions that impact their literacy performance. PISA can also reveal the complicated relationship regarding achievement at the individual, school, and country levels via non-cognitive survey data (OECD, 2019a, p. 227). With its rich data content, PISA provides policymakers, families, and educators with the opportunity to analyze and examine many variables regarding students. Therefore, PISA exams prepared by the OECD provide objective, valid, and reliable data through which participating countries can make their own inferences.

One of the focus areas of PISA exams is reading, and it was last implemented in 2018. A good number of studies have been conducted on the reading tasks in PISA, addressing different variables. These studies cover the variables affecting student performance (Tavsancıl, Yıldırım, & Bilican Demir, 2019), the use of information and communication technologies (ICT) (Leino, 2014; Steffens, 2014), gender (Brozo et al., 2014; Mak, Cheung, Soh, Sit, & Jeong, 2017; Puteh, Zin, & Ismail, 2016; Zehner, Goldhammer, & Sälzer, 2018), cross-country comparisons based on various variables (Aydin, Erdağ, & Taş, 2011; Brozo, Shiel, & Topping, 2007; Cheema, 2018; Shiel & Eivers, 2009; Spaull & Taylor, 2015; Sullivan, McConney, & Perry, 2018; Vázquez-Cano, Gómez-Galán, Infante-Moro, & López-Meneses, 2020), domestic results and comparisons based on various variables (Bozkurt, 2016; Harju-Luukkainen et al., 2016; Spaull, 2019; Tsvetkova, 2016), and cultural differences and comparisons (Kankaraš & Moors, 2014; McQueen & Mendelovits, 2003; Tan, 2020). These studies suggest that it is possible to make some predictive comments about the problems and solutions regarding reading at the global or country level by evaluating the situations that affect adolescents' reading skills owing to the PISA data.

Reading Literacy

Many factors are affecting reading as it consists of complex processes. Literacy skills of adolescents compared to primary school students are more complicated due to the intensive curriculum and lack of motivation (Biancarosa & Snow, 2006). Students' reading experience, habits, strategies, beliefs, perceptions, attitudes, and motivation play essential roles in the reading process and comprehension. The factors affecting adolescents' reading comprehension can be listed as;

- “1. fluency of text reading;
2. vocabulary, or the breadth and depth of knowledge about the meaning of words;
3. background, or prior knowledge related to the content of the text being read;
4. higher-level reasoning and thinking skills;
5. active and flexible use of reading strategies to enhance comprehension; and
6. motivation and engagement for understanding and learning from text” (Torgesen et al., 2007, pp. 10-11).

On the other hand, the influence of the reading texts and related tasks cannot be overlooked. The international student evaluation processes take into account many factors affecting reading.

People have continued to read for different purposes with different tools, along with the development of technological tools. The changing nature of reading requires understanding single-source texts and multi-source texts (Cope & Kalantzis, 2000; OECD, 2019a; Zammit, 2011). Reading literacy is defined in PISA as the competencies that enable the reader to establish a close relationship with the information in a single or multi-source text for a specific purpose. Students are expected to read for various purposes and have high reading motivation in addition to those competencies in reading (OECD, 2019b). In the last 20 years, especially, people have focused on online reading, which includes multi-source texts. Today, PISA assessments are heavily based on online reading. Therefore, the components of the reading process have become even more complicated. Reading multi-source digital texts may cause students to have relatively more difficulties because it requires understanding intertextuality. However, we need to focus on students' experiences of how they perceive PISA texts or describe their PISA reading experience to draw firm conclusions. PISA results have given the most comprehensive data in this regard. Difficult texts or reading tasks can negatively affect reading comprehension (Soemer & Schiefele, 2019). Therefore, it is necessary to take a closer look at the data indicating the perceived level of difficulty with PISA exams and reading tasks.

