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Do the scores obtained from online applications correspond to face-to-face exam scores?

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Abstract

The emergent Covid-19 pandemic in Wuhan, China, at the end of 2019 has affected the whole world in a short time. Therefore, schools have been closed worldwide, and online learning opportunities have been exploited. Although lessons are taught online, problems have been experienced about measuring and evaluating lessons. This quasi-experimental study with a quantitative method was conducted to offer suggestions for the measurement problems. The present study examined the relationship between the measures of academic achievement obtained through different approaches from the students studying at a university. According to the results, the achievement points earned by the students through weekly blogs had a high level of correlation with the traditional final scores. However, the scores of the practices such as online exams and term papers were not an acceptable fit with the final exams. Therefore, the scores of online missions extended over time can be claimed to be the approach that best substitutes the final exams.

Keywords: Assessment, Evaluation methodologies, Covid-19, Edmodo, Education

Introduction

The Covid-19 pandemic that emerged in Wuhan, China, soon affected the whole world at the end of 2019. The epidemic in China spread to Europe and other countries, especially the USA. Due to the virus's rapid spread, the World Health Organisation (WHO) declared Covid-19 a pandemic on the 12th of March, 2020 (WHO, 2020a). According to the Covid-19 data of the World Health Organisation, on the 21st of September, 2020, there were 30,949,804 confirmed cases worldwide and 959,116 reported deaths (WHO, 2020b). Turkey was eighth in the world by the maximum number of cases in the epidemic, causing devastating effects, especially in Europe. As stated by J. J. Rousseau, educational environments are in mutual interaction with social events. The Covid-19 pandemic has led to a shift in many social areas such as working conditions, transportation, daily life etc. it also has seriously affected education. These changes have inevitably revealed the necessity of reconsidering educational processes within the context of epidemic and technology. The Covid-19 pandemic has forced school closures in 191 countries, affecting at least 1.5 billion students and 63 million primary and secondary teachers (UN News, 2020). Furthermore, traditional education was interrupted or distance education was initiated at universities in many countries such as Italy, Germany, Finland, and Turkey. Additionally, several countries temporarily suspended academic facilities such as congresses and meetings (EDF, 2020). This transformation in educational environments paved the way for radical changes. It is possible to claim that the world was unprepared for this shift. To illustrate, despite distance education being initiated after school closures (including universities), as of the 16th of March in France, the Ministry of Education could not provide teachers with comprehensive digital resources to continue their classes. The students at public schools could not be taught for a month with the suspension of schools on the 20th of March in England even though private schools began to attend classes through video conferencing programs. Meanwhile, the BBC produced 14 weeks of course content aligned with the curriculum. In Spain, all the schools and universities were closed on the 14th of March. They were not supposed to be re-opened in the spring term (Yüzbaşıoğlu, 2020). During this period, school closures procrastinated for reaching the peak point in France for at least one month. They prevented the health sector accumulation from increasing further (Di Domenico et al., 2020). Assuming that the epidemic will continue for a while, it can be asserted that each component of educational environments with continuous face-to-face social interaction has to adapt to the inevitable shift.

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Considering that educational environments are based on objectives, content, teaching process, and measurement and evaluation (Demirel, 2008), it is essential to reconsider them in distance education. It has succeeded in building the shift on a theoretical framework for teaching objectives, content, and teaching/learning situations quickly. Many institutions like UNESCO (2020) have offered suggestions and solutions in that vein. As the face-to-face teaching and learning process could not be continued, several ministries of education around the world used their online learning networks. In contrast, some others benefited from open source education platforms such as Moodle, Edmodo etc. Some private schools and universities have exploited online class applications such as Zoom, Webex, Teamlink, Microsoft teams, and Adobe connect for live lessons. The options mentioned above are different alternatives for the same purpose, and they are similar in terms of functionality. Therefore, no instability or serious problem has occurred concerning the means of distance education.

As can be understood, the educational institutions and decision-makers, who adapted for the lessons to be taught online quickly, have faced severe problems measuring and evaluating student achievements. The first emergent problem was about which way to follow. That is why face-to-face exams cannot be used during the Covid-19 period. In addition to the fact that measurement and evaluation are the feedback mechanism and the complementary components of the teaching environment, they must be handled carefully when considering their importance, as narrated in the following paragraph.

