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A DEVELOPMENT OF THE HABITS OF MIND INVENTORY

Hasan Akdeniz[1i],
Gülay Ekici[2]
[1]PhD Student, Gazi University,
Faculty of Education,
Department of Educational Sciences,
Curriculum and Instruction
Ankara, Turkey
[2]Prof. Dr. Gazi University,
Faculty of Education,
Department of Educational Sciences,
Curriculum and Instruction
Ankara, Turkey

Abstract:
The aim of this study is to develop an inventory of individuals' habits of mind. A 256-item was generated and presented to the expert opinion during the development of the inventory. After the validity of the Lawshe analysis, 144 items were excluded from the inventory. There are 16 scales in the inventory. The draft inventory of 112 items was applied to 707 students studying in science and art centers during 2017-2018 academic year. In order to determine the suitability of the data for factor analysis, Kaiser-Meyer Olkin (KMO) coefficient and Barlett's Sphericity test, Exploratory Factor Analysis (EFA) for providing proof of construct validity, Cronbach's Alpha for the purpose of determining reliability , item total correlation for providing proof of internal validity of the items, Confirmatory Factor Analysis (CFA) calculations were made for the suitability of sub-dimensions. As a result of the transactions, the inventory has been proven to be a useful tool in determining the habits of minds of individuals.

Keywords: habits of mind, inventory development, gifted and talented student

1. Introduction

Habits are repetitive, conditioned behaviors that people have gained during their lifetime. Habit is a state of being considered within the whole of the combination of both the general and the state of continuity and the combination of both elements, and in consecutive periods. Duhigg (2012) emphasizes that more than 40% of people's daily

[i] Correspondence: email hasanakdeniz.gazi@gmail.com

behaviors are not really decisions, but habits. Habits are physical, emotional and mental. Physical habits; individuals unwittingly eat his meals, are moving habits such as bike rides. Emotional habits are the main factor that triggers the reactions of individuals against any event. If individuals shape their emotions, their reactions to events will be shaped accordingly. For example, emotional habits such as success, failure, pride, arrogance, jealousy, anger identify and control individuals' reactions to events. Habits of mind; when it comes to any problem situation, it is the ability of the person to choose and apply the appropriate ones among these high-level mental skills by emphasizing the cognitive characteristics specific to people such as logical reasoning, determination and creativity (Leikin, 2007). Goldenberg (2009) habits of mind; it is defined as the habits that it is possible to do, not just emphasize that it is good, natural and included in its repertoire (Ekici, 2016).

According to Cuoco (2008), habits of mind; mental habits that enable students to develop general cognitive repertoires and approaches that can be applied to problems they face in different situations. Costa and Kallick (2008) describe habits of mind as they are the characteristics of what intelligent people do when they are confronted with problems, the resolutions to which are not immediately apparent. Habits of mind focus on the processes and strategies that individuals need to do to learn how to use their minds effectively. Mental habits serve as a mental discipline. Students, parents, and teachers, when confronted with problems, they said, "What's the smartest thing I can do right now?" use one or more of the habits of the mind by asking the question. Habits of mind help students to think effectively, learn to criticize, help others to support their thoughts, problem-solving skills and gain the ability to make effective decisions. Individuals use the habits of mind to solve the problems they face (Costa & Kallick, 2008). Costa and Kallick (2008) defined the habits of mind in sixteen categories, which students can use in their daily lives and in related disciplines. These; persisting, managing ımpulsivity, listening with understanding and empathy, thinking flexibly, thinking about thinking (metacognition), striving for accuracy, questioning and posing problems, applying past knowledge to new situations, thinking and communicating with clarity and precision, gathering data through all senses, creating, ımagining, ınnovating, responding with wonderment and awe, taking responsible risks, finding humor, thinking ınterdependently, remaining open to continuous learning. Habits of mind; to insist on the solution of the problems faced by them, to plan the solutions, to use all the data sources in the environment, to ask the right questions, to benefit from their previous experiences, to be able to produce new solutions by looking at the problem from different perspectives, to think in a flexible way, to work in cooperation with others It aims to express correctly, to have a sense of humor and to be willing to learn continuously for their development.