Perceived Difficulty of Reading Tasks

The PISA 2018 cycle was added questions asking students about the difficulty of the reading tasks in PISA exams. The questions aim to test the unknown word ratio, text difficulty, and the ability to maintain coherence inferences (OECD, 2020). It is quite recent that PISA aims to survey the perceived difficulty, and there are no empirical research findings in Turkey regarding the perceived difficulty of PISA reading tasks. Therefore, it is significant to determine the possible variables (if any) affecting this new situation.

Although text difficulty is more associated with such field-related variables as word recognition and the meaning connection (Akyol, 2011), it is also related to individuals' beliefs about how they perceive themselves in reading tasks (Keskin, 2014). The concept of the perceived difficulty can be defined as a subjective assessment of task difficulty that emerges through cognitive, motivational, and emotional evaluations (Efklides as cited in Fulmer & Tulis, 2013). In PISA exams, more specifically, the perceived difficulty in reading tasks has been emphasized, and the data reveal that many 15-year-old students have had difficulty understanding what they read (OECD, 2014; Torppa, Eklund, Sulkunen, Niemi, & Ahonen, 2018). 1 in 4 students has difficulty in identifying the main idea in a text of moderate length or synthesizing information from different sources (OECD, 2019b, p. 19). The perceived difficulty of reading texts is not solely due to the text. The literature points to individual differences that may play an important role in shaping adolescents' reading and comprehension processes. For instance, studies suggest that the perceived difficulty of a reading task can vary due to readers' capacities, which may depend on students' level of proficiency in reading or gender-related differences (OECD, 2019b). In sum, the perceived difficulty is a preliminary indicator that points to the difficulty of the reading task (Klauda & Guthrie, 2015) and is influenced by many variables. Therefore, it should be taken into account by those responsible for reading education.

Language educators often associate difficulties in reading and comprehension with text difficulty. Studies using readability formulas or cloze tests, which are generally based on measuring the word and sentence length, aim to estimate the text difficulty. According to the readability formula result, it is predicted that the easier the text is, the easier it is to understand. However, scholars agree that the linguistic, contextual, and conceptual structure of the text and the reader-writer (use of pronouns, tense, and voice) relationships are more determinative in readability than criteria such as sentence length (Fulcher, 1997, pp. 503-504). On the other hand, the difficulty in understanding the text -the task difficulty- is related not only to the textual structure but also individual differences (interest, attitude, motivation, etc.). Soemer and Schiefele (2019) determine that interest in the reading topic and text difficulty indirectly affect reading comprehension. They state that the decrease in the interest in the reading topic and the increase in mind wandering affect

comprehension negatively. Students report that they experience more mind wandering for the easy texts compared with the difficult texts when reading a text in which they are not interested (Fulmer, D'Mello, Strain, & Graesser, 2015).

Perceived difficulty and self-efficacy construct the two dimensions of a general concept (Liu, Doucette, & Farris, 2007). However, the perceived difficulty is distinct from self-efficacy. Rosenzweig and Wigfield (2017) have posited that the perceived difficulty decreases with the increase in self-efficacy. On the other hand, the perceived difficulty has a negatively related to motivation (Guthrie, Klauda, & Ho, 2013). The perceived difficulty may predict reading success more strongly than self-efficacy (Klauda & Guthrie, 2015). Studies have shown that the perceived difficulty in reading is not related to the topic (Fulmer & Tulis, 2013) and comprehension of the text (Ürün Karahan & Taşdan, 2016). Purposeful reading (Cheon & Ma, 2014) and understanding of the syntax (Kauchak, Leroy, & Hogue, 2017) or lexis (Leroy, Helmreich, & Cowie, 2010) in the text have an impact on the perceived difficulty, which predicts the reading motivation (Ürün Karahan & Taşdan, 2016).

According to the Ministry of Education (MONE, 2019), the reading literacy average scores of the Turkish students who participated in PISA 2018 have increased significantly compared to those who participated in PISA 2015. It is uncertain to what extent the perceived difficulty of reading tasks impacts this increase. The relationship between students' perception of task difficulty, which PISA 2018 cycle has begun to assess, and potential variables, as well as the significance of this relationship, must be illustrated. Therefore, future studies need to reveal uncertainties regarding the interactions of new fields examined in PISA and determine the variables that have possible impacts.

