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AN INVESTIGATION OF THE SENSORY INTEGRATION MATERIALS DEVELOPED BY THE ASSOCIATE STUDENTS IN THE MATERIAL DEVELOPMENT COURSE

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Abstract

The aim of this research is to determine the effect of associate degree students' studies on developing sensory integration materials in the material development course on material development skills. In addition, it is also aimed to determine whether the type of high school students graduated from has an effect on the material development process. The single-group quasi-experimental design, which is among the experimental models, was used in the research. The study group of the research consists of Sivas Cumhuriyet University Health Services Vocational School Child Development Department students in the 2021-2022 academic year. The research group consists of 27 students in totally (25 females and two males). *"Application-Based Educational Technology and Material Development Competencies Scale"* was used to obtain data related to the research. The descriptive statistics, dependent groups t-test, independent groups t-test, and frequency analysis tests were used for the analysing of the data. When the findings obtained in the study were examined, a significant difference was found between the pre-test and post-test scores of the participants. In addition, it was determined that the factor type of high school graduated from had a significant impression on the average score of the students.

Keywords: Material, material development, sensory integration, associate degree

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1. Introduction

It is seen that the changes and transformations in today's world are faster than ever before. Technological innovations have a significant impact on this fast-paced way of life. These developments and changes, which affect all areas of life, also affect education, which is among

the essential processes of human life. It is aimed to train people who are aware of international developments, use technology effectively, and have the requirements of globalizing world citizenship, rather than people who know only certain subjects or specialize in one subject in education processes. For this, teachers and trainers are expected to be well-equipped in setting up the environment arrangement, selecting and preparing the materials in the learning-teaching processes (Yanpar-Yelken, 2015).

It is important to use educational materials that serve the educational purpose to create an effective and productive classroom environment and to apply current methods and techniques. Using the educational material facilitates learning and ensures permanent learning in all education levels and teaching environments. Many abstract topics and concepts become understandable for students when these materials are used. The general benefits of using materials in educational settings are as follows; makes learning easier and permanent, increases interest, attention, and desire for learning, provides active and active learning, enables learning through experiences in daily life, increases academic achievement, and increases critical thinking, problem-solving and creativity skills (Akçay, Tüysüz, Feyzioğlu, & Oğuz, 2008; Apperson, Laws, & Scepansky, 2006). Through these materials, the multiple learning environments were presented to students. Thus, students are supported to meet their individual learning needs, realize their permanent learning by embodying abstract concepts, and learn difficult lessons more easily (Akçay et al., 2003).

For students to achieve high-level learning, teachers need to choose the right and effective material, and use it in learning environments and have material development skills when needed (İzci, 2006). Teachers should have proficiency in making appropriate choices for teaching objectives, considering the students' readiness, ability, interest, success, and development levels in material selection (Hollingsworth & Hoover, 1999). It is stated that the students' willingness to learn will increase as the teachers determine the lesson teaching materials by taking into account the needs of the students, the class size, and the available opportunities. Different materials are needed at several educational levels. Education level affects the structure and complexity of the selected material. Depending on the scope of the lesson and the level of the student, the use of a simple material developed by the teacher or a technology-based material may be preferred (Güven, 2006). The educational materials serve to transfer the experiences to other environments by providing the emergence of a living environment through the sensory organs they address. In particular, it is emphasized that materials that stimulate the senses of preschool children are very important (Hesapçıoğlu, 2008). The fact that the education in the pre-school period forms the basis of other educational steps and the education given in this period gains importance in the world has drawn attention to pre-school education and hence to the materials used.

The senses begin to develop while still in the mother's womb, and thus the person communicates with his environment (Pekçetin, 2015). The sense arises through the interaction