The purpose of this study is to develop an inventory that can be used to determine the habits of mind of individuals. In order to generate the items of the inventory (J. Guenther, 1997; Dostal, 2000; Goliff, 2005; Campbell, 2006; Dvorak, 2007; Costa & Kallick, 2008; White & Wood, 2009; Burgess, 2012; Robinson, 2013; Elyousif & Abdelhamied, 2013; Khudair, 2013; Osman, 2016; Bülbül, 2016; Korkmaz, 2015;

Körükçü, 2015; Köse & Tanışlı , 2014; Tıraşoğlu Begüm, 2013; Altan, Lane, & Dottin, 2017) the researches about habits of mind were examined. When the related literature is examined, no likert type measuring tool that determines the habits of individuals has been found. Existing measuring tools are in the form of rubric form or single item rating. Therefore, it is thought that the inventory aimed to be developed will contribute to the literature.

2. Method

In this part of the study, participants, the procedure that carried out the development of the inventory and the explanations for the analysis of the data are included.

2.1 Participants

In this study, data were collected from two different sample groups. Both groups are specially talented students. Data were obtained from 443 students for EFA and 264 for CFA. Students who participated in the study contained in the 2017-2018 academic year studying in different provinces in Turkey's science and arts center by are individuals 15 years and older. Of the participants, 389 were male (55%) and 318 (45%) were female. In total, n = 707 samples were analyzed for inventory development.

2.2. The Procedure

The habits of mind inventory was applied to gifted students who were willing and studying at the Science and Art Centers. After the applications were completed, all scales were examined and the inventory of the students whose answers were considered invalid due to lack of response, multiple coding or not coding some items were determined and excluded from the analysis.

The inventory development process has been carried out following the steps presented below .

Figure 1: Steps in the habits of mind inventory development

When the shape is examined, it is seen that the inventory prepared in order to determine the students' levels of development of habits of mind inventory is developed in four stages.

2.3. Literature Review and Generating Items

The habits of mind inventory consists of 16 sub-scales. First, 256-item was generated from the statements that are thought to be indicative of the habits . There are 16 items for each habit. There are also images representing each habit in the inventory. The images and sample items in the inventory are as shown in the table.

Table 1: Habits of Mind and Sample Items for Each Habit

	Habits of Mind		İtem
1		Persisting	If I fail at the first attempt in a job I started, I'll keep trying until I get it.
2		Thinking and communicating with clarity and precision	I ignore my little achievements to achieve my real goal.
3		Managing impulsivity	I listen to both people and body language.
4		Gathering data through all senses	I look for different and new perspectives in my work.
5		Listening with understanding and empathy	I can plan and evaluate my own thoughts.
6		Creating, imagining, innovating	I check them more than once to make sure my work is accurate and precise .
7		Thinking flexibly	I'm not afraid to ask questions to know what I don't know.
8		Responding with wonderment and awe	My previous experiences are instructive.
9		Thinking about thinking (metacognition)	I can express my thoughts clearly and accurately.
10		Taking responsible risks	I use all my senses to learn something new.
11		Striving for accuracy	I know how to produce ideas and processes on a subject.
12		Finding humor	I am intrigued; I wonder about most of the environment I live in.
13		Questioning and posing problems	I take risks to try new ideas and methods on a subject that I don't know.
14		Thinking interdependently	In many cases I can laugh at myself.
15		Applying past knowledge to new situations	I participate in group work to contribute to teamwork and learn from my friends.
16		Remaining open to continuous learning	I always learn new things.

