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DEVELOPING A SCALE: PERCEPTIONS OF HIGH SCHOOL STUDENTS ABOUT THE RELATIONSHIP BETWEEN CHEMISTRY AND DAILY LIFE

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Abstract

This study aimed to develop an instrument to measure the perception of high school students regarding the relationship between chemistry and daily life and to determine the validity and reliability levels of the developed measurement tool. The data were collected from 7308 high school students from 59 provinces in Turkey. After the exploratory factor analysis was carried out to get an idea about the structure of the Perception Scale for Chemistry and Daily Life Relationship, the structure obtained was checked by confirmatory factor analysis. Originally consisting of 35 items, the load factor of the scale was decreased to 26 items following the removal of 9 items which were understood to be at a low level in item-total correlation and reliability. The Perception Scale for Chemistry and Daily Life Relationship consisted of 26 items and four factors: Awareness, Development, Interest, and Consciousness. These findings concluded that the scale obtained was valid and reliable in determining student perceptions about the relationship between chemistry and daily life. Teacher educators and chemistry teachers can use the instrument to determine high school students' perceptions of the relationship between chemistry and daily life. In this way, it may contribute to training students with potential for chemistry-related professions by implementing appropriate ways.

Keywords: *Daily Life Chemistry; High School Students; Perception; Scale Development.*

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A. Introduction

The most emphasized reason is that the relationship between chemistry subjects and daily life is not included in the lessons. Student separating real life and chemistry lessons at school causes students to develop useless information systems related to chemistry (Osborne & Freyberg, 1985). Moreover, what we encounter and observe in our daily life should be used and associated with chemistry in the process of students gaining awareness and using and transferring these experiences. In this way, it should not be ignored that individuals understand the importance of the relationship between daily life events that affect their lives. The information they learn in chemistry lessons at school will contribute to the awareness of chemistry and daily life relationship, or in short, have positive perceptions about the relationship between chemistry and daily life. Although chemistry is a discipline that contains and explains many vital phenomena, chemistry is one of the less popular courses among students (Chowdhury, 2013; Hofstein et al., 2011; Osborne et al., 2003; Özgün-Koca & Şen, 2006).

As a result of the research, many interrelated reasons that cause students not to like the chemistry lesson and find it difficult have been revealed (Chowdhury, 2013; Franco-Mariscal, 2015; Gilbert, 2006; Gilbert et al., 2011; Laugksch, 2000; Mahaffy et al., 2018; Ong et al., 2022; Roberts, 1982). Among these reasons, the most emphasized is that the relationship between chemistry subjects and daily life is not included in the lessons. Keeping the chemistry lessons at school separate from the real life of the students causes the students to develop useless information systems about chemistry (Osborne & Freyberg, 1985).

According to Gilbert (2006), students should be able to give meaning to chemistry education. They should experience their education about some aspects of their lives and be able to create consistent mental plans about the subject. Providing students with helpful information they can use daily can make them aware of the relationship between chemistry and daily life. It can cause them to prefer using their chemistry knowledge in interpreting the phenomena they encounter (Georgiou & Sharma, 2012; Jegstad & Sinnes, 2015; Kim et al., 2012).

"Chemistry is everywhere," the chemistry lesson should be one of the essential tools to make sense of these chemical phenomena in nature and our environment. Students argue that they should be able to solve the problems they encounter in daily life by interpreting the chemistry knowledge they learned in the lesson (Habig et al., 2018; Sevian et al., 2018; Van Vorst & Aydoğmuş, 2021; Wanjek, 2000). According to Gilbert (2006) and Dori et al. (2018), students should experience their education about some aspects of their lives and create consistent mental plans about the subject. However, although chemistry is so intertwined with daily life, it is still seen by many students as an abstract and challenging lesson that bears no relation to life (Gilbert, 2006; Karslı-Baydere, 2021; Reid, 2000).

Students should be aware that chemistry knowledge can be used in daily life to prevent the chemistry lesson from being regarded as an abstract and challenging lesson. For example, chemistry can clean a coffee stain spilled on garments with detergent, make the cake rise better, comprehend how the zeppelins fly, and explain how curly hair is straightened by blowing. When the subject and daily life examples are correctly associated, it arouses students' curiosity (Rahmani, 2021). Moreover, in this way, students are aware that chemistry is everywhere.

There is a three-stage 12-year compulsory education in Turkey. Secondary education is the last of these three levels and covers four years. Students enter the high school passing exam known as LGS, organized by the Turkish Ministry of National Education (MoNE), and are placed in high schools according to their scores. The overall objectives of all teaching programs in high schools are the same and share a common denominator. One of the objectives of the high school level chemistry curriculum prepared by the MoNE is to use the knowledge and skills acquired in chemistry lessons to explain the phenomena related to daily life (MoNE, 2018). Therefore, the gains in the high school chemistry curriculum were determined in a way that aims to have students realize the relationship between chemistry and daily life.

