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Adaptation of Student-Educator Negotiated Critical Thinking Dispositions Scale into Turkish Educational Context

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ABSTRACT

The aim of this study was to adapt the Student-Educator Negotiated Critical Thinking Dispositions Scale (2020) developed by Quinn et al. (2020) to the Turkish educational context. After the language validity studies, the Turkish version was administered to 380 university students: 178 (46.8%) female and 202 (53.2%) male. Confirmatory factor analysis was applied to examine the construct validity of the scale. The obtained fit values were found to be within the acceptable range. In order to examine the reliability of the scale, Cronbach's alpha value and Spearman-Brown correlation value were analyzed to determine the split-half reliability level. Cronbach's alpha value for the whole scale was 0.85 and Spearman-Brown correlation value was calculated as $r=0.78$. The significance of the difference between the item scores of the lower and upper 27% groups determined according to the total score was determined by t-test. The results of the study indicate that the Student-Educator Deliberative Critical Thinking Dispositions Scale, a six-dimensional instrument, possesses adequate validity and reliability when administered to Turkish students.

Keywords: Critical thinking, critical thinking dispositions, scale adaptation

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Introduction

According to the World Economic Forum (WEF) Future of Jobs Report 2020, self-management skills such as critical thinking and analysis, problem solving and active learning, resilience, stress tolerance and flexibility are among the skills that will continue to increase in importance in the next five years. According to the report, the skills that will become indispensable in this new period are called 3C (Complex Problem Solving, Creativity, Critical Thinking). Critical thinking, which is the use of logic and reasoning to identify the strengths and weaknesses of alternative solutions, outcomes or approaches to problems, is especially important in the 21st century, where skills such as technology design and programming are prominent.

Critical thinking is a metacognitive process that involves conceptualising, applying, analysing, synthesising, and evaluating information derived or generated from observation, experience, reflection, reasoning, communication as a guide to belief and action (Dwyer et al., 2016). Critical thinking skill is an important educational outcome that is linked to general job performance (Baril et al., 1998), effective decision making (Park & Kim, 2009), academic achievement (Scott & Markert, 1994), knowledge transfer and problem solving (Garcia & Pintrich, 1992).

Critical thinking involves higher level thinking skills, while critical thinking disposition is the process of making decisions about these skills (Facione & Facione, 1996). Critical thinking disposition, which has a positive relationship with critical thinking skills, is defined by Facione et al. (1995) as a consistent intrinsic motivation that enables decision making and problem solving. A student with high critical thinking skill level; attempts to reach wings on a discourse, reaches the correct source of the information obtained, may be aware of prejudices, ask effective questions, can express themselves clearly and they are aware of their own metacognition (Kökdemir, 2000).

In addition, critical thinking is an important ability for individuals to analyze their thought processes in depth and to distinguish between right and wrong (Ennis, 2011; Ritchhart et al., 2020). Individuals who can think critically are highly intrinsically motivated, determined, careful and open-minded (Facione, 2020).

Individuals with high intrinsic motivation move towards their own goals in their learning and development processes without the need for external incentives. These individuals are driven by curiosity and enjoy discovering new information on their own (Deci & Ryan, 1985; Ryan & Deci, 2020). Critical thinking is the guide of this curiosity because the individual questions the information they encounter, investigates its accuracy and reaches a logical conclusion (Paul & Elder, 2014; Bailin & Battersby, 2016). Perseverance ensures the sustainability of critical thinking. Determined individuals continue to look for solutions without giving up despite the difficulties they face (Duckworth, 2016). This makes it possible not to be afraid of making mistakes in the critical thinking process and to reach better results by learning from mistakes. Being attentive is another indispensable component of critical thinking. Attentive individuals pay attention to details and can see the subtle connections between events and information. This enables more sound decisions to be made by making in-depth analysis instead of superficial approaches (Halpern, 2014; Heijltjes et al., 2019). Open-mindedness, on the other hand, refers to the individual's respect for different views and opinions and evaluating every idea without prejudice. Critical thinking requires understanding different perspectives and developing one's own thoughts. Open-minded individuals give a chance even to ideas that contradict their own views, which increases their intellectual development (Zhang, 2021).

