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Original Article

Validity Evidence for a Persian Version of the Online Self-Regulated Learning Questionnaire

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ABSTRACT

Background: Due to the importance of self-regulated learning in distance education (especially online learning environments), researchers are constantly looking for a suitable instrument to evaluate it more accurately. The purpose of this study was to investigate validity and reliability of the Barnard's et al (2009) Online Self-Regulated Learning Questionnaire in Iranian context.

Methods: The study was a descriptive survey that implemented a correlational research design. The population of this study were all postgraduate students enrolled in the online courses at universities located in Tehran in the academic year 2017-2018. A sample of 450 students were selected by Cluster random sampling and responded to the Barnard et al (2009) Online Self-Regulated Learning Questionnaire, of which, 418 questionnaires could be analyzed.

Results: The findings showed that the questionnaire had acceptable formal and content validities. The results of exploratory factor analysis by the principal components method, confirmed six factors named goal setting, environment structuring, task strategies, time management, help seeking and self-evaluation. These six factors account for 56.78 % of the overall variance. To determine the factor validity, a confirmatory factor analysis was used, and the results showed that the model appropriately fit to data. All of the tests confirmed the model. (X2/df=1.930<3, RMSEA=0.064, GFI=0.94, NFI=0.92, CFI=0.94). The results of this study showed that Cronbach's alpha coefficient ranged from 0.84 to 0.94 and Intraclass correlation coefficient and Pearson correlation coefficient of test-retest were 0.77 and 0.78, respectively.

Conclusion: The instrument appears to be appropriate for assessing self-regulated online learning among Iranian students for research or intervention purposes.

Keywords: Online learning environments, Self-regulated learning, Validity, Reliability

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Introduction

Today we are witnessing the rise of numerous online courses that are offered by educational institutions around the world (1). Unlike face-to-face settings, the online learning environment exceeds standard synchronous education where students learn at the same time and place, and provides for asynchronous learning in which space and time are not barriers (2). Despite these advantages, success in an online learning environment excessively relies on a student's ability to autonomously and actively engage in the learning process (3). Online students are required to be more independent, as the very nature of online settings promotes self-directed learning (4). Therefore one of the required skills for success in such learning environments is self-regulated learning ability (5) defined as learners' systematic effort to manage their learning process to achieve personal goals (6). Research has shown that self-regulated learning is critical in determining students' successful learning experiences in an online learning environment (7). Self-regulated learners are known to set goals, plan ahead, and consistently monitor and reflect on their learning process. They effectively manage their time and learning resources (8) and persist in a challenging learning context; therefore, student self-regulation is important in determining successful learning experiences in an online course. (6). Nevertheless, examining the role of self-regulation skills in the online learning environments has not received as much attention as in traditional face-to-face environments (9). Due to the importance of self-regulation in learning, researchers are constantly looking for a suitable instrument to evaluate this feature in online learning environments (10). While existing instruments such as Motivated Strategies for Learning Questionnaire (11), the Metacognitive Awareness Inventory (12), and the Learning Strategies questionnaire (13) provide valid data in traditional learning environments, their validity in online learning environments has not been established. A recent study has shown that the MSLQ could not be validated in an asynchronous online learning environment (14). Additionally, the validity of the MAI and the LS in online settings has not yet been tested. The online Self-Regulated Learning Questionnaire proposed by Barnard et al. (15) is a response to the need to provide a valid instrument for online learning environments. The instrument was originally designed to study self-regulated learning behaviors in online learning environment in The United States. Although, according to Winne and Jamieson-Noel (16), self-reporting scales of self-regulated learning have unrealistic estimates of self-regulated behaviors, Barnard reports that the results obtained from this instrument showed satisfactory psychometric properties over time (17). In a study on 628 students (204 completed questionnaire) enrolled in the online courses at a large, public university in the Southwestern United States, Barnard et al. (15) assessed the validity and reliability of the OSLQ using confirmatory factor analysis. The results showed that 6 factors model had the best fit to data and the reliability of the factors ranged from 0.87 to 0.96. This instrument was also investigated by other researchers. Korkmaz & Kaya (18) studied the validity and reliability of this scale using confirmatory factor analysis on Turkish students (N=222) and showed that 6 factors model had the best fit to data and the reliability of the factors ranged from 0.63 to 0.95. Chumbley, Haynes, Hainline & Sorensen (19) also examined the validity and reliability of this scale using confirmatory factor analysis on American students (N=146) and showed that 6 factors model had the best fit to data and the reliability of the factors ranged from 0.87 to 0.94. Fung, Yuen & Yuen (20) also examined the validity and reliability of this scale using confirmatory factor analysis on Hong Kong students (N=412) and showed that 6 factors model had the best fit to data and the reliability of the factors ranged from 0.75 to 0.86.