Perception is the process or capacity to gain awareness, understand and interpret our environment, and classify different information. According to social cognitive learning theory, perception is a process in which the brain organizes and interprets sensory-based information. Every stimulus that comes to the sense organs is not perceived. Selective attention, values, needs, attitudes, and preferences are adequate for perception (Banyard & Hayes, 1994, p.323; Cüceloğlu, 1997; Erden & Akman, 2007; Freeman et al., 2001; Mack et al., 1992). With the individual's interpretation, each acquires meaning, and completion of the perception process is thus ensured. According to Efron (1969), perception is the first form of cognitive contact with the world in which people live. As all the conceptual information is based on the awareness of this first contact, studies on perception are essential for scientific research. Holtzman (1963) believes that perception results from one's experience through education, culture, and other factors.

Students' consciousness of using their chemistry knowledge in daily life and their awareness of where and how they can benefit from it reveal their perceptions of the relationship between chemistry and daily life. The fact that students evaluate chemistry lessons as abstract lesson shows that their perception that chemistry is related to daily life is insufficient. The perceptions of high school students on the relationship between chemistry and daily life are influenced by their communication with teachers and other students and by educational and instructive activities in school and media (Shaw & Dybdahl, 2000). Perceptions of students on the relationship between chemistry and daily life can be essential in facilitating the difficulties students encounter during a chemistry lesson.

In the studies carried out until now, the relationship between chemistry and daily life has been approached regarding some compelling features, such as attitude and motivation. It has been associated with and interpreted within chemistry and daily life contexts. In the accessible literature, although there are scale studies (Koçak & Önen, 2012; Ulusoy & Önen, 2014) for determining attitudes and motivations of students toward daily life chemistry and there is the development and validation of a scenario measurement tool for context-based learning (Kang et al., 2019). however, no study has examined the relationship between chemistry and daily life regarding "Perceptions" or "Perceptual Behaviors."

Since perception is a practical feature related to attitudes and motivational behaviors, attitude, on the other hand, is the combination of emotions, behaviors, and thoughts systems, and it can be said that attitude measurement can only be possible when these three components can be measured simultaneously (Allport, 1935; Banyard & Hayes, 1994, p.6; Erkuş, 2003; Koçak & Önen, 2012; Mannopovna, 2019; Tezbaşaran, 1997). Similarly, when taken as motivation, motivation for learning (behavior orientation aiming to satisfy various needs) explains the behavior orientation towards the use of a method, technique, or strategy (Banyard & Hayes, 1994, p.325, 360; Krpan & Schnall, 2017; Ulusoy & Önen, 2014; Postman, 1953). Therefore, since the concept of perception reveals individual belief systems, it can also be affected by the behavior patterns and tendencies of the environment, in which the individual's perception interacts with his/her own belief. In other words, the perceptions of students on the relationship between chemistry and daily life will be positively influenced by emphasizing the many concepts, situations, and explanations encountered in daily life in teaching and learning activities in their classroom environment. It will also increase how much students benefit and share socially and scientifically teaching activities.

Attention to the phenomena we encounter in daily life is combined with a student's experiences on the subject in his/ her daily life. This combination will also enable the student to identify needs and preferences for where to use this combination. The most crucial task teachers should do in chemistry classes is to create an environment that will reveal the relationship between daily life and their chemistry lesson topics to students and allow students to explain the problems or events they encounter in daily life with chemistry knowledge. Combined with all these, it will be possible to create a selective perception system for students about chemistry and daily life. In the studies where perceptions of individuals are researched or perception definitions are made, it is seen that the components mentioned above related to interest, awareness, development, and consciousness have been mentioned (Argon & Ertürk, 2013; Assaraf & Damri, 2009; Banyard & Hayes, 1994, p.350; Coren et al., 1993, p.17; Murray & Crammond, 2020; Özdemir, 2010). In this respect, the research also has a feature that can be associated with social cognition processes and social psychology.

The study aimed to develop a perception scale for the relationship between chemistry and daily life and to determine the measurement tool's validity and reliability levels. It is thought that by applying this scale, students' perceptions of the relationship between chemistry and daily life can be determined. It is thought that this study is essential in terms of chemistry teachers applying this scale to determine students' perceptions and then guiding students appropriately by emphasizing the necessity and importance of the relationship between chemistry and daily life. For example, according to the scale results, students with a positive perception of the relationship between chemistry and daily life can be determined. These students can be directed to professions related to chemistry. The scale could be evaluated as an assessment tool that facilitates the relationship between chemistry and the daily life of individuals within multi-dimensional ways of analyzing. At the same time, it assesses chemistry teachers' relationship between chemistry and daily life tendencies.