When the table is examined, it is seen that Habits of mind inventory consists of 16 sub-dimensions. All positive items were rated on a five-point Likert type scale (Never = 1, Always= 5). In negative items, scoring was performed in the opposite way (Never = 5, Always= 1). The lowest point value (1) was derived from the highest score value (5) to be obtained from the habits of mind inventory at the stage of determining points intervals, and this value was divided into total number of points. As a result, the score ranges were determined (Vogt, 2005; Büyüköztürk, 2010; Erkuş, 2012). The evaluation intervals are as in the table.

Table 2: Evaluation Scales of Scale Items

Preferred Value	Value range
1. Never	1,00 - 1,79
2. Rarely	1,80 - 2,59
3 .Sometimes	2.60 - 3.39
4. Often	3,40 - 4,19
5. Always	4,20 - 5,00

The rating ranges of the data obtained in the Likert scale type were accepted as equal and the score range coefficients to be calculated as a result of arithmetic environments were preferred as 0.79 (Vogt , 2005; Büyüköztürk, 2010).

2.4. Expert Feedback

The indication of whether the scale items are sufficient to measure the property to be measured (in terms of quantity and quality) can be expressed as Content validity. One of the ways to determine the validity of the Content is to consult expert opinion (Vogt, 2005; Büyüköztürk, 2010). For the habits of mind inventory was received opinions from, Turkish Language experts (2), curriculum development experts (2), experts for gifted and talented students in Biology and Science education (4) and assessment and evaluation experts (2). Some corrections have been made in accordance with the opinions and recommendations of experts. Measurement validity of the Habits of mind Inventory; tested under content and construct validity. Developed by Lawshe (1975) and updated by Wilson, Pan and Donald (2012) in terms of the validity rates and content validity values of the developed scale items, in order to validate the expert opinions obtained from the preliminary studies conducted on subjects such as the suitability of the collected data for the targeted sample. In Lawshe technique, there is a need of at least 5 and a maximum of 40 people (Yurdagül & Bayrak, 2012). Each substance that is intended to be included in the habits of mind inventory is rated as "appropriate", "partially appropriate", unsuitable for this item if not suitable Z in the form of expert opinions. In order to allow the experts to make a statement, a gap has been left under each item and it is stated that the experts can also correct the items when necessary. Content validity rates for each item in the scale were determined. Content Validity Ratios (CVR) are expressed as a percentage of the number of experts indicating the say appropriate toplam view of any substance to a half of the total number of experts indicating the opinion on the substance. If the CVR values

contain a negative or a value of 0, these substances should be eliminated first. The items with positive CVR values are the items that should be subjected to statistical procedures. The minimum values at the α = 0.05 significance level related to Content validity rates are as shown in the table.

Table 3: Content Validity Ratio Values and Expert Numbers

Number of Specialists	Minimum	Number of Specialists	Minimum
5	0.99	13	0.54
6	0.99	14	0.51
7	0.99	15	0.49
8	0.78	16	0.42
9	0.75	17	0.37
10	0.62	18	0.33
11	0.59	19	0.31
12	0.56	20	0.29

Yurdagül, H. (2005). *Use of validity indexes for Content validity in scale development studies.* XIV. It was presented at the National Educational Sciences Congress. Denizli, Pamukkale University.

α=.05 significance level for 10 experts minimum value of the content validity ratio Veneziano and Hooper (1997) are expressed as by 0.62. A total of 144 items were excluded from the scale by examining each item one by one, which was below 0.62, with a predominance of CVR value minus (-) and zero (0), similar to the scale structure, not in the subject area, and not considered to serve the purpose. The inventory consists of a total of 112 items, 7 of which are for each mind habit scale. Also with students "Participatory Verification" (Merriam, 2013). 10 students were interviewed to test the agreement of each item. The students examined the items and indicated the points they could not understand and understand. In line with the feedback, necessary adjustments have been made and made ready for the inventory pilot study.

2.5. Data Analysis

The data obtained were entered into the SPSS 22 package program and the following analyzes were performed within the content of the validity and reliability study of the scales included in the inventory .