Timmis et al. (2016) stated that measurement and evaluation processes are more challenging while designing other variables in online learning is easier. To exemplify, it was declared by MoNE in Turkey that there would not be any measurement and evaluation, and no questions would be posed in the central exams for the content to be included within the scope of distance learning for K-12 schools (Sabuncu, 2020). Although online courses have been taught in many countries worldwide, written exams have been cancelled, suspended, postponed, or test formats have been changed (Sahu, 2020; Tedmem Report, 2020). The interruption of exams affects critical decisions such as students' continuation to the next grade or stage, certification, graduation, entrance to higher education, and entering the labour market. During the pandemic, how the students should be scored to pass to the next grade, how the transition between the stages will take place, whether the exams will be held or not, and whether the implementation of exams will be changed or not have distinguished as the issues to be decided urgently (Tedmem Report, 2020). Therefore, 280 senior medical school students at Imperial College London in the UK took "open book exams" online for the first time (Tapper, Batty, & Savage, 2020). In the USA, students entered Advanced Placement (AP) exams to gain the advantage of entering prestigious universities online this year due to the pandemic (AP, 2020). Different options such as online assignments, online quizzes, and projects have been put into action by the universities in Turkey. However, online exams have been seriously criticized in the relevant literature due to cheating (Watson & Sottile, 2010). On the other hand, assignments and projects have been blamed for not providing reliable results as a measuring instrument because the task can be performed by someone else and for creating an excessive burden on teachers (Griffin, 2014). In this case, the questions of which instruments to use in measurement and evaluation and how to make sure that they produce valid and reliable results constitute a significant problem. The present study is expected to contribute to the literature by offering suggestions for the above problems.

The purpose of this study was to reveal the relationship between the scores obtained through different measuring approaches within the scope of emergent question marks in terms of educational measurement and evaluation processes during the Covid-19 period. In this regard, the study's problem statement was identified to be "Can achievement scores obtained through different approaches be used instead of the traditional final exam scores?" The present study is significant in providing experimental evidence rather than personal opinions regarding the question "Is it reasonable to determine student achievement distantly?" which has been on the agenda since the beginning of 2020.

Method

This quasi-experimental quantitative study was designed with a single group post-test pattern (Akbay, 2019). The control group was not required as in-group variables were compared in the study. The participating students had a "Teaching Principles and Methods" course (2 hours per week, theoretically) as a part of their pre-service training over an academic term (14 weeks). At the same time, they ordinarily continued their education before the Covid-19 pandemic.

Experimental Process

In the quasi-experimental study conducted within the "Teaching Principles and Methods" course, the students received face-to-face education and entered the final exams ordinarily. However, no midterm exam was administered during the process. The data were collected from the students through Edmodo, an open-source learning management platform, within the context of out-of-class measuring approaches. During the experimental process, it was declared that students would write blogs, take quizzes, submit their term papers, and be informed about the course content via Edmodo. The students were enabled to use the Edmodo platform through the training at the very beginning of the semester. Throughout the teaching/learning process, the subject's content to be covered for the following week was delivered, and they had to take a quiz before the class. In other words, students were asked to take the quizzes without participating in the in-class learning processes after checking the course content. When the class was over, they wrote blogs about the lesson. In addition, students were also requested to hand in a term paper to be submitted via Edmodo. Student achievements were determined by using the results of all these measuring instruments together with the final exam.

Study Group

The study group consisted of the sophomores studying at the department of social sciences teaching in the faculty of education in a state university in southeast Turkey. Of the 30 students included in the study, 11 were male, and 19 were female. The students voluntarily participated in the study, continued their face-to-face education, and had the tools (computer, smartphone, internet connection, information about how to use Edmodo, etc.) needed for online applications to be used in measurement and evaluation.

Data Collection

The scores obtained from online blog writing, remote quizzes, and individual homework were collected in addition to the final exam scores within the scope of the study. The 0–100 scale was used to score student work with four different measuring approaches. The scores obtained by the students through the four approaches mentioned above had an impact on the final passing grades. Detailed information on the instruments was provided below.

Final Exam Scores

Within the scope of the study, an ordinary final exam was held under traditional conditions for the students. The face-to-face final exam was administered, as the experimental process was completed before the Covid-19 pandemic. The final exam consisted of two independent sections, and the final score was determined to be the sum of the scores obtained from those two exams. The first part of the exam was composed of 20 multiple-choice questions, and the validity and reliability studies were performed by Yıldırım (2016) for his doctoral dissertation. The test was graded over 50 points.