For the reasons addressed above, a multi-level model consisting of student-level and school-level independent variables is needed to determine the factors that are likely to affect the perceived difficulty of PISA reading texts and tasks. Therefore, we have identified the dependent variable as students' feelings about the PISA reading tasks [based on non-cognitive responses given to the PISA 2018 questionnaire]. To investigate the relationships between the dependent and independent variables, we have considered the independent variables at both school and student levels following the structure of the PISA data. We aim to identify the relationships between the dependent variable and the schools' digital capacity as the school-level independent variable and the usefulness of reading strategies, reading format preference, time spent reading, and online reading as the student-level independent variables. The research questions of the study are as follows:

1. Do students' views on reading tasks in the PISA test differ across schools?
2. Which of the student-level factors impact their views on reading tasks in the PISA test?
3. Which of the school-level factors impact their views on reading tasks in the PISA test?
4. Do the interactions of student-level and school-level variables significantly predict students' views on reading tasks?

Method

The data obtained from PISA 2018 exam had a 2-level structure. It was observed that students were grouped in school with a hierarchical structure where level one was students, and level two was schools. Therefore, it is not possible to use the independent observation assumption, which is the basis for classical statistical techniques. The notion behind this approach is that individuals in the same group are more similar -or the same- than individuals in different groups (Raudenbush & Bryk, 2002). The current study considered the Hierarchical Linear Modeling (HLM) as an appropriate model for the purposes of this research.

Participants

The participants included 15-year-old Turkish students who participated in the 2018 PISA. We selected the sample from PISA exams using the stratified random sampling method. Based on this method, the schools were first determined, and then the students who would take the PISA exam from these schools were randomly sampled. As a result of this sampling practice, 6890 students from 186 schools participated in the PISA 2018 from Turkey. 49.6% of the students were girls, while 50.4% were boys (MEB, 2019, pp. 23-24).

Materials

The data of this study was the data of Turkish students, which was contained in the OECD PISA 2018 database (OECD, 2020). First, the dimensions to be investigated in this research were determined based on the information in the database. The dependent variable of the study was the questions between the range of ST163Q02HA and ST163Q04HA ($\alpha = .71$) that measured students' feelings regarding PISA reading tasks. These questions were grouped and titled "In the PISA test, how do you feel about the reading tasks" (TASKFEEL). For example, the first question was the following: "There were many words I could not understand." The Likert scale consisted of Strongly disagree (1), Disagree (2), Agree (3), and Strongly agree (4). There were five independent variables at the student level (Level-1) in the research. The first group of questions ranging from ST161Q06HA to ST161Q08HA was labeled as "Perceived Difficulty in Reading" (PERCDIFF). The scale for this variable was a 4-point Likert scale (Strongly disagree=1, Agree=4), and the Cronbach's alpha internal consistency coefficient was at a satisfactory level ($\alpha=.69$). The second group of questions measured the dimension of usefulness for understanding and memorizing text (USEFMEMO). The questions in this group were in the range of ST164Q01IA-ST164Q06IA with a 6-point Likert scale (Not useful at all=1, Very useful=6), and the internal consistency reliability was calculated to be $\alpha=.70$. The third group of questions was collected under "How often involved in:", concerning the frequency of reading e-mails and news online, online information-searching, researching online, and participating in messaging software and discussion groups (ONLINVOL). These items were listed as ST176Q01IA, 2IA, 3IA, 5IA, 6IA, and 7IA with a 5-point Likert scale (I don't know what it is=1, Several times a day=5) and had sufficient reliability ($\alpha = .79$). The fourth group contained a single item, "About how much time do you usually spend reading for enjoyment?", labeled as ST175Q01IA (SPENDREAD). This item intended to determine how much time was spent reading for enjoyment with a 5-point Likert scale (I do not read for enjoyment=1, more than 2 hours a day=5). The last group of questions included a single item, "Which of the following statements best describes how you read books (on any topic)?", labeled as ST168Q01HA (PAPERDIGIT). This question had a 4-point Likert scale (I rarely or never read books=1, I read books more often in paper format=2, I read books more often on digital devices=3, I read books equally often in paper format and on digital devices=4). This item aimed to identify whether reading was in print or a digital environment. The school-level (Level-2) variable was named SCHDIGIT, indicating schools' capacity for the use of digital devices. The SCHDIGIT variable consisted of questions in the range of SC155Q01HA- SC155Q11HA (OECD, 2020).