- Factor of data In order to determine its suitability for analysis, Kaiser-Meyer Olkin (KMO) coefficient and Barlett's Sphericity test,
- Exploratory Factor Analysis (EFA) to provide evidence for construct validity ,
- Cronbach's Alpha, to determine reliability
- item total correlation to provide evidence for the internal validity of substances,
- Confirmatory Factor Analysis (CFA) calculations were made for the conformity of the sub-dimensions.

3. Results

In this part of the study, the measurement validity and reliability studies of the inventory are explained.

3.1. Validity Studies

It was checked whether the contents were normal. At this stage Kolmogorov-Smirnov and Shapiro-Wilk normality tests were used and each subscale items were examined considering their sub-dimensions. A normality distribution made normal distribution of the data obtained from the other were observed. For this reason, parametric tests were used in data analysis.

Firstly construct validity SPSS 22 package program each subscale exploratory factor analysis was performed, and then to determine the suitability of each scale model IBM AMOS 22 through confirmatory factor analysis software package was used in the. Harrington (2008) states that if the scale is based on a theoretical structure, only confirmatory factor analysis is sufficient. The habits of mind inventory is based on the Habits of mind theory, which was developed by Costa and Kallick (2008) and whose dimensions were defined. Factor distributions of each habits of mind within the scale were examined. After the exploratory factor analysis, confirmatory factor analysis was applied to the subscales.

3.1.1. Exploratory Factor Analysis

Kaiser-Meyer-Olkin (KMO) other test shows whether the data structure generated by the variables obtained from a particular sample is sufficient for factor analysis. The adequacy of the sample was tested by KMO measurement. A KMO value of 0.60 and above indicates that the sample would be sufficient for factor analysis. If this value is close to 1, factor analysis is suitable for the data group (Bayram, 2012; Tabachnick & Fidell, 2013). The results of the KMO measurement are as in the table.

Table 4: The KMO and Bartlett's Test Kaiser-Meyer-Olkin Measure of Sampling Adequacy Results

Kaiser-Mayer-Olkin (KMO) Measure of Sampling Adequacy		,929
Barlett Test	**Approx. chi-square**	46856.665
	df	6216
	Sig .	000 *

* p <0.01

Kaiser-Mayer-Olkin (KMO) is a size related to the suitability of the correlation between sample and scale items. Kaiser-Mayer-Olkin (KMO) value of 0.60 's is above acceptable values comprises (Büyüköztürk, 2010; Tabachnick & Fidell, 2013). KMO value of the inventory was 0.929 (p<.01) and the chi square value was 46856.66 (p<.01), which verified the appropriateness of the data for factor analysis.

Table 5: The KMO and Bartlett's Test Kaiser-Meyer-Olkin Measure of Sampling Adequacy Results Habits of Mind Inventory Sub-Scales

Habits of Mind	Kaiser-Mayer-Olkin (KMO) Measure of Sampling Adequacy	Barlett Test		
		Approx. Chi-Square	df	Sig.
Persisting	0.86	1494.25	21	000*
Thinking and communicating with clarity and precision	0.80	771.95	15	000*
Managing impulsivity	0.86	1455.29	21	000*
Gathering data through all senses	0.81	774.84	15	000*
Listening with understanding and empathy	0.78	904.74	15	000*
Creating, imagining, innovating	0.80	1116.25	10	000*
Thinking flexibly	0.85	1506.49	15	000*
Responding with wonderment and awe	0.90	1629.47	21	000*
Thinking about thinking (metacognition)	0.83	1218.23	15	000*
Taking responsible risks	0.81	1081.50	15	000*
Striving for accuracy	0.86	1294.08	21	000*
Finding humor	0.85	1031.19	21	000*
Questioning and posing problems	0.83	1517.74	21	000*
Thinking interdependently	0.68	715.36	21	000*
Applying past knowledge to new situations	0.78	791.87	15	000*
Remaining open to continuous learning	0.86	1626.98	15	000*