of the person's eyes, ears, tongue, skin, and nose with stimuli from the environment. All senses are related to each other, and they all form a meaningful whole (Mather, 2018). Life continues thanks to the senses that make it easier for a person to adapt by perceiving the conditions and his environment (Çetin-Sultanoğlu & Aral, 2015). The senses are used in numerous areas such as learning, fulfilling wishes, enjoying, having self-control, using psycho-motor skills, performing operations using high-level cognitive skills, and self-development (Kranowitz, 2006). The processing of the senses, their coordination, interpretation, and production of appropriate responses to environmental stimuli, in other words, the organization of sensory inputs, are explained with the concept of "sensory integration" (Cabral-Silva & Tudella-Martinez, 2015; Magalha˜es, 2008). Sensory integration is one of the important educational concepts that have become widespread in recent years. Although the first studies on this subject started especially for children with autism, learning disabilities, and the elderly with sensory loss, the sensory integration studies have been started to be applied to children who have no problems in the process. Sensory integration studies are based on learning by perceiving environmental stimuli with one's senses. Sensory integration, which is also expressed in the literature with concepts such as sensory processing, sensory integrity, sensory integration; it explains the neurological development that enables the formation and interpretation of stimuli from the environment and information by organizing understanding and purposeful behaviors (Schaaf & Miller, 2005). Children who cannot healthily perform the sensory integration process may experience delays in participating in activities in their daily lives and gaining vital skills. These delays can cause developmental regressions and inadequacies, resulting in serious problems (Armstrong, Redman-Bentley, & Wardell, 2013; Bar-Shalita, Parush, & Vatine, 2008). Sensory integration activities are also considered as early intervention activities. And is addressed within the framework of five basic principles as follows:

1. Sensory integration and sensorimotor development are skills that have very important effects in the learning process.

2. Communication and the data received from the environment support brain development.

3. The central nervous system is open to constant change and development.

4. The significant sensory-motor activities affect the nervous system through stimuli from the environment and support neurological changes that affect learning.

5. Sensory development occurs in a specific order. Each developmental stage lays the groundwork for the next stage of sensory development (Miller, Anzalone, Lane, Cermak, & Osten, 2007).

Deficiencies in sensory experience can cause permanent developmental delays and dysfunctions in cognitive, social, and emotional areas. Children who perform learning activities in a well-designed, rich and stimulating environment that supports their sensory development show a higher level of sensory development (Balıkçı, 2013). While the senses are

conventionally defined as the sense of touch, sense of smell, sense of taste, sense of hearing, and sense of sight, in recent studies, the balance (Vestibular) and the movement (Proprioceptive) senses have also been defined. The sense of touch is expressed as the most primitive and fundamental form of communication (Mercuri et. al., 2019). The effects of the sense of touch on experiences and behaviors in daily life is widely known. The sense of touch is not only used to understand, perceive and react to the outside world. The lived experiences leave effects on the ego and the body, bordering the mental representations of the body and the temperament exhibited towards the environment (Bremner & Spence, 2017). The sense of smell appeals to the lower layers of memory in a way that is not seen in any other sense. This situation reveals the intense power and permanence of odor in remembering (Isbell & Isbell, 2007). Tastes of food and objects are perceived by taste buds located in the tongue and mouth region. The chemical sense of taste includes five basic taste categories: sweet, sour, bitter, salty, and umami (the fifth taste) (Slocombe, Carmichael, & Simner, 2016). The sense of hearing, which in the prenatal period, develops in the postnatal period (Goldstein, 2019; Yükselen & Aldiş, 2020). The act of hearing and the sense of hearing are not the same thing. While sounds are perceived in the act of hearing, the sounds heard in the sense of hearing are interpreted in the mind (Çetin-Sultanoğlu & Aral, 2015). The ability to hear, which has a vital function in life, is one of the most effectively used senses in the learning process. In this sense, a properly trained sense of hearing directly affects the success of the student. The sense of sight is a sensory field that develops rapidly from born (Gander & Gardiner, 2015) and reaches the level of seeing of an adult at the age of one (Trawick & Smith, 2017). The sense of balance is the area of sensory-related to controlling someone's own body, determining his position and relationship on the ground. While people are moving, they perceive the movements of the objects in the environment and the direction of their relationship with the body through the sense of balance. The sense of balance has a unifying structure and explains the relationship between gravity and the universe (Taygur-Altıntaş & Yılmazer, 2015). The sense of balance, which has a great impact on daily life, is also closely related to reflexes (Angelaki & Cullen, 2008). The sense of movement explains how the position of the body's limbs is perceived and controlled by the brain (Fidan, Yıldız, & Şahan, 2019). It regulates the movement of the muscles by providing the relationship between the parts of the body with each other and the space (Çetin-Sultanoğlu & Aral, 2015). In addition to the task of controlling muscles and joints, the sense of movement also affects the lungs and intestines (Proske & Gandevia, 2012). The sensory integration explains the functionalization of all these sensory areas and ensures the correct relationship and interaction with each other.