Procedure

The data file containing information about the students and schools was collected from the OECD's publicly available database (OECD, 2020). The dataset included data from other countries, yet we extracted the data files on Turkey as the present study was only concerned about investigating Turkish data. Using SPSS software (IBM Corp, 2013), student and school data were merged into a single file, and the data file was analyzed using Jamovi (The Jamovi Project, 2019). Then, the data that were irrelevant to the research variables in our study were removed from the data file. We also excluded the missing data from the analysis. Analyses were conducted with the remaining 6679 student data. Since the variables at Level 1, PERCDIFF, USEFMEMO, and ONLINVOL, consisted of more than one item, the mean scores of the items were calculated. On the other hand, the SPENDREAD and PAPERDIGIT variables included single items, and the scores remained as they

were. Similarly, the second level SCHDIGIT variable and the dependent variable TASKFEEL consisted of more than one item; thus, the analyses were conducted using mean score calculations. All the analyses based on the HLM models were carried out with the R Software-based (R Core Team, 2018) Jamovi (The Jamovi Project, 2019) and the GAMLJ module (Gallucci, 2019). In our analyses, we utilized the four most common models used in the HLM analyses (Raudenbush & Bryk, 2002, pp. 68-85). Firstly, the null model was used to calculate how much of the variance in the dependent variable was predicted by Level 1 and 2. Secondly, the means-as-outcomes regression model was used to determine how much of the variation in the dependent variable was explained by the Level 2 independent variable. Then, the random coefficients model was performed to understand the predictor variables at Level 1 and determine the relationship between the dependent and independent (predictor) variables. In the fourth step, the intercepts- and slopes-as-outcomes model allowed us to observe the effects of the interactions of the 1st and 2nd level variables on the dependent variable. The level of statistical significance was selected as .05.

Findings

The multi-level models were performed to determine the variables that may have caused variability in the perceived difficulty of PISA reading tasks of students who took the PISA 2018 exam. Due to the structure of the hierarchical linear model, we started our analyses with the null model. The null model tests whether there are differences between the two groups and whether HLM is required for subsequent analysis (Woltman, Feldstain, MacKay, & Rocchi, 2012).

Null Model

The null model is also referred to as the unconstrained (Woltman et al., 2012, p. 62) or the one-way ANOVA model in the literature. It also calculates the predictor variables between and within schools (Raudenbush & Bryk, 2002, p. 69).

Table 1. Parameter estimates for the null model

Names	Estimate	SE	Lower	Upper	df	t	p
(Intercept)	1.98	0.0164	1.95	2.01	177	121	<.001
Groups	Name	SD	Variance	ICC			
CNTSCHID	(Intercept)	0.197	0.0389	0.0979			
Residual		0.599	0.3586				

Table 1 illustrated that the school averages of the perceived difficulty of PISA reading tasks were significantly different from each other ($t(177) = 121, p = .001$). This result also indicated that further HLM analyses were needed. The variance of the perceived difficulty of PISA reading tasks between schools was estimated as 0.0389. The variance between students was 0.3586. Dividing the total variance by the variance within schools, we estimated the intraclass correlation coefficient (ICC) as approximately 0.098. The results showed that approximately 9.8% of the variability in students' perceived difficulty of PISA reading tasks resulted from the difference between schools.