* $p < 0.01$

KMO value of the inventory were between .68-.90 ($p<.01$) and the chi square value were between 715.36-1629.47 ($p<.01$), which verified the appropriateness of the data for factor analysis. In addition, the significance of Bartlett's values ($p<.001$) also supports data showing normal distribution. Tabachnick and Fidell (2013) suggest that factor loads should be at least 0.30. Factor loads of substances in the inventory of habits of mind. 529 to .829. Some items in the scales were excluded from the inventory due to the fact that the factor loads were below 0.30. The number of items formed on the scales as a result of factor analysis is as follows; Persisting (7 items), thinking and communicating with clarity and precision (6 items), managing impulsivity (6 items), gathering data through all senses (6 items), listening with understanding and empathy (7 items), creating,

imagining, innovating (7 items), thinking flexibly (6 items), responding with wonderment and awe (7 items), thinking about thinking (metacognition) (6 items), taking responsible risks (6 items), striving for accuracy (5 items), finding humor (7 items), questioning and posing problems (6 items), thinking interdependently (6 items), applying past knowledge to new situations (7 items), remaining open to continuous learning (6 items), in total 101 items were included. The total variance values for the subscales of the habits of mind inventory and overall are shown in tables.

Table 2: Total Variance Values Explained in the Habits of Mind Inventory

Sub-scales	Components	Initial Eigenvalues			Rotation Sums of Squared Loadings		
		Total	%Variance	Cumulative%	Total	%Variance	Cumulative%
Persisting Scale	1	3,405	48.649	48.649	3,405	48.649	48.649
	2	,886	12.651	61.299			
	3	,694	9.914	71.213			
	4	,639	9.134	80.347			
	5	,589	8.409	88.757			
	6	452	6.453	95.210			
	7	335	4.790	100000			
Managing Impulsivity Scale	1	2,578	42.973	42.973	2,578	42.973	42.973
	2	,977	16,291	59.264			
	3	762	12.697	71.961			
	4	637	10,625	82.586			
	5	542	9,030	91.616			
	6	503	8.384	100000			
Listening with Understanding and Empathy Scale	1	3,395	48.504	48.504	3,395	48.504	48.504
	2	,827	11.810	60.315			
	3	,744	10,631	70.945			
	4	660	9.425	80.370			
	5	,561	8.017	88.387			
	6	,453	6.467	94.854			
	7	360	5,146	100000			
Thinking Flexibly Scale	1	2,637	43,949	43,949	2,637	43,949	43,949
	2	850	14.174	58.123			
	3	,781	13,013	71.136			
	4	,653	10,882	82.017			
	5	560	9.330	91.347			
	6	519	8,653	100000			
Thinking About Thinking (Metacognition) Scale	1	2,667	44.443	44.443	2,667	44.443	44.443
	2	,977	16.282	60.725			
	3	,824	13.732	74.457			
	4	600	9,996	84.453			
	5	,521	8.685	93.138			
	6	412	6,862	100000			
Striving for Accuracy Scale	1	2,841	56.811	56.811	2,841	56.811	56.811
	2	795	15,907	72.718			
	3	551	11.029	83.747			
	4	436	8.717	92.464			
	5	377	7,536	100000			
Questioning and Posing Problems Scale	1	3,284	54.728	54.728	3,284	54.728	54.728
	2	,859	14.324	69.052			
	3	,602	10.036	79,089			
	4	528	8.793	87.881			