Considering the studies whose results show the important role of the concept of Self-Regulated Learning for learners'

success in online learning environments (21–25) and since no Persian instrument was found in the review of the literature for measuring Self-Regulated Learning in online learning environments, investigating the psychometric properties of this scale in an Iranian sample provides the opportunity for Iranian researchers to have a valid and reliable instrument for research or intervention purposes. The purpose of this study was to report validity and reliability of the Online Self-Regulated Learning Questionnaire in Iranian context. To this end, the most important questions that this research seeks to address are:

1- To what extent is the Online Self-Regulated Learning Questionnaire (QSRL) valid in Iranian context?

2- To what extent is the Online Self-Regulated Learning Questionnaire (QSRL) reliable in Iranian context?

Methods

Participants

The study was a descriptive survey that implemented a correlational research design. The population of this study were all postgraduate students enrolled in the online courses at universities located in Tehran in the academic year 2017-2018. 450 students (requiring at least 200 samples for each of exploratory and confirmatory factor analysis and considering probable sample loss) were selected through Cluster random sampling. Among the universities offering e-learning courses in Tehran, 4 universities were selected randomly (a few classes at each university) and questionnaires were presented in face-to-face sessions and 418 questionnaires could be analyzed. Participants were fully informed as to the voluntary and confidential nature of the study. Participants ranged in age from 22 to 53 years old. 56% (234) of them were male and 44% (184) were female. Their GPA was 16.76.

Instrument

Online Self-Regulated Learning Questionnaire was used to collect research data. This questionnaire was designed by Barnard et al. (15) to measure self-regulated learning in online learning environments and included 24 questions on a 5 point Likert scale. Six subscales: Goal setting (Questions 1,2,3,4,5), environment structuring (Questions 6,7,8,9), task strategies (Questions 10,11,12,13) time management (Questions 14,15, 16) help seeking (questions) and self-evaluation (21, 22, 23, 24) were examined. Barnard et al. (15) reported the reliability of these subscales as 0.95, 0.92, 0.93, 0.87, 0.96, and 0.94, respectively, and total reliability as 0.90. Also, its construct validity was confirmed by confirmatory factor analysis.

Procedure

The procedure was to evaluate the content validity of the questionnaires in both source and target languages, using the standard Backward-Forward Translation method as a guide for cross-cultural matching of the questionnaire (26). This procedure involves the following steps: translation, reverse translation, expert review and pilot study. At first, the original text of the questionnaire was translated into English by an English language expert and an educational technology expert and after a discussion between the translators the translations were combined and the final version of translation was prepared. In the second step, the questionnaire was translated back into English by two other (freelance) translators and then to make sure that both English translations are equivalent and have the same semantic load, two other English language experts were asked to match the Back Translation version with the original one. Finally, after discussions among translators, the necessary corrections were made to the Persian version and the final translation was prepared (see Appendix). The effect of each question item was calculated to quantify the formal validity. Initially, a 5-point Likert scale was used for each of the 24 items: Strongly Agree (Score 5), Agree (Score 4), Undecided (Score 3), Disagree (Score 2), Strongly Disagree (Score 1). The questionnaire was then administered to 46