Means-as-Outcomes Regression Model

While there was no student-level variable in this model, the model included school-level variables to test their effect on the dependent variable. Therefore, the possible effect of schools' digital capacity (SCHDIGIT) on the dependent variable was analyzed with the means-as-outcomes regression model. Table 2 below presented the results.

Table 2. Parameter Estimates of Means-as-Outcomes Regression Model

Fixed Effects	Estimate	SE	Lower	Upper	df	t	p
(Intercept)	1.9740	0.0161	1.942	2.0057	175	122,32	< .001
SCHDIGIT	-0.0665	0.0272	-0.120	-0.0132	181	-2.44	0.016
Random Effects		SD	Variance				
CNTSCHID	(Intercept)	0.194	0.0373				
Residual		0.599	0.3539				

Examining Table 2, we observed that schools' digital capacity was a significant predictor of students' perception of task difficulty ($p < .05$). In other words, an increase of 1 percentage point in schools' digital capacity caused a decrease of approximately 0.06 score points in the students' perception of PISA reading task difficulty. The low scores in the dependent variable corresponded to 'strongly disagree', and the improvements or opportunities in schools' digital capacity appeared to assist the students with the ease of comprehension of PISA texts. Upon the addition of schools' digital capacity as a school-level independent variable to the model, we used the $(\tau_{00}(\text{null}) - \tau_{00}(\text{SCHDIGIT})) / \tau_{00}(\text{null})$ formula to find the explained variance at Level 2 or the rate of variance reduction (Raudenbush & Bryk, 2002, p. 74). Based on the results, approximately 4% of the real variance of the perceived difficulty of PISA reading literacy tasks across schools was explained by the schools' digital capacity $(0.0389 - 0.0373 / 0.0389 = 0.04)$.

The Random-Coefficient Model

With the random-coefficient model, we aimed to determine which variables at the student level were significant predictors of the scores of the perceived difficulty of PISA reading literacy tasks. We asked how much the regression equations varied from school to school (Raudenbush & Bryk, 2002, p. 75). Therefore, the student-level variables PERCDIFF, USEFMEMO, ONLINVOL, SPENDREAD, and PAPERDIGIT were added to the model and analyzed. The results were presented in Table 3.

Table 3. The parameter estimates of the random-coefficient model

Fixed Effects	Estimate	SE	Lower	Upper	df	t	p
(Intercept)	1.9711	0.0133	1.9452	1.9971	169	148,80	< .001
PERCDIFF	0.3489	0.0114	0.3266	0.3711	6642	30.72	< .001
USEFMEMO	-0.0153	0.0068	-0.0287	-0.0019	6636	-2.24	0.025
ONLINVOL	-0.0192	0.0092	-0.0372	-0.0013	6596	-2.10	0.036
PAPERDIGIT	-0.0251	0.0083	-0.0414	-0.0089	6605	-3.02	0.003
SPENDREAD	-0.0123	0.0059	-0.0238	-0.0001	6628	-2.09	0.037
Random Effects		SD	Variance				
CNTSCHID	(Intercept)	0.152	0.0232				
Residual		0.555	0.3080				

Table 3 demonstrated that all the student-level independent variables added to the model were significant predictors of TASKFEEL, the dependent variable of the study. According to the model, an increase of 1 percentage point in the PERCDIFF scores causes an increase of approximately 0.35 score points in TASKFEEL. An increase of 1 percentage point in USEFMEMO, ONLINVOL, PAPERDIGIT, and SPENDREAD scores appeared to cause a decrease of approximately -0.015, -0.019, -0.025, and -0.012 score points in TASKFEEL respectively. Upon the addition of student-level independent variables to the model (Table 3), the formula $(\sigma^2(\text{null}) - \sigma^2(\text{RC Model})) / \sigma^2(\text{null})$ was used to find the explained variance at Level 1 or the rate of variance reduction (Raudenbush & Bryk, 2002, p. 79). The calculations showed that the variables PERCDIFF, USEFMEMO, ONLINVOL, SPENDREAD, and PAPERDIGIT at the student level decreased the intra-school variance by 14% $(0.3586 - 0.3080 / 0.3586 = 0.14)$. Thus, we argued that these independent variables at the student level constituted approximately 14% of the variance in TASKFEEL.