It is known that an individual spends important developmental periods at school in the process of his/her life. Therefore, the role of the teacher in teaching critical thinking skills to students is undeniable (Ennis, 1991). “The main task of the teacher is to guide and facilitate learning. In order to teach effectively, he/she knows how students learn and develop. It organises activities and provides opportunities to support their intellectual, social, and personal development. It applies various teaching strategies to encourage the development of critical thinking, problem solving and performance skills” (MoNE, 2002:23, cited in Öztürk, 2004). As can be seen from this definition, communication between the teacher and the student is particularly important in teaching not only critical thinking but also thinking skills.

When scale development studies related to critical thinking in the literature are examined; the scale for the evaluation of critical thinking through philosophical questioning for 5–6-year-old children (Karadağ et al., 2017), California critical thinking tendency scale (Kökdemir, 2003), Pamukkale critical thinking skills scale (Duru et. al., 2022), critical thinking skills scale (Karabulut et. al., 2023), critical thinking questionnaire (Sarığöz, 2014), achievement test for measuring critical thinking skills (Eğmir & Ocak, 2016), critical thinking tendency scale (Akbıyık, 2002; Akın et al, 2015; Semerci, 2016), critical thinking motivation scale (Dönmez & Kaya, 2016), critical thinking attitude scale (Yılmaz Özelçi, 2012), teacher behaviours inventory supporting critical thinking (Alkın-Şahin & Gözütok, 2013), critical thinking skills scale for science course (Gülen, 2019), critical thinking scale for nurses (Urhan, 2019), critical thinking tendency scale for primary school students (Akar, Uluçınar, 2020), critical thinking skills test for high school students (Orhan & Çeviker-Ay, 2022), Marmara critical thinking tendencies scale (Özgenel & Çetin, 2018), critical thinking standards scale for prospective teachers (Aybek et al. , 2015), the effect of teacher attitudes on students' critical thinking skills scale (Tokyürek, 2001), critical thinking tendency scale for secondary school students (Yıldırım-Döner & Demir, 2021), UF/EMI critical thinking tendency scale (Kılıç & Şen, 2014). A scale that includes student-teacher joint communication was not found. Therefore, this study aimed to adapt the ‘Student-Educator Negotiated Critical Thinking Dispositions Scale’ developed by Quinn et al. (2020) into Turkish. Considering the limited availability of scales related to critical thinking dispositions, the adaptation of SENCTDS into Turkish is thought to be useful for studies that will examine the determinants and outcomes of both skill-based and disposition-based aspects of critical thinking.

Method

Research Model

The purpose of this study is to conduct validity and reliability analyses to adapt the Student-Educator Negotiated Critical Thinking Dispositions Scale (SENCTDS), originally designed to assess students' critical thinking dispositions, for use within a Turkish educational context.

Study Group

This study was conducted with 380 university students studying in the departments of Turkish and English Language Teaching at a university in the Aegean region of the 2023-2024 academic year. Of these, 178 (46.8%) were female and 202 (53.2%) were male. According to Child (2006), the recommended sample size for performing the factor analysis technique should be five times the number of items, and Comrey and Lee (1992) state that a sample size of three hundred is "good." The 380 responses collected for the 21-item Student-Educator Deliberative Critical Thinking Dispositions Scale are deemed sufficient.

Original Measurement Tool

'Student-Educator Negotiated Critical Thinking Dispositions Scale' developed by Quinn, Hogan, Dwyer, Finn, and Fogarty (2020) consisting of twenty-one items and 6 sub-dimensions developed to measure students' critical thinking dispositions. It is a 7-point Likert scale (1=strongly disagree, 7=strongly agree). In addition, items numbered 4,5,6,7,8,9,10,11 in the scale are reverse items.

To ensure the construct validity of the original scale, exploratory and confirmatory factor analyses were conducted with two different samples. As a result of confirmatory factor analysis, $\chi^2 = 166.278$, $p > .05$, GFI = .909; IFI: .995; CFI=.978; RMSEA=.017, [90% CI:.000-.042] values were obtained. In addition to construct validity, convergent and divergent validity studies were also included in the development stages of the original scale. In these studies, it was found that there was a positive relationship between the Need for Cognition Scale, Motivated Strategies for Learning Questionnaire, and Real-World Outcomes Scale, which measure similar constructs, and a negative relationship between the Generic Conspiracist Beliefs Questionnaire and the Revised Paranormal Beliefs Scale for divergent validity. In addition, within the scope of the reliability study of the original scale, Cronbach's alpha values of the general and sub-dimensions of the scale were calculated. These values ranged between 0.59 and 0.82 (Quinn, et al., 2020).