The second part of the exam consisted of three open-ended questions and scored over 50 points. The opinions of field experts and measurement and evaluation specialists were received while preparing the questions, and the rubrics were used to score. The questions in the exam were as follows:

> *Select one of the sample learning outcomes listed. When you consider the course process related to the learning outcome you have chosen assuming that you were a Social Studies Teacher;*
>
> - *How do you go about the teaching process? How do you use which method or technique? Why?*
> - *Indicate what high-level thinking skills will develop in your students with the method or technique you use.*
> - *Explain which teaching theories or approaches have traces on your teaching processes based on rationales.*

The exam papers were anonymously graded by the same rater three weeks apart based on the rubric, and similar results were achieved (r=.93, p<.01).

Scores from Weekly Blogs

Students were asked to write blogs on Edmodo every week. In the beginning, the whole class was informed about how to write blogs and criteria to evaluate their performance. A pilot blog was written and scored for the first week but was not included in the overall evaluation. This way, students were enabled to familiarise themselves with the process. Afterwards, the students were requested to write blogs about the course for 10

weeks. The blogs involved questions on the covered subject in a recent week. For example, the blog questions for a random week were as follows:

1. *What did you learn the best, what did you learn the least, why?*
2. *Which of the learning models in a recent week is practically better for you? Why?*
3. *How would you use the model you chose when you were a teacher? Can you explain with a classroom activity?*

The students were given five days for blog writing, and the blogs were scored over 10 points (over 100 points in total) by two distinct researchers every week. The researchers scored the blogs based on the rubric presented in Appendix 1. A high degree of agreement (r=.97, p<.01) was found between the scores of the two researchers. It can be appreciated as evidence of the reliability of the obtained data. The final blog scores of the students were estimated by the average scores of the two raters.

Quiz Scores

Remote quizzes were administered nine times in different weeks of the semester. In the first week, a pilot quiz was held to familiarize the students with the process, but the scores were not considered. The quizzes were prepared on Edmodo using multiple-choice, true-false, matching, short-answer or gap-filling question types. A minimum of 5 and a maximum of 13 questions were included in the exams. The students' mean scores from nine quizzes were converted to the 0-100 scale. The questions involved in the quizzes were prepared by the field expert considering the opinions of measurement and evaluation specialists and field experts. The content validity was tested to cover the relevant week, and the exams were held online through Edmodo. A one-minute duration was determined for each question in remote exams, and a single entrance was allowed for the quizzes (Figure 1).