Intercepts- and Slopes-as-Outcomes Model

With the intercepts- and slopes-as-outcomes model, we investigated the effect of the interactions of student-level independent variables and SCHDIGIT variables on the TASKFEEL. Table 4 displayed the results.

Table 4. Parameter estimates of intercepts- and slopes-as-outcomes model

Names	Estimate	SE	Lower	Upper	df	t	p
(Intercept)	1.9727	0.0132	1.9470	1.9985	167	150,0604	< .001
PERCDIFF	0.3491	0.0158	0.3181	0.38014	176	22.0553	< .001
ONLINVOL	-0.0169	0.0104	-0.0374	0.00341	159	-1.6327	0.105
SCHDIGIT	-0.0501	0.0223	-0.0937	-0.0064	175	-2.2480	0.026
USEFMEMO	-0.0197	0.0080	-0.0354	-0.0040	152	-2.4611	0.015
PAPERDIGIT	-0.0245	0.0089	-0.0420	-0.0070	144	-2.7410	0.007
SPENDREAD	-0.0149	0.0066	-0.0278	-0.0020	165	-2.2622	0.025
SCHDIGIT * USEFMEMO	-0.0178	0.0136	-0.0445	0.0089	162	-1.3043	0.194
ONLINVOL * SCHDIGIT	0.0094	0.0177	-0.0253	0.0441	172	0.5295	0.597
PERCDIFF * SCHDIGIT	0.0032	0.0263	-0.0485	0.0548	175	0.1200	0.905
SCHDIGIT * PAPERDIGIT	0.0003	0.0153	-0.0302	0.0296	153	-0.0167	0.987
SCHDIGIT * SPENDREAD	0.0021	0.0111	-0.0197	0.0239	168	0.1864	0.852
Random Effects		SD	Variance				
CNTSCHID	(Intercept)	0.1499	0.0225				
	PERCDIFF	0.1453	0.0211				
	ONLINVOL	0.0664	0.0044				
	USEFMEMO	0.0552	0.0031				
	PAPERDIGIT	0.0453	0.0021				
	SPENDREAD	0.0404	0.0016				
Residual		0.5400	0.2916				

As seen in Table 4, the significant predictors of TASKFEEL (the dependent variable) at student level were PERCDIFF ($b=.35$, $s.e.=.02$, $p<.001$), USEFMEMO ($b=-.02$, $s.e.=.01$, $p<.05$), PAPERDIGIT ($b=-.02$, $s.e.=.01$, $p<.01$), and SPENDREAD ($b=-.01$, $s.e.=.01$, $p<.05$) while the school-level significant predictor was SCHDIGIT ($b=-.05$, $s.e.=.02$, $p<.05$). The student-level variable ONLINVOL was not a significant predictor on TASKFEEL ($b=-.02$, $s.e.=.01$, $p>.05$). When considered the cross-level interactions of the student (Level 1) and school-level 1 (Level 2) variables in the model, the interaction appeared not to be a significant predictor of TASKFEEL. In other words, variables at the school and student levels significantly predicted the dependent variable, independently of each other.

Discussions

This study aimed to identify student and school-level variables that may predict Turkish students' perceived difficulty of reading tasks in PISA 2018. The results illustrated that usefulness for understanding and memorizing text, the frequency of online involvement, time spent reading for enjoyment, and reading format preference (online and print) at the student level, and schools' digital capacity at the school level significantly predicted the students' perceived difficulty in reading. Analyzing the effect of the interaction of Level 1 and Level 2 variables on the dependent variable, we observed that the interaction was not a significant predictor of the dependent variable.