The sensory integration studies mean presenting the correct data to children from the born for the development of children. It was found that the application of sensory integration activities, which were initially developed for children with developmental and behavioral problems, were later applied to all children, giving positive results (Trawick & Smith, 2017). In this direction, sensory integration materials have a significant impact. However, it is stated that all kinds of materials used in pre-school education are insufficient (Odacı & Uzun, 2017).

Although different materials are used in sensory integration, it is not possible to say that these materials are sufficient. Teachers and educators who will work in pre-school education should have knowledge about sensory integration and can develop the materials needed when necessary. In this direction, the sensory integration materials development study was carried out in the material development lesson for associate degree students in child development, in this study. In addition to the effect of the study on the material development skills of the students, it was examined whether there was a difference in terms of the type of school they graduated. In this study, it was aimed to determine the effectiveness of associate degree students' studies on developing sensory materials in the material development lesson and to examine the effect of the type of high school they graduated from on the material development process. In line with this purpose, the answers to the following questions were sought during the research process:

1. Is there a significant difference between the pretest-posttest scores of Departments of Child Development students (DCD) from the "Application-Based Educational Technology and Material Development Competencies Scale" (ABETMDC)?

2. Is there a significant difference between the pretest-posttest scores of DCD students according to the variable of the type of high school they graduated from?

2. Method

This section contains information about the model of the research, the study group, the data collection tool, the application process, and analysis of the data. The ethical permission for the study was obtained with the decision of Sivas Cumhuriyet University Scientific Research and Publication Ethics Social and Human Sciences Board dated 30.12.2021-112934 and numbered E-60263016-050.06.04-112934.

2.1. The research model

The research was designed in accordance with the single-group quasi-experimental design. The research group was determined in accordance with the selective criterion sampling method among the purposive sampling models. The research was cpnducted with a single group. The quantitative research method was preferred to obtain the research data.

2.2. The study group

The study group of the research consists of Sivas Cumhuriyet University, Vocational School of Health Services; Child Development Department (DCD) students in the 2021-2022 academic year.. The research group consists of 27 students (25 females and two males). Workshops were held for the students in the material development course to develop sensory integration materials within the scope of the lesson.

The criteria used to determine the study group of the research are as follows:

- ✓ The students in the research group should not have taken this lesson before.
- ✓ The participants are required to take part in the application voluntarily.

After the application, the criteria for the materials produced by the students are as follows:

- ✓ The sensory materials produced during the application should be a quality that pre-school children can use.

Table 1. Demographic characteristics of research group students

Variables		*f*	%	Variables		*f*	%
Gender	Female	25	92.6	Type of high school graduated	Vocational high School	14	51.9
	Male	2	7.4		Anatolian High School	13	48.1
Economical situation	1.Very good	1	3.7	Mother education	1. Primary School	17	63.0
	2.Good	9	33.3		2. Secondary School	5	18.5
	3.Medium	17	63.0		3. High School	3	11.1
	4.Low	-	-		4. University	2	7.4
Residence	1. Village	4	14.8	Father education	1. Primary School	12	44.4
	2. District	7	25.9		2. Secondary School	6	22.2
	3. City	10	37.0		3. High School	7	25.9
	4. Metropolitan	6	22.2		4. University	2	7.4

When Table 1 is examined; it is seen that the distribution of students by gender is predominantly female. It has been determined that the economic status of approximately 2/3 of the students is at a medium level, the number of Anatolian high school and vocational high school graduate students are almost the same and the residents of the city were more than the others. In addition, it was determined that the number of students whose parents were primary school graduates was higher than the others.