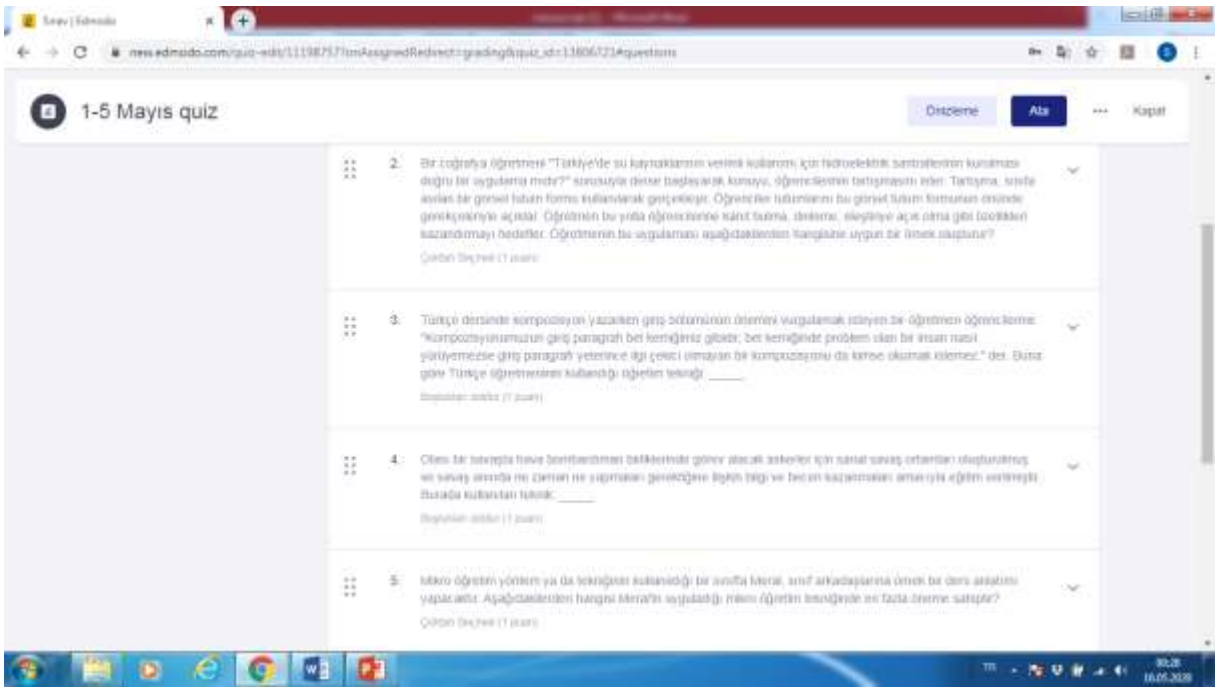

Figure 1. A screenshot of a quiz

Individual Homework Scores

A different subject title was assigned to each student as individual homework. For instance, while a student numbered 4 scrutinized Neurophysiological Learning Theory, another (numbered 23) searched the Constructivist Theory. The students were given six weeks to prepare their assignments with the instruction of *"Summarise the learning theory and model you have been assigned within the academic framework and explain that model in terms of the in-class use and relevant practices"*. The students submitted their homework before the final exam.

The assignments were scored two times by the same researcher over 100 points three weeks apart based on the holistic rubric presented in Appendix 2, and full alignment (r=1.00) was observed between the scores.

Data Analysis

As the present study included continuous data, the correlation coefficient was used to prove the relationship between the scores. Their differentiation from the mean of the final exam was scrutinised through a one-sample t-test. Research data collected through different approaches from the same study group were analysed by the IBM SPSS Statistics software package. The skewness and kurtosis were first examined to check for normality during the analysis process. Parametric tests were used as the values for final exam scores (skewness=-0.53, kurtosis=-1.08), blog scores (skewness=-0.27, kurtosis=-0.48), quiz scores (skewness=-0.24, kurtosis=-1.20), and homework (skewness=-0.79, kurtosis=0.38) were in the range between -2 and +2 as stated by George and Mallery (2003).

Results

Within the scope of the study, it will be useful to present the scores obtained by the students through different measuring techniques throughout the process before investigating the relationship between the scores. Therefore, the obtained scores are presented in Table 1.

Table 1. The obtained scores

Student	Final score	Blog score	Quiz score	Homework score
Student1	54	70.5	55.2	85
Student2	63	75.5	72.2	86
Student3	45	34.5	74.5	50
Student4	75	87	79.2	85
Student5	68	79	50.8	76
Student6	87	96.5	66.2	75
Student7	28	36.5	39.5	37
Student8	70	83	84.7	71
Student9	73	80.5	50	90
Student10	63	44.5	37.5	64
Student11	58	82.5	48.4	79
Student12	73	93	83.3	84
Student13	75	87	81.9	91
Student14	45	17	53.4	57
Student15	45	38.5	37.5	70
Student16	45	30	68.4	37
Student17	65	56	60.9	84
Student18	45	43	75	58
Student19	80	77.5	80.4	73
Student20	63	81.5	55.6	80
Student21	28	26	59.3	64
Student22	89	95	79.2	99
Student23	45	55	33.3	66
Student24	55	72	47.2	74
Student25	58	85.5	66.7	80
Student26	80	72	80.6	76
Student27	50	71.5	70.8	82
Student28	58	24	38.3	55
Student29	70	55	60	66
Student30	80	92.5	86.1	88

The chart for scores presented in the table is given in Figure 2.