Table 1. Number of items in the sub-dimensions of the scale and Cronbach's Alpha values

Scale ve Sub-Dimensions	Number of items	Cronbach's Alpha
1. Reflection	3	0.59
2. Attentiveness	4	0.79
3. Open-mindedness	4	0.82
4. Organisation	3	0.68
5. Perseverance	3	0.78
6. Intrinsic goal motivation	4	0.73
Scale-Wide	21	0.77

Operations Performed in Data Analysis

To adapt the scale into Turkish, permission was obtained from co-author M. Hogan via email. The study followed the steps outlined by Şeker and Gençdoğan (2020):

- Step 1: Translation into Turkish
- Step 2: Analysing and comparing translations
- Step 3: Reversal method
- Step 4: Initialising the translation test
- Step 5: Application of language validity
- Step 6: Statistical analyses related to language validity
- Step 7: Finalising the translated test
- Step 8: Reliability and validity analyses of the Turkish test

In the first step, the scale was translated from English, the original language of the scale, into Turkish by six experts. In the second step, six different translations were analysed by the researcher and her supervisor and edited as a Turkish form. Turkish translations were corrected by two Turkish language experts. In the third step, the Turkish form was translated back into English by four experts. In the fourth step, the translations were compared and edited by the field expert. In addition, it was sent to the authors of the scale to check whether the interpretation of the Turkish words (i.e. translated back into English) had the same meaning as the original English version. In the fifth step, the Turkish and English versions of the scale were administered to 30 English language teaching students at separate times. In the sixth step, correlation values were calculated based on the responses of the students. In the seventh step, a focus group interview was conducted with five university students to determine the comprehensibility of the items in the Turkish version of the scale. Their opinions about each item were taken and adjustments were made. Finally, the final check of the linguistic appropriateness of the scale was conducted by different Turkish language experts. In the eighth step, since the final version of the scale translated into Turkish is more suitable for the Turkish structure, the validity and reliability studies were conducted with the data obtained by organizing and applying the scale as a 5-point Likert scale as Completely Agree (5), Agree (4), Somewhat Agree (3), Disagree (2), Strongly Disagree (1).

Data Analyses

To ensure the language validity, which is one of the process steps of the scale adaptation study, the Turkish and English versions of the scale were applied to the same group within two weeks and the Pearson Product Moment correlation coefficient was calculated to determine the relationship between the scores obtained since the data were normally distributed. To examine the validity of the scale, construct validity was examined. Confirmatory factor analysis (CFA) was performed for construct validity and fit indices were examined. To examine the reliability of the scale, the Cronbach's alpha value of the scale and the Spearman-Brown correlation value were examined to determine the two-half reliability level. The t-test was used to test whether there was a significant difference between the item scores of the lower and upper 27% groups determined according to the total score.

Results

Language Validity

To ensure the language validity of the scale, the English and Turkish forms of the scale were administered to thirty students studying in the department of English language teaching. Pearson Product Moment correlation coefficients calculated according to the scores obtained were 0.82, 0.92, 0.90, 0.90, 0.75, 0.89, 0.90 for the 6 sub-dimensions, respectively. Since the correlation value should be at least 0.70 (Seçer, 2018), the results obtained show that the English and Turkish forms are equivalent.

Confirmatory Factor Analysis (CFA) Results

CFA was conducted to verify the existing factor structure of the Turkish translated SENCTDS scale. The results of CFA examined with the help of LISREL 8.80 programme are shown in Table 2.

Table 2. CFA results of SENCTDS

fit indexes	perfect fit criteria	acceptable fit criteria	pre-modification compliance criteria	post-modification compliance criteria
χ^2	$p > 0.05$		969.926	750.16
χ^2/sd	$0 \leq \chi^2/sd \leq 2$	$2 \leq \chi^2/sd \leq 5$	4.6	4.3
RMSEA	$0.00 \leq RMSEA \leq 0.05$	$0.05 < RMSEA \leq 0.08$	0.077	0.073
CFI	$0.95 \leq CFI \leq 1.00$	$0.90 \leq CFI < 0.95$	0.93	0.93
IFI	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI < 0.95$	0.93	0.93
NNFI	$0.95 \leq NNFI \leq 1.00$	$0.90 \leq NNFI < 0.95$	0.91	0.92
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI < 0.95$	0.91	0.91
PGFI	$0.95 \leq PGFI \leq 1.00$	$0.50 \leq PGFI < 0.95$	0.67	0.67
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI < 0.95$	0.89	0.90

Source: Kline (2011)

The fit values obtained before and after the modification between item 9 and item 11 are shown in Table 2. It was determined that the χ^2/sd value changed from 4.6 to 4.3. According to Hooper et al. (2008), this value being less than 5 is an acceptable value. As a result of the modification, χ^2/sd value and RMSEA and GFI values also changed, and it was determined that the fit indices obtained were within the acceptable value range. The t values obtained because of CFA were analysed, and it was seen that all items were significant at 0.01 level. In addition, Figure 1 shows that the item-standardized load values in the model are greater than 0.30 (Seçer, 2018).