2.3. Data collection tools,

The data of this research were obtained using the "*Application-Based Educational Technology and Material Development Competencies Scale".*

2.3.1. Application-based educational technology and material development competencies scale (ABETMDC)

As a result of the textbook and literature review prepared by Varank and Ergül (2009), 217 general instructional technologies and material design competencies were determined and gathered in ten groups. Later, these competencies were evaluated by experts working in the Educational Technology Departments of Education Faculties in Turkey, using the three-stage Delphi assessment technique. Reviewing these competencies (0-insignificant, 1-less important, 2-moderately important, 3-important, 4-very important) evaluations were requested

from the experts. In addition, experts were requested to add different competencies to the assessment. As a result of this evaluation, scoring (qualifications with 2 points or more) and suggestions, 239 new general instructional technologies and material design competencies were determined. In the the second Delphi evaluation phase, 239 competencies were sent to the experts, and asking them to re-evaluate, score and make suggestions. At the last stage, similar processes were repeated and 227 competencies were obtained. The Cronbach Alpha coefficient of these competencies was calculated as 0.97. The ABETMDC scale was created by determining that 46 of 227 competencies are suitable for the skill that the scale aims to measure. These factors were sent to ten teachers and asked to evaluate them in terms of criteria such as intelligibility, suitability for the field and suitability for the purpose. The recommendations from experts were taken into account. The analyzes of the determining factors were made again, and it was determined that seven of them were overlapping and these factors were removed from the scale. It was observed that the other 39 factors had a six-dimensional structure. The Cronbach Alpha coefficient of the 39-factor scale is 0.95, and 0.95 in this study. It was stated that it would be appropriate to use the scale as 46 factors in studies to be conducted without separating the total into sub-factors. In this sense, when calculating the scores obtained from the scale, it can be accepted that the total score can be evaluated over 46 points, and the sub-factors can be evaluated based on the factors they contain. Regarding the competencies in the scale, participants (4-Definitely, 3-I have, 2-Undecided, and 1-I dont have) were asked to mark the option that suits them. *The naming of the factors of the scale is as follows:*

Factor 1: To be able to make the general analysis, planning, design, and evaluation of the lesson, and to give lectures (15 items).

Factor 2: Being able to use distance education, artificial intelligence teaching systems and multimedia. (6 items).

Factor 3: Being able to use the internet and a computer to produce written material in the lesson (5 items).

Factor 4: Being able to use various tools (6 items).

Factor 5: Being able to prepare programmed and two-dimensional printed teaching materials (4 items).

Factor 6: Being able to use the cyclopes and slide projector (3 items).

2.4. Application process

The research was carried out within the scope of the Material Development lesson given to DCD second year students. The research process was carried out by the responsible researcher. At the beginning of the education period, the purpose of the study, the application process of the study, the points to be considered in the application, and the characteristics of the sensory integration materials planned to be developed were told to the students. The presentation about

sensory integration was explained to the students. The sense of hearing, sense of smell, sense of sight, sense of taste, sense of touch, sense of balance, and sense of movement were introduced to the students. “What is sensory integration?"; “What do the materials developed about this serve?”; “What are the sensory materials used in preschool?” etc. the questions from the students were answered in detail. Considering that there are seven different sensory areas, 27 students were divided into seven different groups. In terms of the success of the students in the groups, attention was paid to the heterogeneity of the groups. The distribution of the groups is given in Table 2.

Table 2. Information on the distribution of groups

Sensory area	Female	Male
Sense of Hearing	4	-
Sense of Sight	4	-
Sense of Touch	3	-
Hearing	3	1
Sense of Smell	4	-
Sense of Balance	4	-
Sense of Movement	3	1

Before the groups started to work, the ABETMDC scale was applied to the students as a pre-test. The scale was applied during one class hour. The material development course is given as a total of four hours per week, two hours of theoretical lessons and two hours of practical lessons. In the application lesson, sensory integration material development workshops were held. An academic semester consists of fifteen weeks. However, due to the "continuation of the first-week lesson-registrations, the mid-term exam week, the week after the mid-term exam week, and the last week", taking into account the absences of the students, the practice lessons was held for the remaining 11 weeks. In the first week of the practice lesson, sensory integration and collaborative work were introduced to the students. The information about the process was given to students. In the second week of the practical lesson, the pretest application of the scale was made, and the students were divided into groups. The sensory integration and material development workshops were held for eight weeks. In the last week, the scale was applied as a posttest. As a result of the research, the sensory integration materials developed with the students were examined, and the materials that served the purpose were determined.