students to determine its validity. After the questionnaires were completed by the target group, the formal validity was calculated using the item impact formulas, i.e. (significance * frequency (in percentage)=impact score). In order to qualitatively evaluate the content validity of the questionnaire, 12 experts in educational sciences, psychology and educational technology were asked to present their corrective views in written form after careful study of the instrument. It was also emphasized that in evaluating the content validity the following factors should be taken into consideration: grammatical accuracy, suitable vocabulary, the importance of the questions and proper placement and completion time. To quantitatively evaluate the validity of the content and to ensure that the most important and correct content (question requirement) is selected, and to make sure that the instrument questions are designed to measure the content, content validity ratio and content validity index were utilized respectively. For this, 12 educational specialists including 5 PhD in educational technology, 3 PhD in educational sciences and 4 PhD in educational psychology were asked to determine the degree of appropriateness of each question to the context of Iranian culture on a scale of: a) essential, b) useful but unnecessary, and c) unnecessary. After obtaining expert opinions, using formulas:

and Lawshe's table, questions with content validity ratios above 0.56 were retained in the questionnaire and the rest were deleted. After calculating content validity ratio, content validity index was calculated based on Waltz and Basel content validity index.

$$CVR = \frac{Ne - N / 2}{N / 2}$$

To this end, the questionnaires were again handed to the experts to calculate the content validity index. They were asked to comment on each of the 24 questions according to three following criterions on a 4-point Likert scale: irrelevant (1), partially relevant (2), related (3), fully related (4): Relevance, simplicity and clarity. Accordingly, the score for the content validity index was calculated based on the following formula: total score for each question that scores 3 and 4 (highest score) divided by the total number of voters. Questions with content validity index higher than 0.79 are accepted.

To investigate the construct validity of the questionnaire, exploratory factor analysis was performed to determine the number of factors using Varimax rotation. Finally, 6 factors were identified and then confirmatory factor analysis was performed to check the fit of the questionnaire with 6 factors.

To assess the reliability of the questionnaire, the test-retest and intraclass correlation coefficient were used; the validated version of the questionnaire was given to 52 students and then they were asked one week later to fill the questionnaire again. Cronbach's alpha method was also used to examine the internal consistency of the questionnaire. Data were analyzed using spss21 and Lisrel 8.80 software.

Results

The M ranged from 2.68 for Question 24 to 4.12 for Question 8, and SD from 0.76 for Question 7 to 1.13 for Question 21. Also The M and SD were respectively 3.84 and 0.92 for goal setting, 3.18 and 1.11 for environment structuring, 3.32 and 1.09 for task strategies, 3.27 and 1.05 for time management, 3.03 and 1.18 for help seeking, and 3.21 and 1.06 self-evaluation.

Formal Validity: The results of the item impact method indicated that all questions had a score greater than or equal to 1.5. Therefore, they were included in the questionnaire and the instrument's formal validity was confirmed.

Content Validity: The results of content validity ratio indicated that all questions were equal to or greater than the Lawshe's table index (0.56) within a range of 1- 0.77. Accordingly, all items were accepted and none were deleted. Content validity index results indicated that all the questions except 5, 15 and 17 (after adjusting CVI reached to 0.79) had higher scores than 0.79. Also the

final number of content validity index was 0.85 and thus the content validity of the scale is confirmed.