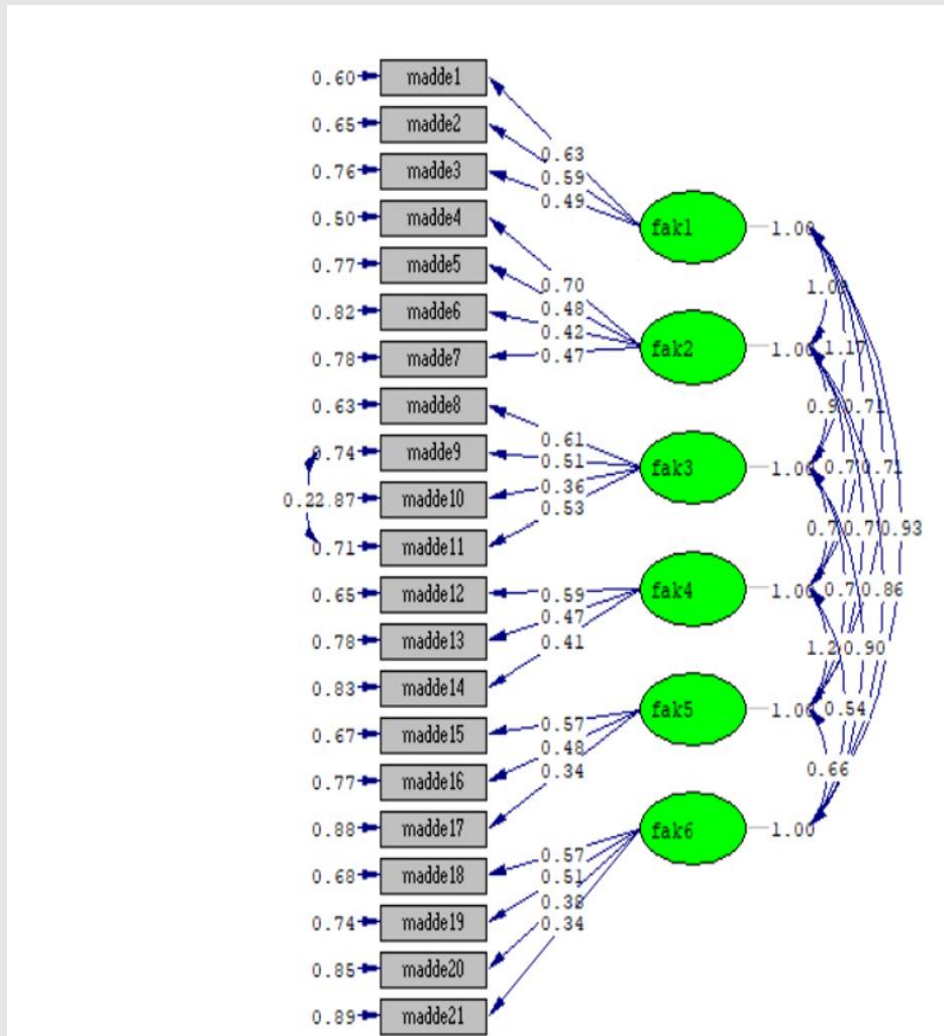


Figure 1. Standardised load values of SENCTDS

Reliability

Cronbach's alpha method was used to determine the reliability of the Student-Educator Negotiated Critical Thinking Dispositions Scale. Cronbach's alpha coefficient of the scale was calculated as 0.85. For the scale to be considered reliable, the reliability coefficient must be at least 0.70 (Büyüköztürk, 2020).

Table 3. Reliability coefficients of the total and sub-dimensions of the scale

Sub-Dimension	Original	Turkish
1. Reflection	0.59	0.65
2. Attentiveness	0.79	0.81
3. Open-mindedness	0.82	0.83
4. Organisation	0.68	0.69
5. Perseverance	0.78	0.79
6. Intrinsic goal motivation	0.73	0.73
TOTAL	0.77	0.85

In addition, the Spearman-Brown correlation value showed that the two-half reliability level of the scale was $r=0.78$. The Spearman-Brown correlation value of at least 0.70 in the scale development and adaptation process shows that the scale has sufficient reliability. Independent sample t-test was performed to determine whether there was a significant difference between the item mean scores of the lower 27% and upper 27% groups determined according to the SENCTDS scale scores.