In our study, we proposed that the schools' digital capacity (Level 2 variable) was a significant predictor of students' perceived difficulty of PISA texts and tasks. However, there have been different findings in the literature. Petko, Cantieni, and Prasse (2016) claimed that in studies investigating international student

assessment data, the findings regarding the positive effect of schools' frequent use of educational technology on student achievement were insufficient. Similarly, considering the home variable, Gubbels, Swart, and Groen (2020) argued that the effect of having ICT equipment at home and school on success was unclear. Petko et al. (2016) examined the PISA 2012 data. They pointed out that the variables, including the frequency of computer use for entertainment and school-related purposes at home and the frequency of computer use at school, had a similar pattern. The impact of these variables was positive in 29 countries with a positive attitude towards ICT. No impact was observed in 10 countries. The relationship between ICT and reading or overall success varied across countries. Bulut and Cutumisu (2018) concluded that the ICT at home and at school positively correlated with the achievement of Turkish students participating in PISA 2012 in science and mathematics literacy, while it was negatively correlated with Finnish students. Therefore, we posited that ICT was an essential variable in developing student performance and increasing student success in Turkey. A review of the literature showed that the impact of schools' digital capacity on the dependent variable was partially supported.

Our findings revealed a negative correlation between students' attitudes towards the usefulness of reading strategies and the dependent variable, which was the perceived difficulty of PISA reading tasks. The students reading the texts twice, summarizing them, reading them aloud, underlying the important parts of the texts, focusing on the easier part for comprehension perceived the texts as easy to understand. Çeçen and Alver (2011) and Güngör (2005) found out that students had already used those strategies frequently. We proposed that students were able to transfer the strategies they frequently used to PISA tasks. As Säälik, Nissinen, and Malin (2015) stated, the PISA 2009 database, including meta-cognitive learning strategies of students from Baltic countries, strongly predicted students' reading proficiency at both student and school levels. Therefore, we concluded that the ability to know and use reading strategies explained the perceived difficulty of PISA exams.

There was a negative correlation between the reading format preference and the dependent variable (the perceived difficulty of PISA reading tasks). Based on the scores assigned to the answer options of reading format preference (online=1, print=2), we could argue that students were more inclined to read in print ($M=2.16$). Many studies showed that students preferred printed texts more than online materials (Keskin & Çetinkaya, 2017; Mizrachi et al., 20016; Rutherford, Singleton, Derr, & Merga, 2018; Spencer, 2006). On the other hand, several studies illustrated that adolescents preferred digital environments more (Duran & Alevli, 2014; Tveit & Mangen, 2014). Three meta-analysis studies (Clinton, 2019; Delgado, Vargas, Ackerman, & Salmerón, 2018; Kong, Seo, & Zhai, 2018) concluded that the performance of reading in print was better than reading in the digital environment. Studies conducted so far have not been clear about reading format preferences, which seems to be quite reasonable since readers' actions and imposed effects in print and digital environments are quite similar. Eye movements (Siegenthaler, Wurtz, Bergamin, & Groner, 2011), reading speed (Kong et al., 2018), cognitive processes (Lee & Wu, 2012), comprehension, fatigue, and immersion (Hou, Rashid, & Lee, 2017) during online reading are similar to reading in print. Due to technological developments and the spread of digital devices, some scholars predicted that online reading would prevail over reading in print (Delgado et al., 2018; Pfost, Dörfler, & Artelt, 2013). Mozuraitė (2015) argued that the rapid change of the reading paradigm was related to expanding understanding of the “functional literacy” rather than the changing landscape of technology. However, readers preferred print for longer readings (Keskin & Çetinkaya, 2017; Mizrachi et al., 20016). Electronic media were mostly used for browsing or scanning purposes. Reviewing the impact of this variable, we considered our findings to be in line with the results in the literature.