Construct Validity: To increase reliability and reduce the risk of error, exploratory and confirmatory factor analysis was performed on two separate samples. Thus 418 samples were divided into two parts. For exploratory factor analysis, the factor analysis capability was first investigated through Kaiser-Meyer-Olkin and Sphericity Bartlett indexes. The Kaiser-Meyer-Olkin index value (0.921) indicated the adequacy of the data for factor analysis and the Bartlett Sphericity Index (2924. 878, P<0.001) also showed that the data correlation matrix is not zero and therefore the factorization is justified. Varimax orthogonal method was used to determine the factors. To determine whether online self-regulated learning scale is saturated with several factors, Eigenvalue (equal to one), explained variance and the scree plot were examined. Table 1 and Figure 1 show the E values of the principal components analysis and the scree plot, respectively. According to Figure (1), the number of factors for the questionnaire is confirmed because the diagram falls on factor 6 and therefore 6 factors were extracted. The factor loadings obtained for the 24 items confirm the validity of the factors. These 6 factors account for 56.778% of the total variance. 18.889% of the total variance is related to the number one factor namely Environment structuring.

In Table 2, factor loadings of the 24 items are visible after rotating on factors. Accordingly, items 4, 3, 2, 1 on factor 1 (Environment structuring), items 5, 6, 7, 8, 9 on factor 2 (Goal setting), items 10, 11, 12, 13 on factor 3 (Task strategies), items 14, 15, 16 on factor 4 (time management), items 17, 18, 19, 20 on factor 5 (Help seeking) and items 21, 22, 23, 24 on factor 6 (Self-evaluation) have been loaded. Also alpha value was not higher than 0.94, and accordingly no questions were removed.

Table 1: Statistical indexes of 6 online self-regulated learning questionnaire factors after a Varimax rotation by principal component analysis

Indexes / Factors	Eigenvalue	Percentages of explained variance	Cumulative Percentages of variance
1	4.534	18.891	18.891
2	2.706	11.274	30.165
3	2.197	9.152	39.318
4	1.662	6.923	46.241
5	1.416	5.899	52.140
6	1.115	4.645	56.785

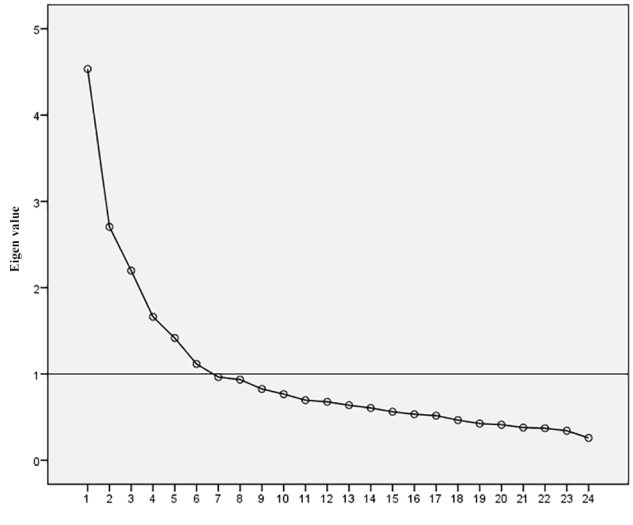

Figure 1: The scree plot

Table 2: Factor loads on subscales

Items / Subscales	Environment structuring	Goal setting	Task strategies	Time management	Help seeking	Self evaluation	Cronbach"s alpha if item deleted
1. I choose the location where I study to avoid too much distraction.	0.771						0.947
2. I find a comfortable place to study.	0.721						0.944
3. I know where I can study most efficiently for online courses.	0.692						0.946
4. I choose a time with few distractions for studying for my online courses.	0.638						0.948
5. I set standards for my assignments in online courses.		0.542					0.949
6. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).		0.668					0.947
7. I keep a high standard for my learning in my online courses.		0.692					0.946
8. I set goals to help me manage studying time for my online courses.		0.731					0.945
9. I don't compromise the quality of my work because it is online.		0.649					0.947
10. I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.			0.527				0.949
11. I read aloud instructional materials posted online to fight against distractions.			0.551				0.948
12. I prepare my questions before joining in the chat room and discussion.			0.584				0.946
13. I work extra problems in my online courses in addition to the assigned ones to master the course content.			0.492				0.947
14. I allocate extra studying time for my online courses because I know it is time-demanding				0.531			0.949
15. I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule.				0.631			0.948
16. Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.				0.547			0.947