Table 4. T-test results for the lower-upper group averages of the scale sub-dimensions

Sub-Dimension	Group	N	Mean	SS	sd	t	p
Reflection	Subgroup	103	13.9	1.34	204	-57.62	.000*
	Topgroup	103	24.81	0.38			
Attentiveness	Subgroup	103	19.07	1.81	204	-52.22	.000*
	Topgroup	103	28.64	0.47			
Open-mindedness	Subgroup	103	16.13	1.70	204	-52.83	.000*
	Topgroup	103	28.43	1.10			
Organization	Subgroup	103	10.37	1.47	204	-50.63	.000*
	Topgroup	103	21.56	1.08			
Perseverance	Subgroup	103	11.31	1.63	204	-48.44	.000*
	Topgroup	103	22.09	0.77			
Intrinsic goal motivation	Subgroup	103	22.56	1.77	204	-39.61	.000*
	Topgroup	103	32.30	0.65			

According to the t-test results in Table 4, it was determined that there was a significant difference between the lower and upper groups ($*p<.05$). According to the results obtained, the total scores of 6 sub-dimensions distinguish the individuals in the lower and upper groups. In Table 5, it was seen that there was a significant difference between the averages of the lower and upper 27% groups for each item in the scale, and it was concluded that each item was sufficient to distinguish individuals in terms of the feature it measured. In addition, item-total correlation values showing the relationship between the score obtained from each item and the total scale score were calculated. Item-total correlations ranged from 0.25 to 0.62, exceeding the 0.20 threshold (Büyüköztürk, 2020), indicating strong internal consistency.

Table 5. Item-total correlation and t-test results for lower-upper group means

Item no	t (Top%27- Sub%27)	Item-Total Correlation	Item no	t (Top%27- Sub%27)	Item-Total Correlation
Item 1	22.05*	0.62	Item 12	13.28*	0.40
Item 2	18.11*	0.53	Item 13	15.85*	0.46
Item 3	11.83*	0.42	Item 14	11.44*	0.34
Item 4	18.07*	0.61	Item 15	14.11*	0.41
Item 5	11.66*	0.46	Item 16	13.61*	0.41
Item 6	15.28*	0.40	Item 17	11.37*	0.37
Item 7	10.49*	0.39	Item 18	11.55*	0.43
Item 8	15.56*	0.56	Item 19	11.69*	0.40
Item 9	14.25*	0.44	Item 20	9.53*	0.32
Item 10	11.08*	0.33	Item 21	5.34*	0.25
Item 11	18.51*	0.52			

* $p<.05$

Discussion and Conclusion

In this study, the Student-Educator Negotiated Critical Thinking Dispositions Scale developed by Quinn et al. (2020) was adapted into Turkish. Language and field experts were assisted in ensuring language validity. The original 7-point Likert-type scale was organised as a 5-point Likert scale as Completely Agree (5), Agree (4), Somewhat Agree (3), Disagree (2), Strongly Disagree (1) because it is more suitable for Turkish structure. The original and Turkish forms of the scale were administered to thirty students studying in the English language teaching department at different times. The scale scores obtained from the two forms were calculated according to the sub-dimensions and Pearson Product Moment correlation coefficients were calculated as 0.82, 0.92, 0.90, 0.75, 0.89, 0.90, 0.75, 0.89, 0.90 for the 6 sub-dimensions respectively. In order to determine the comprehensibility of the items in the scale translated into Turkish, a focus group interview was conducted with university students and the final check of the linguistic appropriateness of the scale was carried out by a Turkish language expert.

The 6-factor structure of the Student-Educator Deliberative Critical Thinking Dispositions Scale was confirmed by CFA as in the original scale. The fit values obtained ($\chi^2/df=4.3$, RMSEA=0.073, CFI=0.93, IFI=0.93, NNFI=0.92, NFI=0.91, PGFI=0.67, GFI=0.90) were within the acceptable range (Bentler, 1980; Çokluk et al., 2012). There is no definite criterion regarding which of the many fit values obtained because of CFA will be accepted as standard (Munro 2005, cited in Çapık, 2014). As a result of the fit values obtained, it can be said that the 6-dimensional structure of the scale is compatible and sufficient with the original structure.