	5	399	6.652	94.533			
	6	328	5,467	100000			
Applying Past Knowledge to New Situations Scale	1	3,674	52.486	52.486	3,674	52.486	52.486
	2	,682	9.748	62.234			
	3	,665	9.504	71.738			
	4	554	7,919	79.657			
	5	,511	7,300	86.957			
	6	,465	6,638	93.594			
	7	448	6,406	100000			
Thinking and Communicating with Clarity and Precision Scale	1	3,057	50.949	50.949	3,057	50.949	50.949
	2	,862	14.364	65.312			
	3	,677	11.284	76.597			
	4	558	9.304	85.901			
	5	,459	7.654	93.555			
	6	387	6.445	100000			
Gathering Data Through All Senses Scale	1	2,931	48.846	48.846	2,931	48.846	48.846
	2	,872	14.525	63.371			
	3	686	11.435	74.806			
	4	,594	9,893	84.699			
	5	524	8.733	93.431			
	6	394	6,569	100000			
Creating, Imagining, Innovating Scale	1	3,265	46.645	46.645	3,265	46.645	46.645
	2	838	11.974	58.618			
	3	777	11.098	69.716			
	4	642	9.177	78.893			
	5	585	8.360	87.253			
	6	470	6.716	93.969			
	7	422	6.031	100000			
Responding with Wonderment and Awe Scale	1	3,023	43.182	43.182	3,023	43.182	43.182
	2	,898	12.831	56.014			
	3	,742	10,605	66.619			
	4	,659	9.415	76.034			
	5	620	8,850	84.884			
	6	,546	7.804	92.688			
	7	512	7.312	100000			
Taking Responsible Risks Scale	1	3,256	54.274	54.274	3,256	54.274	54.274
	2	812	13,538	67.812			
	3	,652	10.859	78.671			
	4	553	9.218	87.888			
	5	401	6,676	94.564			
	6	326	5,436	100000			
Finding Humor Scale	1	2,316	33.089	33.089	2,316	33.089	33.089
	2	1,280	18.289	51.378	1,280	18.289	51.378
	3	933	13.333	64.712			
	4	831	11.866	76.578			
	5	664	9.484	86.062			
	6	522	7.464	93.525			
	7	,453	6,475	100000			
Thinking Interdependently Scale	1	2,553	42.542	42.542	2,553	42.542	42.542
	2	982	16.369	58.911			
	3	845	14.089	73,000			
	4	626	10.433	83.433			
	5	,548	9,130	92.562			
	6	446	7,438	100000			

Remaining Open to Continuous Learning Scale	1	3,444	57.397	57.397	3,444	57.397	57.397
	2	731	12.176	69.573			
	3	578	9.638	79.211			
	4	500	8,338	87.549			
	5	,434	7,235	94.784			
	6	313	5.216	100000			

Correlation coefficients between the subscales of the Habits of Mind Inventory were calculated for convergent validity as a proof of construct validity.

Table 3: Habits of Mind Inventory Pearson Multiplication Moment between Scales Correlation Analysis Results