The frequency of online reading and the dependent variable had a negative correlation. That is, students with higher online reading frequency stated that they perceived PISA tasks as easier. Spanish adolescents participating in PISA 2009 mostly used e-mail and instant messaging applications. Searching online

information, using an online dictionary and encyclopedia were less frequently performed (Gil-Flores, Torres-Gordillo, & Perera-Rodriguez, 2012). Also, students' frequency of reading books, magazines, and newspapers in their spare time significantly decreased. Instead, students preferred online chat, news, or short informative texts using various websites (MEB, 2019). It can be asserted that online activities, such as reading e-mails or chatting online, may negatively impact reading success (Pfof et al., 2013).

Time spent reading, and the dependent variable had a negative correlation. As the time spent reading increased, students' scores of the perceived difficulty of PISA tasks decreased. In other words, students who spared more time to read perceived PISA tasks as easy. This is often an expected result. Spending time to read influences reading behavior positively (Stokmans, 1999). Neff (2015) suggested a meaningful relationship between time spent reading and PISA 2009 scores, stating that students reading more than 2 hours a day scored higher in the test. Furthermore, as the time spent reading increased, reading performance improved. The Polish students participating in PISA 2000 and 2009 developed their skills related to text comprehension and interpretation as they read for enjoyment, spending more time reading (Zasacka & Bulkowski, 2017). Another study examined the PISA 2009 database on Turkey and highlighted that time spent reading at school and outside of school was a factor in predicting success in reading (Özer Özkan & Doğan, 2013).

Another variable that this study considered was the perceived difficulty. Our findings revealed that students who participated in PISA 2018 had difficulty in text comprehension and coherence inferences as their perceived difficulty increased. There has been a scarcity of studies on the relationship between perceived difficulty and reading tasks in the literature. Students' interest in tasks may relatively depend on task difficulty (Fulmer & Frijters, 2011). Students who perceived the texts or questions more easily tended to continue solving problems. Besides, the interaction between task condition and proficiency level had a significant effect on determining and using reading strategies (Oxford, Cho, Leung, & Kim, 2004). Hence, students who were self-sufficient and perceived the tasks as easy used appropriate reading strategies. On the other hand, students who had difficulty in reading texts (losing text coherence, poor inferencing, failure of detection of contradictions in texts, etc.) perceived the tasks as difficult. Fulmer and Tulis (2013) found that changes in affect during a reading task negatively impacted the situational interest in the task, and higher perceived difficulty was related to less interest and affect. Additionally, spending less time on task and working faster in problem-solving impacted the perception of task difficulty (Goldhammer et al., 2014). Therefore, students who could use appropriate reading strategies, work more fluently, and process coherence relations in texts may be more likely to perceive the PISA reading tasks as easy.

Conclusions

PISA 2018 asked students whether the reading tasks were easy or difficult. The scores of the answers consisted of the dependent variable of this study. Why is the perceived difficulty of PISA tasks worth investigating? There is more than one answer to this question. First of all, the fact that students do not have difficulty in PISA exams and find the questions easy indicates that they have acquired higher-order reading skills at the international level. If the participating students of a country find the questions difficult compared to the students in the same age group participating from other countries, it can be taken as a sign for reviewing the content of language skills provided in schools. Another point is that reading and comprehension are fundamental skills in academic studies. An accurate reading of this reality is necessary to establish measures of improvement in the process. Therefore, the fundamental approach to PISA results should be "assessment," not "evaluation". Besides, analyzing the data of student responses also enables us to determine other variables that affect the results. This research has produced results that allow us to make direct inferences for the simple question above and the research purposes of this study. The main recommendations of this study include (i) reading lengthy materials in print, (ii) teaching strategy use, (iii) controlling the efficiency of time spent online, (iv) increasing time spent reading, and (v) ensuring a satisfactory level of digital capacity for schools.

Limitations

The current study has several limitations. The data regarding schools' digital capacity were limited to the period of PISA data collection. Therefore, the fact that technological advancement is quite rapid should be taken into account in data generalization. Another limitation was that the data of the study can only inform Turkey's conditions and cannot be used for the interpretations or generalizations of international implications.

Note

The OECD is not responsible for the possible statistical errors in our analyses.

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