2.5. Analysis of data

The data obtained in the research were recorded digitally and analyzed through the SPSS program. Regarding the ABETMDC scale, the Shapiro-Wilk (S-W) test was used to determine whether the data of the research groups met the normality values (Demir, Saatçioğlu, & Imrol, 2016). Since the data did not meet the normality assumption, ($p<.05$), skewness and kurtosis

values were checked (Pretest / ±Skewness=-.507; Kurtosis=.051; Posttest / ±Skewness=.278; Kurtosis=-.918). Field (2013) states that in cases where these values are in the range of ±2.00, parametric tests can be performed assuming that normality is met. Accordingly, it was decided to use parametric tests. In this context, dependent groups t-test and independent groups t-test were applied. For the findings to be understandable, the results are given in the tabular form.

2.6. Examples of the sensory integration materials developed by students in practice

Examples of sensory integration materials developed with the students during the application process are presented below.

Figure 1. Material samples of sense of hearing.

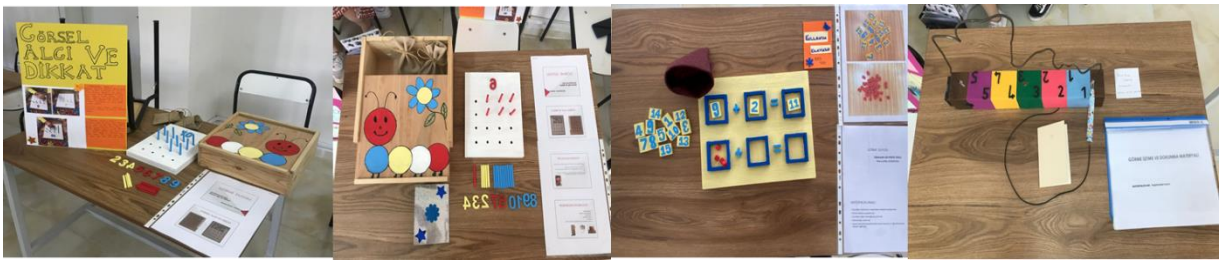

Figure 2. Material samples of sense of sight

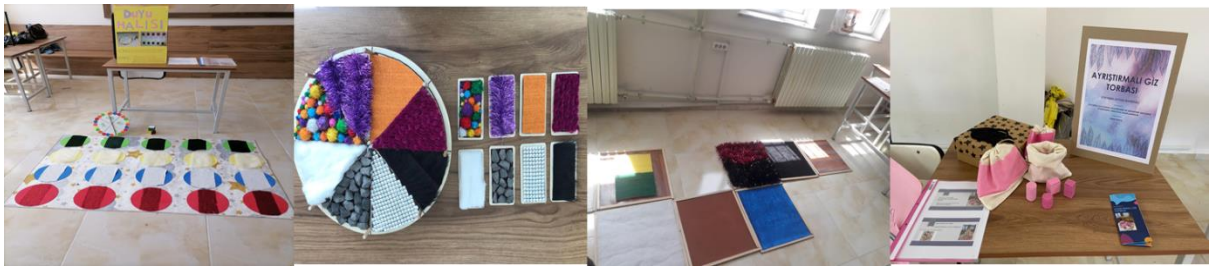

Figure 3. Material samples of sense of touch

Figure 4. Material samples od sens of taste

Figure 5. Material samples of sense of smell

Figure 6. Material samples of sense of balance

Figure 7. Material samples of sense of movement

3. Results

In this part of the research, the findings obtained from the data are presented by tables, respectively. The findings regarding the pretest scores of the research group from the ABETMDC scale are given in Table 3.

Table 3. Research group ABETMDC scale pretest results

Scale posttest	n	$\bar{x}$	Item mean (4)	Item mean (100)	sd	Min.	Maks.	Skewness	Kurtosis
Factor 1	27	39.74	2.65	66.23	4.76	31	47	-.295	-.823
Factor 2	27	13.74	2.29	57.25	2.55	7	17	-1.204	1.721
Factor 3	27	11.93	2.39	59.65	2.18	7	16	-.437	.564
Factor 4	27	15.96	2.66	66.50	2.26	11	22	.179	1.370
Factor 5	27	11.30	2.83	70.63	1.59	8	14	-.094	-.399
Factor 6	27	6.33	2.11	52.75	1.39	4	10	.467	.438
Total	27	121.00	2.63	65.76	12.59	94	144	-.507	.051

When the findings obtained in the pretest application of the scale were examined, it was seen that the mean score in total and five factors is at a moderate level ($\bar{x}$<70) and high in one factor ($\bar{x}$>70). The skewness and kurtosis values were determined to be within acceptable limits.