For the reliability of the scale, Cronbach's alpha coefficients of the whole scale and its sub-dimensions were calculated. It was calculated as 0.85 for the whole scale, 0.65 for reflection sub-dimension, 0.81 for attention sub-dimension, 0.83 for open-mindedness sub-dimension, 0.69 for organisation sub-dimension, 0.79 for perseverance sub-dimension and 0.73 for intrinsic motivation sub-dimension. These values were found to be compatible with the Cronbach's alpha values in the original scale. In addition, the Spearman-Brown correlation value for the split-half reliability level of the Turkish translated scale was calculated as $r=0.78$.

In order to determine the discrimination of the scale, t-test results were examined between the scores of the lower and upper 27% groups. It was determined that there was a significant difference in the results obtained. This shows that the items in the scale are discriminative. In addition, item-total correlation values were calculated to determine the relationship between each item and the total scale score. Correlation values were found to vary between 0.25 and 0.62. When the item-total correlation values in Table 5 are analysed, it is seen that the correlation value of the first 20 items is higher than 0.30 and the 21st item has a value of 0.25. Positive and high item-total correlation values indicate that the items in the scale measure similar behaviours and have high internal consistency (Büyüköztürk, 2020).

The results confirm that the SENCTDS scale has 6 sub-dimensions as in the original scale, the internal consistency of these sub-dimensions is high and serves the targeted purpose. Thus, it can be said that the Student-Educator Negotiated Critical Thinking Dispositions Scale can be used to measure the critical thinking dispositions of students.

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Conflicts of Interest

This research was conducted by Emine CAN YURT under the supervision of Associate Professor. Dr. Beste DİNÇER. Both authors are half responsible for the transformation, control, editing and supervision of the article.

Ethics

With the decision number 2024/5-XXV dated 03.06.2024 of Adnan Menderes University Educational Research Ethics Committee, it was stated that the study was in accordance with the principles of the ethics committee.

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Annex 1. Turkish version of “Critical Thinking Dispositions Scale with Student-Educator Discussion”

Madde No		Tamamen katılıyorum	Katılıyorum	Biraz Katılıyorum	Katılmıyorum	Hiç Katılmıyorum
1	Bana bir teori, yorum veya sonuç sunulduğunda, iyi bir destekleyici kanıtı olup olmadığına karar vermeye çalışırım.					
2	Karar vermem gerektiğinde konu ile ilgili mümkün olduğunca çok bilgi toplarım.					
3	Bir konu hakkında sonuca varmadan önce o konu hakkında mümkün olduğunca çok bilgi toplamaya çalışırım.					
4	Bir iş hakkında düşünürken dikkatimin kolayca dağıldığını fark ederim.					
5	Bir problem hakkında düşünürken, konsantre olmakta zorlanırım.					
6	Başka şeyleri düşünmem nedeniyle, önemli bilgileri sıklıkla kaçıırım.					
7	Yeni bir konu öğrenirken sık sık hayal kurarım.					
8	Düşünmek 'esnek olmakla' ilgili değil, 'haklı olmakla' ilgilidir.					
9	Farklı dünya görüşleri hakkında açık fikirli olmak, insanların düşündüğü kadar önemli değildir.					
10	Karmaşık sorunları çözmeye uğraşırken, çözüme ulaşamıyorsam çabuk pes ederim.					
11	İnandığım ve bilgisine sahip olduğum bir konu hakkında çok fazla düşünmenin bir anlamı yoktur.					
12	Yapmam gereken şeylerin ve düşüncelerimin listesini oluşturmayı severim.					
13	Düşüncelerimi düzenleyebilmek için notlar tutarım.					
14	Çok miktarda bilgiyi düzenlememe yardımcı olması için basit çizelgeler, diyagramlar ya da tablolar yaparım.					
15	Bir görev çok zor olduğunda dahi sabrederim.					
16	Hayal kırıklığı, yapmam gereken şeyleri yapmama engel değildir.					
17	Bazen zor olsa bile o zor işe devam etmeyi arzu ederim.					
18	Düşünmem için beni zorlayan bilgilerden hoşlanırım.					
19	Zorlu şeyleri öğrenmek için can atarım.					
20	Zor görevleri tamamlamak benim için eğlencelidir.					
21	Anlaşılması güç olsa dahi merakımı uyandıran bilgilerle uğraşmaktan zevk alırım.					