17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	0.732		0.949
18. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.	0.711		0.948
19. If needed, I try to meet my classmates face-to-face.	0.682		0.945
20. I am persistent in getting help from the instructor through e-mail.	0.622		0.946
21. I summarize my learning in online courses to examine my understanding of what I have learned.		0.514	0.948
22. I ask myself a lot of questions about the course material when studying for an online course.		0.679	0.947
23. I communicate with my classmates to find out how I am doing in my online classes.		0.642	0.945
24. I communicate with my classmates to find out what I am learning that is different from what they are learning.		0.612	0.946

In order to confirm the questionnaire's factors structure, after deleting outliers (24, 28, 33, 39, 128, 201, 221) through univariate (box plot) and multivariate (Mahalanobis index), confirmatory factor analysis model was used using LISREL. The basic assumption of the researcher is that each factor is related to a particular subset of variables and the researcher has a certain assumption about the number of model factors before doing the research. The results are reported in Table 3. It is noteworthy that the assumptions required to perform confirmatory factor analysis were examined and the results indicate that these assumptions are respected.

Table 3 shows that the research model is a valid model. The RMSEA value is 0.064. Therefore, this value is less than 0.09 indicating that the root mean square error of approximation is satisfactory and the model is acceptable. Also, the ratio of Σ^2 to the degree of freedom is less than 3 and the values of GFI, CFI and NFI are 0.9 and RMR is less than 0.09, indicating that the data are well-fitted.

According to Figure 2, the parameters for measuring the subscales are appropriately identified. All path coefficients of the six-factor pattern were statistically meaningful ($P<0.01$).

Reliability

To test the stability of the structures, the test-retest method was used. The results of calculating the reliability coefficient in Table 4 show that the Pearson correlation coefficient as well as the ICC for all subscales are greater than 0.6, indicating high level of agreement. Also paired t-test ($P>0.05$) indicating mean score of subscales was not meaningful at each round of measurement. Also the values obtained from Cronbach's alpha indicate that each of subscales has a good internal consistency, so its reliability is accepted.

Discussion

Given the studies indicating the essential role of self-regulated learning as predictor

Table 3: The Fit indexes of online self-regulated learning questionnaire

Fit indexes	Value	Acceptable range	Result
χ2/df	1.930	3<	Approved
RMR	0.087	<0.09	Approved
GFI	0.94	<0.9	Approved
NFI	0.92	>0.9	Approved
CFI	0.94	>0.9	Approved
RMSEA	0.064	<0.09	Approved

Table 4: Evaluating stability and internal consistency of online self-regulated learning questionnaire subscales

Subscales	The number of items	Pearson correlation coefficient	Intraclass correlation coefficient	(P Value) paired t-test	Cronbach's alpha coefficients
Goal setting	5	0.78	0.76	0.35	0.93
Environment structuring	4	0.83	0.82	0.41	0.91
Task strategies	3	0.76	0.77	0.37	0.84
Time Management	4	0.80	0.79	0.40	0.88
Help seeking	4	0.81	0.79	0.39	0.90
Self-evaluation	4	0.80	0.78	0.38	0.92
Total scale	24	0.78	0.77	0.33	0.94