The findings regarding the posttest scores of the research group from the ABETMDC scale are given in Table 4.

Table 4. Research group ABETMDC scale posttest results

Scale pretest	n	$\bar{x}$	Item mean (4)	Item mean (100)	Sd	Min.	Maks.	Skewness	Kurtosis
Factor 1	27	40.37	2.68	67.10	7.35	15	52	-1.319	1.237
Factor 2	27	17.70	2.95	73.75	3.09	13	24	.072	-1.059
Factor 3	27	13.78	2.76	68.90	1.76	11	16	-.227	-1.228
Factor 4	27	20.52	3.42	85.50	2.59	15	24	-.423	-.957
Factor 5	27	13.37	3.34	83.56	1.74	10	16	-.241	-1.125
Factor 6	27	8.96	2.99	74.67	1.32	7	11	.073	-1.092
Total	27	148.198	3.22	80.49	16.03	124	181	.278	-.918

When the findings obtained in the posttest application of the scale were examined, it was seen that the mean score in total and four factors is high ($\bar{x}$>70) and moderate in two factors ($\bar{x}$<70). The skewness and kurtosis values were determined to be within acceptable limits.

Table 5 shows the results of the dependent groups t-test applied to determine whether the pretest-posttest comparison point averages of the research group from the ABETMDC scale were statistically significant.

Table 5. Research group ABETMDC scale pretest-posttest dependent groups t-test results

		n	$\bar{X}$	sd	df	t	*p*
Factor 1	Pretest	27	39.74	4.76	26	-.393	.694
	Posttest	27	40.37	7.35			
Factor 2	Pretest	27	13.74	2.55	26	-4.739	.000*
	Posttest	27	17.10	3.09			
Factor 3	Pretest	27	11.93	2.18	26	.3.603	.001*
	Posttest	27	13.78	1.76			
Factor 4	Pretest	27	15.96	2.26	26	-8.089	.000*
	Posttest	27	20.52	2.59			
Factor 5	Pretest	27	11.30	1.59	26	-4.374	.000*
	Posttest	27	13.37	1.74			
Factor 6	Pretest	27	6.33	1.39	26	-6.249	.000*
	Posttest	27	8.96	1.32			
Total	Pretest	27	121.00	12.59	26	-6.869	.000*
	Posttest	27	148.19	16.03			

*p<.05

According to the findings in the Table 5, in the pretest-posttest comparison analysis of the ABETMDC scale of the associate degree students participating in the study, statistical significance was found in favor of the posttest in the total of the scale and its five factors (p<.05).

Table 6 shows the results of the pre-test independent groups t-test, which was conducted to determine whether the type of high school students graduated from affects the scores they get from the ABETMDC scale.

Table 6. Graduated high school type variable ABETMDC scale pretest independent groups t-test results

	Groups	n	$\bar{X}$	Sd	df	Levene test		t	*p*
						F	*p*		
Factor 1	Vocational	14	39.71	4.79	25	.167	.686	-.029	.997
	Anatolian	13	39.76	4.91					
Factor 2	Vocational	14	13.64	1.54	25	3.983	.057	-.198	.845
	Anatolian	13	13.84	3.38					
Factor 3	Vocational	14	12.00	1.75	25	1.465	.237	.192	.849
	Anatolian	13	11.84	2.33					
Factor 4	Vocational	14	15.92	2.49	25	.000	.990	-.081	.936
	Anatolian	13	16.00	2.08					
Factor 5	Vocational	14	11.28	1.48	25	.551	.465	-.035	.972
	Anatolian	13	11.30	1.75					

Factor 6	Vocational	14	6.00	1.10	25	1.660	.209	-1.296	.209
	Anatolian	13	6.69	1.60					
Total	Vocational	14	121.21	9.61	25	2.434	.131	.088	.930
	Anatolian	13	120.76	15.59					

It was determined that there was no significant difference between the pretest scores of the students participating in the study in terms of the total of the scale and the type of high school graduated in all factors (p>.05).