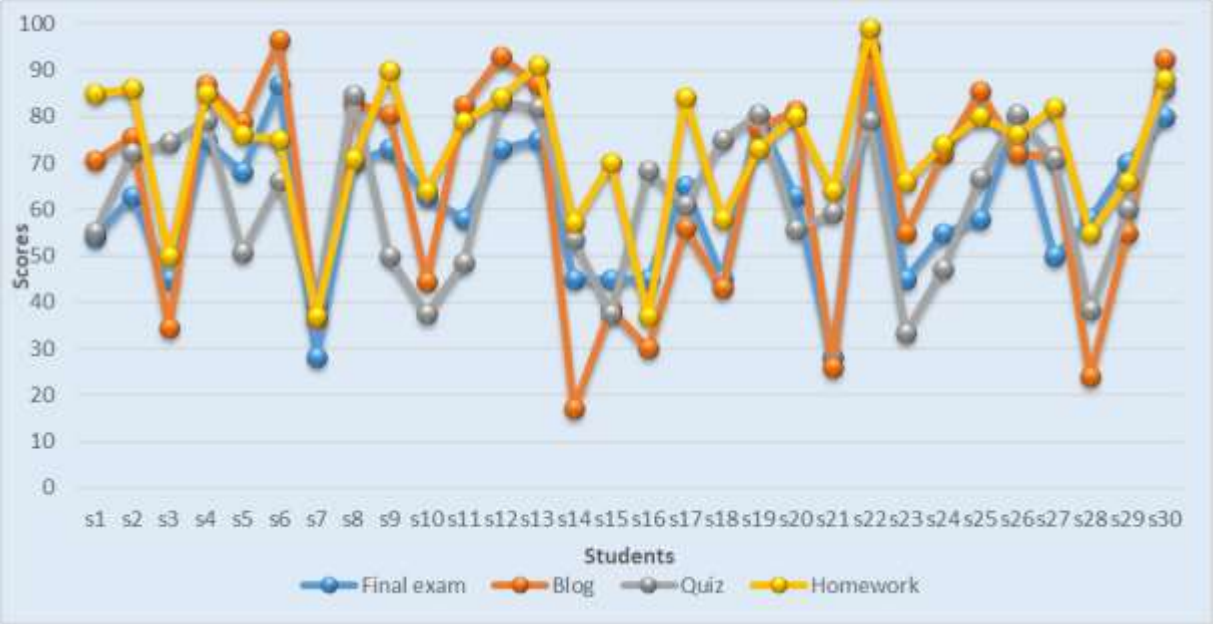

Figure 2. Score chart for all students

As shown in the table above, data were collected through different approaches from the study group. Descriptive statistics for the obtained achievement scores are presented in Table 2.

Table 2. Descriptive statistics for the scores

	N	Minimum	Maximum	Mean	Std. Deviation
Final score	30	28.00	89.00	61.10	15.98
Blog score	30	17.00	96.50	64.73	24.18
Quiz score	30	33.30	86.10	62.54	16.34
Homework score	30	37.00	99.00	72.73	15.14

Descriptive statistics for each type of score were given in Table 2. The examination of the scores yielded that the obtained scores did not widely differ, though a perfect fit could not be observed. It would be meaningful to determine whether other scores differed from 61.1, the mean of the final exams. According to the results of the one-sample t-test, it was revealed that there were no significant differences between the blog scores [$t(29)=0.82$, $p>.05$] and the quiz scores [$t(29)=0.48$, $p>.05$] with the mean of the final exams. However, homework scores [$t(29)=4.21$, $p<.05$] statistically differed from the mean of the final exams. Based on this, it can be claimed that the correlation coefficients to be obtained between blog writing and quiz scores with final scores would yield more precise results because there was no significant difference between these two scores. However, it was impossible to make a similar inference for the correlation of homework having significantly different means from the final exams. Hence, the correlation between two examinations with different means only indicates that they change together but do not imply the same/similar level of achievement.

The applicability of other exams instead of the final exam was tested within the scope of the study. In this regard, the relationship between the four exams was tested using the correlation coefficient (Table 3).

Table 3. Correlation between the scores

		Blog	Quiz	Homework
Final exam	Pearson Correlation	.774**	.514**	.683**
	Sig. (2-tailed)	.000	.004	.000
	n	30	30	30
Blog	Pearson Correlation		.492**	.812**
	Sig. (2-tailed)		.006	.000
	n		30	30
Quiz	Pearson Correlation			.362*
	Sig. (2-tailed)			.049
	n			30

According to Table 3, there was a positive, statistically significant, and relatively strong relationship between the final scores and those obtained from blog writing (r=.77, p<.01). There was a positive, statistically significant, and moderate relationship between the final exam and the quiz (r=.51, p<.01). However, there was a positive, statistically significant and moderate relationship between the final exam and homework (r=.68, p<.01). It would not be useful for grading achievements as they had different means based on the one-sample t-test results presented above. The acceptable fit limit of the scores obtained from the other instruments included in the study with the final exam scores was accepted to be .70 since it would be the reliability of the use of this data in a sense (Baumgartner & Chung, 2001). Therefore, it can be asserted that the final exam scores and blog scores were both compatible and related.

A positive, statistically significant, and moderate relationship between blog and quiz scores (r=.49, p<.01); a positive, statistically significant, and high level of relationship between blog and homework scores (r=.81, p<.01); a positive, statistically significant, and low level of relationship between quiz and homework scores were also found. Though they were not directly related to the main problem of the study.