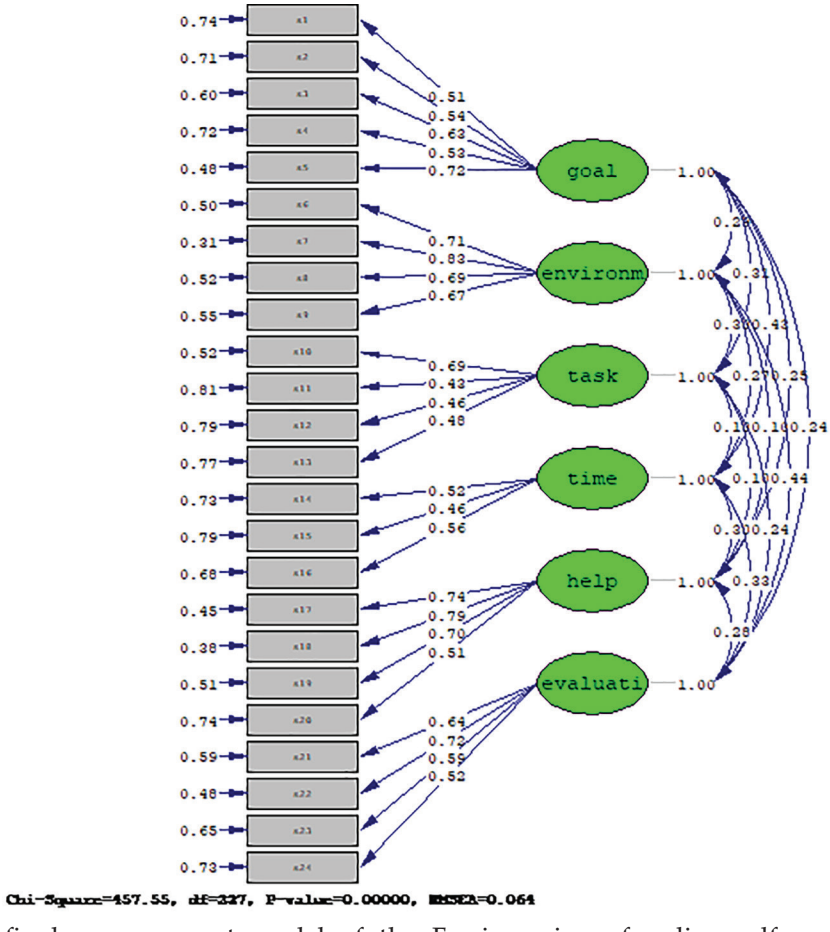

Figure 2: The final measurement model of the Farsi version of online self-regulated learning questionnaire and fully standardized estimates

of academic performance and satisfaction in online learning environments (21–25) and since no research-approved Persian instrument was found for measuring Self-Regulated Learning in online learning environments, this study was aimed to validate Persian version of the OSLQ.

This scale was selected because it has been widely used in various contexts and many studies have emphasized its high performance as a valid instrument for measuring self-regulated learning in online learning environments.

Conducting an exploratory factor analysis, 6 factors were identified that predict 56.78% of the total variance. These findings are consistent with the results of Barnard et al. (15) on the six-factor scale. Also, confirmatory factor analysis results confirmed the model, in consistence with the findings from previous studies (17–20). ($\chi 2/df=1.930 <3$, CFI=0.94, RMR=0.08, NFI=0.92, GFI=0.94 & RMSEA=0.064). In addition, reliability coefficients for the whole questionnaire and the six subscales ranged from 0.86 to 0.94, signifying adequate internal consistency. The test-retest method to investigate the stability of structures showed that Pearson correlation coefficient as well as ICC was higher than 0.6 for all subscales, indicating high level of agreement. In summary, based on data gathered from Iranian students, scores from the Persian translation of the OLSQ were found to be valid and reliable. The instrument appears to be appropriate for assessing self-regulated online learning among Iranian students for research or intervention purposes.

Limitations

There are some limitations in this study. First, this study has been done on postgraduate students in Tehran. Then, caution should be considered in case of generalization. Second, since the responses were based on self-reporting, as Winne and Jamison-Noel (16) point out, it is more likely that learners overestimate their abilities (their self-regulation skills). Finally, because the original English language version of the questionnaire was developed a few years ago, some items regarding technology might need to be updated; for example, increased use of mobile technology for online learning might need to be taken into consideration in future versions.

Authors' Contribution

A.T designed the study, supervised data collection and analysis, participated in the coordination of the study, and critically revised the manuscript. E.A and R.M also contributed in all the mentioned steps.