Table 7 shows the dependent groups t-test results applied to compare the pretest-posttest scores of the associate degree students who are in the research group and who are also vocational high school graduates, from the ABETMDC scale.

Table 7. ABETMDC scale pretest-posttest dependent groups t-test results of vocational high school graduates

		n	$\overline{X}$	**sd**	**df**	**t**	***p***
Factor 1	Pretest	14	39.71	4.79	13	-.942	.363
	Posttest	14	41.42	5.68			
Factor 2	Pretest	14	13.64	1.54	13	-5.098	.000*
	Posttest	14	17.85	2.56			
Factor 3	Pretest	14	12.00	1.75	13	-4.232	.001*
	Posttest	14	14.50	1.34			
Factor 4	Pretest	14	15.92	2.49	13	-8.625	.000*
	Posttest	14	21.00	2.77			
Factor 5	Pretest	14	11.28	1.48	13	-3.180	.007*
	Posttest	14	13.28	1.68			
Factor 6	Pretest	14	6.00	1.10	13	-8.832	.000*
	Posttest	14	9.42	1.22			
Total	Pretest	14	121.21	9.61	13	7.385	.000*
	Posttest	14	150.42	14.43			

*p<.05

It was found that there was a statistically significant difference between the pretest-posttest scores of the participants who graduated from vocational high schools, in favor of the posttest in terms of the total score of the scale and five factors (p<.05).

Table 8 shows the results of the dependent groups t-test applied to compare the pretest-posttest scores of the associate degree students who are included in the research group, and were also graduated from Anatolian high school, from the ABETMDC scale.

Table 8. ABETMDC scale pretest-posttest dependent groups t-test results of students who graduated from Anatolian high school

	n	$\overline{X}$	**sd**	**df**	**t**	***p***

Factor 1	Pretest	13	39.76	4.91	12	.197	.847
	Posttest	13	39.23	8.90			
Factor 2	Pretest	13	13.84	3.38	12	-2.415	.033*
	Posttest	13	17.53	3.66			
Factor 3	Pretest	13	11.84	2.33	12	-1.376	.194
	Posttest	13	13.00	1.87			
Factor 4	Pretest	13	16.00	2.08	12	-4.052	.002*
	Posttest	13	20.00	2.38			
Factor 5	Pretest	13	11.30	1.75	12	-2.906	.013*
	Posttest	13	13.46	1.85			
Factor 6	Pretest	13	6.69	1.60	12	-2.497	.028*
	Posttest	13	8.46	1.26			
Total	Pretest	13	120.76	15.59	12	-3.485	.005*
	Posttest	13	145.76	17.85			

*p<.05

It was concluded that there was a statistically significant difference in the pretest-posttest scores of the participants who graduated from Anatolian high school in the ABETMDC scale in favor of the posttest in terms of the total score of the scale and four factors (p<.05).

Table 9 shows the results of the independent groups t-test applied to determine whether there was a significant difference between the posttest mean scores obtained from the scale according to the type of school they graduated from.

Table 9. Graduated high school type variable ABETMDC scale posttest independent groups t-test results

	Groups	n	$\bar{X}$	sd	df	Levene test		t	*p*
						F	*p*		
Factor 1	Vocational	14	41.42	5.68	25	.313	.581	.758	.457
	Anatolian	13	39.23	8.90					
Factor 2	Vocational	14	17.85	2.56	25	3.685	.066	.260	.797
	Anatolian	13	17.53	3.66					
Factor 3	Vocational	14	14.50	1.34	25	1.604	.217	2.377	.027*
	Anatolian	13	13.00	1.87					
Factor 4	Vocational	14	21.00	2.77	25	.321	.576	1.007	.323
	Anatolian	13	20.00	2.38					
Factor 5	Vocational	14	13.28	1.68	25	1.035	.319	-.257	.799
	Anatolian	13	13.46	1.85					
Factor 6	Vocational	14	9.42	1.22	25	.014	.908	2.016	.045*
	Anatolian	13	8.46	1.26					
Total	Vocational	14	150.42	14.43	25	1.216	.281	.742	.465
	Anatolian	13	145.76	17.85					

*p<.05

When Table 9 were examined, it was found that there was a significant difference in two factors of the scale ($p<.05$) according to the variable of the type of high school graduated from among the posttest scores of the participants, but there was no significant difference in terms of the total score and four factors ($p>.05$). It was determined that the difference in the factors with a significant difference was in favor of vocational high school graduates.