Conclusion and Discussion

This quasi-experimental study examined the relationship between the measures of academic achievement obtained through different approaches from the students studying at university. The exploited measuring instruments and the obtained scores were explained, and reliability-validity studies were described in detail in the method section. According to the available results, students' achievement scores earned through writing weekly blogs correlated with the traditional final scores. In this regard, it can be alleged that the scores obtained from blog writing were the best substitutes for the final exam. On the other hand, a moderate relationship was determined between the scores obtained through online quizzes and the traditional final scores, which was below the acceptable level (.70). In addition, we revealed that homework scores had significantly different means from the final exam. They failed to offer a useful means since it would lead to a difference in grading achievement. The study was limited to being conducted in the faculty of education at a university and to the online practices through Edmodo.

The present study, using experimental data, aimed to find an answer to the discussion of measurement and evaluation, which has become the most controversial issue with the introduction of distance education during the Covid-19 pandemic. Based on the research results, giving students online tasks extended over time would produce more realistic results in cases where the traditional final exam cannot be held. Online exams are not useful in causing severe mistakes by unidentified variables such as cheating (Watson & Sottile, 2010). As stated in the literature (Ramu & Arivoli, 2012; Sarrayrih & Ilyas, 2013), online exams will only be available if high-level security precautions such as face recognition can be taken. However, in that case, a problem arises regarding the security of private information. Assigning homework jeopardises content validity (Cohen et al., 2005) as it will exclusively focus on a particular subject. Overgeneral homework, on the other hand, will not be useful in terms of effort. Moreover, as mentioned in the introduction part of the study, it can be asserted that homework cannot yield reliable results as a measuring instrument since it can be developed by someone else (Griffin, 2014). Pritchard and Warnakulasooriya (2005) concluded that online homework and practices provided with the Socrative platform could substitute the final exams with a .63 correlation. In this regard, *online tasks extended over time* can be considered the best alternatives to be used instead of the final exams both in terms of validity and reliability and in better agreement with the final exams currently in practice. Herein, online tasks must be designed to explain the context with their own thoughts from their perspective and offer suggestions beyond presenting a basic level of knowledge. Online tasks in our study were the assignments to be enriched with authentic and applicable examples of the students' own.

The introduction of online options raises an additional problem situation about the competencies of academicians and students in using those alternatives. Raaheim et al. (2019) asserted that academicians have little awareness of alternative online measuring instruments, even with a high-quality education in Norway. Kearns (2012), on the other hand, pointed out that students' experience problems in adapting to remote measuring procedures. It reveals that academicians and students are not ready for the shift. Therefore, it can be inferred that these alternative online measuring instruments should be employed upon furnishing the academicians and students with necessary qualifications. On the other hand, larger study groups and research at different levels of education are needed considering the present study was limited to a group of 30 university students. It can be alleged that such studies will substantially contribute to the literature, most particularly in the recent period. In addition, it can be stated that the research results can be used in the measurement processes carried out at the undergraduate level in the context of distance education.

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The datasets used and analyzed during the current study are available in the article.

Author (s) Contribution Rate
The authors contributed equally to the study.

Conflicts of Interest
No potential conflict of interest was reported by the authors.

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Appendix 1. Rubric used when scoring blogs

Criteria	**Score**
The questions were answered by heart superficially, the reasons were not explained, or only one of the questions was answered. Practical suggestions were not offered and sampling was unavailable.	Poor (0-3)
The questions were answered partially or entirely with the explanation of reasons. Practical suggestions and examples were offered without depth.	Moderate (4-6)
The questions were answered in such a way as to explain the reasons. Practical suggestions and examples were included realistically.	Good (7-10)

Appendix 2. Rubric used when scoring homework

Criteria	**Score**
Some features of the theory or model were superficially summarized in book sentences. There were no explanations about the reflection of the theory or model in classroom practices.	Poor (0-25)
The characteristics of the theory or model were summarized in book sentences. Superficial explanations were included about the reflections of the specific features of the theory or model in classroom practices.	Moderate (26-50)
Most of the important details of the theory or model were summarized in student's own sentences. Explanations were included about the reflections of the specific features of the theory or model in classroom practices.	Good (51-75)
Every important detail of the theory or model was summarized in student's own sentences. Deep and enriched explanations with examples were included about the reflections of the specific features of the theory or model in classroom practices.	Exceptional (76-100)