	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**	**A12**	**A13**	**A14**	**A15**	**A16**
A1	1	,645*	,518*	,581*	,580*	,619*	,603*	,588*	,589*	,563*	,583*	,577*	,587*	,581*	,522*	,238**
A2	,645*	1	,477*	,568*	,590*	,504*	,546*	,515*	,504*	,465*	,521*	,478*	,529*	,472*	,405*	,211*
A3	,518*	,477*	1	,591*	,624*	,496*	,542*	,648*	,588*	,591*	,546*	,572*	,483*	,461*	,476*	,380*
A4	,581*	,568*	,591*	1	,634*	,523*	,640*	,606*	,572*	,571*	,652*	,566*	,556*	,536*	,533*	,258*
A5	,580*	,590*	,624*	,634*	1	,627*	,698*	,733*	,675*	,606*	,649*	,613*	,528*	,562*	,518*	,338*
A6	,619*	,504*	,496*	,523*	,627*	1	,614*	,651*	,529*	,544*	,657*	,617*	,449*	,543*	,545*	,220*
A7	,603*	,546*	,542*	,640*	,698*	,614*	1	,652*	,671*	,621*	,683*	,664*	,544*	,615*	,590*	,280*
A8	,588*	,515*	,648*	,606*	,733*	,651*	,652*	1	,601*	,700*	,695*	,667*	,576*	,617*	,582*	,374*
A9	,589*	,504*	,588*	,572*	,675*	,529*	,671*	,601*	1	,617*	,586*	,610*	,518*	,589*	,519*	,317*
A10	,563*	,465*	,591*	,571*	,606*	,544*	,621*	,700*	,617*	1	,681*	,695*	,608*	,594*	,594*	,380*
A11	,583*	,521*	,546*	,652*	,649*	,657*	,683*	,695*	,586*	,681*	1	,682*	,588*	,664*	,703*	,327*
A12	,577*	,478*	,572*	,566*	,613*	,617*	,664*	,667*	,610*	,695*	,682*	1	,543*	,661*	,605*	,309*
A13	,587*	,529*	,483*	,556*	,528*	,449*	,544*	,576*	,518*	,608*	,588*	,543*	1	,520*	,555*	,311*
A14	,581*	,472*	,461*	,536*	,562*	,543*	,615*	,617*	,589*	,594*	,664*	,661*	,520*	1	,593*	,319*
A15	,522*	,405*	,476*	,533*	,518*	,545*	,590*	,582*	,519*	,594*	,703*	,605*	,555*	,593*	1	,387*
A16	,219*	,211*	,380*	,258*	,338*	,220*	,280*	,374*	,317*	,380*	,327*	,309*	,311*	,319*	,387*	1

*p < 0.01

(A1: Persisting, A2: Managing Impulsivity, A3: Listening with Understanding and Empathy, A4: Thinking Flexibly, A5: Thinking About Thinking (Metacognition), A6: Striving for Accuracy, A7: Questioning and Posing Problems, A8: Applying Past Knowledge to New Situations, A9: Thinking and Communicating with Clarity and Precision, A10: Gathering Data Through All Senses, A11: Creating, Imagining, Innovating, A12: Responding with Wonderment and Awe, A13: Taking Responsible Risks, A14: Finding Humor, A15: Thinking Interdependently, A16: Remaining Open to Continuous Learning)

When the table is examined, Pearson Multiplication in order to determine whether there is a significant relationship between all subscales of the habits of mind inventory. There was a statistically significant relationship difference between the subscales ($p < 0.01$). Among the subscales of the habits of mind inventory, there is a meaningful relationship in determining students' habits of mind.

3.1.2. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is considered a natural extension of the AFA model as a process (Lee, 2007). DFA, explain the order of relationship by figuring out the model developed according to a theory (Byrne & Campbell , 1999; Sumer, 2000). The values of the habits of mind inventory of the DFA fit indices are as in the table.

Table 7: Compliance Values of the Habits of Mind Inventory Scales

		Fit Indices				
Sub-scales	**s2 / sd**	**RMSEA**	**RMR**	**GFI**	**AGFI**	**CFU**
Persisting	3,068	.077	0,039	.967	0.93	0,965
Managing Impulsivity	3,495	.059	0,027	0,985	0,966	0.97
Listening with Understanding and Empathy	3,767	0,063	0,018	.981	.962	.973
Thinking Flexibly	3,951	0,065	0,025	.984	.962	0,965
Thinking About Thinking (Metacognition)	3,164	0,055	0,024	.988	.968	.981
Striving for Accuracy	4,263	0,068	0,018	.991	0,965	.988
Questioning and Posing Problems	2,368	0,044	0,017	.991	.977	.993
Applying Past Knowledge to New Situations	2,053	0,039	0,012	.988	.977	.991
Thinking and Communicating with Clarity and Precision	2,379	0,063	0.03	.982	0,952	.982
Gathering Data Through All Senses	4,842	.074	0,023	.983	.955	.971
Creating, Imagining, Innovating	4,526	.071	0,023	0,976	.949	.964
Responding with Wonderment and Awe	3,737	0,062	0,024	.979	.959	.962
Taking Responsible Risks	3,123	0,078	0,035	0,976	.937	0,976
Finding Humor	2,195	0,067	0.08	.969	.934	.924
Thinking Interdependently	4,547	.071	0,024	.982	.957	.959
Remaining Open to Continuous Learning	3.57	0.06	0,014	.987	.967	.987