Ethical Considerations

This research was conducted under the supervision of Tarbiat Modarres University in Tehran, Iran. No ethical issues were found. Participants have attended in this study willingly and data was presented anonymously. Participants were assured that their information will remain confidential.

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Conflict of interests

The author declares that they have no conflict of interests.

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Appendix

ردیف	عبارات	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
۱	من مکانی را برای حضور در کلاس آنلاین انتخاب می کنم که حواس پرتی ام به حداقل برسد.					
۲	مکان راحتی را برای درس خواندن پیدا می کنم.					
۳	می دانم کجا می توانم به طور اثربخش تری برای مطالب درسی دوره آنلاین مطالعه کنم.					
۴	من زمان هایی را برای مطالعه مطالب درسی دوره آنلاین انتخاب می کنم که حواس پرتی ام به حداقل برسد.					
۵	من استانداردهایی را برای انجام تکالیفم در دوره های آنلاین تعیین می کنم.					
۶	من اهداف کوتاه مدت (روزانه یا هفتگی) و همچنین بلند مدتی (ماهانه یا ترمی) را طی دوره آنلاین تعیین می کنم.					
۷	من به استاندارد سطح بالایی برای یادگیری در دوره های آنلاین پای بندم.					
۸	طبق برنامه ریزی قبلی، زمان مطالعه مطالب درسی دوره آنلاین را مدیریت می کنم.					
۹	من کیفیت کارم را به خاطر اینکه دوره بصورت آنلاین است ، زیر سوال نمی برم.					
۱۰	من سعی میکنم یادداشتهای مفصل تری را طی حضور در دوره های آنلاین بردارم، زیرا یادداشت برداری برای یادگیری آنلاین بسیار مهمتر از کلاسهای حضوری است.					
۱۱	برای حفظ تمرکزم، مطالب درسی ارائه شده به صورت آنلاین را با صدای بلند میخواندم.					
۱۲	من سوالاتم را قبل از ورود به اتاق چت و گفتگو آماده می کنم.					
۱۳	در طی دوره آنلاین ، بمنظور تسلط بر محتوا، مسائل اضافه تری را علاوه بر مسائل تعیین شده، حل میکنم.					
۱۴	زمان مطالعه بیشتری را برای مطالب درسی دوره های آنلاین اختصاص میدهم، زیرا می دانم که وقت گیر تر است.					
۱۵	من سعی می کنم روزانه یا هفتگی در یک زمان مشخص مطالعه کرده و به برنامه ام پایبند باشم.					
۱۶	اگرچه هر روز در کلاس حضور نداریم، اما سعی می کنم روزانه به یک اندازه مطالعه کنم.					
۱۷	در صورت نیاز جهت مشورت، به فردی مطلع به محتوای درسی، مراجعه می کنم.					
۱۸	من مشکلات خود را با همکلاسی هایم مطرح می کنم، بطوری که ما می دانیم با چه مشکلاتی مواجه هستیم و چگونه آنها را حل کنیم.					
۱۹	من سعی می کنم در صورت لزوم، با همکلاسی هایم به طور رو در رو ملاقات کنم.					
۲۰	در صورت لزوم، از طریق ارسال ایمیل، از مدرس کمک می گیرم.					
۲۱	برای ارزیابی فهم خود، مطالب آموخته شده را برای خودم خلاصه میکنم.					
۲۲	هنگام حضور در دوره آنلاین، سوالات زیادی را از خود در مورد مطالب درسی ارائه شده، می پرسم.					
۲۳	نظر همکلاسی هایم را در خصوص نحوه عملکردم در دوره های آنلاین، جویا می شوم.					
۲۴	از طریق ارتباط با همکلاسی هایم بررسی می کنم که آیا بین آنچه دارم یاد می گیرم با آنچه آنها در حال یادگیری هستند، تفاوت وجود دارد.					