4. Conclusion, Discussion and Recommendations

When the findings obtained from the pretest application of the scale were examined, it was determined that the average score for the total factors and the five factors was moderate. It was determined that the mean score for one factor was high. In the posttest application of the scale, it was determined that the mean score for the total factors and four factors was high. It was determined that the mean score for the two factors was moderate. When the ABETMDC scale pretest-posttest mean scores of the students in the research group were compared, it was determined that there was a significant difference in favor of the post-test for the total factors and five factors of the scale, but no significant difference for one factor. The findings indicate that the students' material development skills have improved depending on the results of the application studies. The study conducted by Saka and Saka (2005) supports the results of this study. In the results of the research conducted by Karahan (2016), it was determined that there was no significant difference between the scores of the students before and after taking the lesson. Also, it was determined that the score increased in favor of the posttest. In the study conducted by Bozpolat and Arslan (2018), it was determined that the students who took the instructional technologies and material development course stated that they improved themselves within the scope of this course. There are other studies supporting this result in the literature (Dargut & Çelik, 2014; Eyüp, 2012). It has also seen that there are different findings in the literature. In the study conducted by Metin, Birişçi, and Coşkun (2013), it was determined that there was no significant difference between the scores of the students who took instructional technologies and material development lessons and those who did not. As a result of the general analysis, it was determined that the education given for material development increased the skill levels of the students. Considering the importance given to the use of materials in education and the positive effects of using materials on learning, it can be said that this lesson increases the efficiency of education.

It was determined that there was no significant difference between the pretest scores of the students participating in the study in terms of the total of the scale and all scales' factors in the variable of high school graduated. It was determined that there was a statistically significant difference between the pretest-posttest scores of the participants who graduated from vocational high schools in favor of the post-test in terms of the total score of the scale and its five factors and there was no significant difference in one factor. It was determined that there was a statistically significant difference between the pretest-posttest scores of the Anatolian

high school graduates in favor of the posttest in terms of the total score of the scale and its four factors, and there was no significant difference in the two factors. The obtained results indicate that this application has a significant impact on the material development skills of students who are both vocational high school and Anatolian high school graduates. It was found that there was a significant difference in two factors of the scale in terms of the variable of the type of high school graduated between the posttest scores of the participants from the scale, but there was no significant difference in terms of the total score and four factors. It was determined that this difference was in favor of the students who graduated from vocational high schools in the factors with a significant difference. At this point, it can be accepted that vocational high school students are more experienced in practical courses is effective.

In the research findings conducted by Bektaş, Nalçacı, and Ercoşkun (2009), it was understood that the type of high school graduated from did not affect the scores of the students. However, since the study is descriptive and based on application, it overlaps with the pretest findings obtained in this study. In the findings of the study conducted bu Vatansever-Bayraktar and İşleyen (2018), it was concluded that although there was no significant difference between the scores of students who graduated from vocational high schools and Anatolian high schools, vocational high school students had higher scores. Again, a similar finding was obtained in the results of the study conducted by Metin et al., (2013). In line with the findings obtained in the research, the following suggestions are offered:

1. It has been determined that the material development lesson had a positive effect on the material development skills of the students. In this direction, studies to increase the quality of this lesson and to give importance to practice should be enhanced. Although this lesson has an application part, the number of universities that meet the conditions of practical training is limited. For this reason, the establishment of workshops should be supported to conduct practical lessons at universities.

2. In this study, sensory integration materials for pre-school were developed together with students. Making material development practices for different education fields or competencies will serve to develop the materials needed in education.

3. Practice-based training should be given to eliminate the inadequacies and deficiencies of teachers in material development. In these trainings, teachers should be provided to develop materials by knowing the characteristics that a good material should have (durability, economy, suitability for level, etc.).

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