Acceptable fit index ranges given in the table are as follows: Calvini and Ranieri, 2008; Schumacker and Lomax, 2004; Bluch, 2008; MacCallum and Sehee, 1997; Klem (2000), McDonald and Ho (2002). When the table is examined, it is seen that the scales in the Habits of Mind Inventory generally exhibit good fit values, these values are acceptable and confirmed as a model.

3.2. Reliability and Item Analysis

Habits of Mind Inventory's measurement reliability was tested by Cronbach's alpha internal consistency reliability. The Habits of mind Inventory the Cronbach's alpha internal consistency coefficient is α=0 ,971, which indicates that the inventory has internal consistency reliability. Also each subscale the Cronbach alpha internal consistency coefficient ranged from α=0,516 to α=0,846. These results indicate that the subscales have internal consistency reliability. Internal consistency analysis is another method used in item total score correlation. In the item total score correlation, the correlation of the scores of each item with the total score of the scale is calculated. The item-total correlation coefficients obtained in this process, also called item reliability, indicate the reliability of the measurement tool. As a result of the item analysis, the reliability of the scale items was calculated using item-total correlations. Item-total correlation coefficients $r \geq 0.40$ is a very good item and $0.30 \leq r \leq 0.39$ is also a good item (Allen & Yen, 1979; Anastasia & Urbina, 1997; Geuens & Pelsmacker, 2002; Büyüköztürk, 2010). Item-total correlation coefficients values ranges from .32 to .728. These obtained results, scale and content of the scale characterized in that each measure of items that measured by the same property as a whole can be interpreted in the form.

4. Discussion

The Habits of the Mind are a set of 16 identified life-related problem-solving skills needed to operate effectively in society and promote strategic reasoning, insight, perseverance, creativity and know-how. The understanding and application of these 16 habits of mind serve to give the person the skills to deal with real-life situations that allow them to respond using awareness (clues), thought and intentional strategies to achieve a positive outcome. In this study, it is aimed to develop Habits of Mind Inventory "to determine the level of habits of mind that individuals have." For this purpose, a 16-item, which is thought to represent the mind habit, was generated. The item pool was presented to 10 experts and the Content Validity Ratio of each item was determined and 7 items were included in the scale of habits of mind inventory. In addition, 10 students were interviewed to confirm the participants and the students stated that they could not understand the items in the inventory or could be understood differently. According to the feedback from the students, the inventory was finalized and ready for implementation. After the validity and reliability studies in the inventory; Persisting (7 items), thinking and communicating with clarity and precision (6 items), managing impulsivity (6 items), gathering data through all senses (6 items), listening with understanding and empathy (7 items), creating, imagining, innovating (7 items), thinking flexibly (6 items), responding with wonderment and awe (7 items), thinking about thinking (metacognition) (6 items), taking responsible risks (6 items), striving for accuracy (5 items), finding humor (7 items), questioning and posing problems (6 items), thinking interdependently (6 items), applying past knowledge to new situations (7 items), remaining open to continuous learning (6 items) to be received a total of 101 items. All of the habits of mind inventory and bottom of scale reliability coefficient (Cronbach α), factor loadings, item-total correlation factors cross correlation analysis were performed. According to these analyzes; it is understood that the inventory developed and the subscales are consistent within themselves. All validity and reliability studies show that the scale is a valid and reliable measurement tool that can be used to determine the level of mind habits of students. Not all problems are the same. Some problems difficult - much harder – than others. We learn to behave smarter. We need to develop more mature habits of mind to solve more and more difficult problems. It is hoped that the Habits of Mind Inventory will help to identify and improve the habits of the mind.

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