B. Method

The study group was determined by the stratified sampling method, one of the random sampling methods to have a high probability of representing the universe (Fraenkel et al., 2012). Students are studying in high schools connected to MoNE in 59 provinces in Turkey. The study group comprised 7400 high school students in different regions in General High Schools, Anatolian High Schools, Anatolian Teacher High Schools, and Science High Schools under the Turkey Ministry of National Education

(MoNE). However, since some of the students left some of the scale items blank, the analyzes were conducted based on the answers of 7308 students.

1. Development Process of the Data Collection Tool

a. Forming the Scale Item Pool

The literature review was conducted as the first step in developing the Perception Scale for Chemistry and Daily Life Relationship (PSCDLR). In the phase of determining the scale items, the literature on the stages of scale development was reviewed by using scales prepared for different levels, and various studies were examined (Becker, 1978; Bennett et al., 2005; Campbell & Lubben, 2000; Gilbert et al., 2011; Kutu & Sözbilir, 2011; Ulusoy & Önen, 2014). The information obtained from the studies of the experts, who have done research in this field, has been examined, and important points have been determined. In modern education systems, the chemistry curriculum and the teachers' goals are not based on the ability of students to memorize chemistry. This scale development study was conducted to determine the teachers' perceptions of who aims to teach chemistry by experiencing the relationship between chemistry and daily life.

Based on the result of teachers and researchers applying and evaluating the scale, the perceptions of students on chemistry will change positively. Accordingly, it is thought that a high motivation can be created so that the process of developing favorable attitudes will be more successful and systematic and that chemistry lesson achievements will increase, aiming to use chemistry or to use chemistry-based activities in daily life. In this way, determining students' perceptions of the relationship between chemistry and daily life will make an essential contribution to the field in determining how students see the chemistry course, what beliefs students have, or what belief systems they develop for daily chemistry life. From this point of view, it is thought that such a scientific study is required to develop this measurement tool, which aims to identify and categorize student perceptions of the relationship between chemistry and daily life.

b. Application Process

A 35-item pool, thought to be well-sampled and sufficient to distinguish between sub-categories, was created and prepared as a five-point Likert-type rating scale. The scale was presented to the expert opinion on the field. At the end of the evaluations, a trial scale consisting of 30 items with a reduced number of items was prepared and implemented. After the scale was implemented, the item-total correlation was analyzed and calculated with the Pearson correlation coefficient (Table 1).

Table 1: Perception scale for chemistry and daily life relationship

Items	r	Items	r
1	.515	16	.543
2	.524	17	.657
3	.540	18	.663
4	.538	19	.649
5	.534	20	.563
6	.596	21	.358
7	.604	22	.520
8	.066	23	.594
9	.242	24	.620
10	.585	25	.583
11	.585	26	.621
12	.512	27	.549
13	.590	28	.119
14	.580	29	.605
15	.627	30	.595

As seen in Table 1, item-total correlation coefficient values vary between 0.119 and 0.663. According to Özdamar (1997), in item analysis, item-total correlations should not be harmful and should be higher than 0.25 in order to keep the summability feature of the scale intact. In addition, the fact that the item-total correlation is positive and high indicates that the items yield similar behaviors (Büyüköztürk, 2004).

However, it was determined that the total correlations of the 8th, ninth, and 28th items were less than 0.25. Thus, items 8, 9, and 28 negatively affected the test's internal consistency. The internal consistency of the measured structure can be determined by looking at the item-test correlation and using the individuals at the ends (sub-super) as a comparison group. These two methods remove items with low discrimination from the tool and increase internal consistency (Çokluk et al., 2010).

Therefore, although the items in question have to be removed from the test according to the item-total correlation analysis result, it has been deemed appropriate to consider the item discrimination power and to decide whether to remove it accordingly. Item discrimination refers to the ability of an item to differentiate among students based on how well they know the material being tested (Findley, 1956).

In order to determine the discriminant validity of PSCDLR, the upper and lower 27% rule was used. An Independent t-test was performed to determine whether the difference between the item scores of the subjects in the lower (n = 1.973) and the upper of the total group (n = 1.973) for each item in the applied trial scale was significant. As a result of the independent t-test, it has been determined that there are significant differences between the average scores of the students in the upper and lower of the entire group from the items in the trial scale. As a result of the analysis, it was determined that the 21st item averages of the students in the lower of the total group were higher than the average of the students in the upper of the whole group, and the t values of the 8th, ninth, and 28th items were lower than the other items.

According to Demirel (2003), the data of the upper and lower of the total group (upper and lower 27% rule) is a measure of whether the substance distinguishes those with the property desired to be measured with that substance and those that do not. Therefore, it was decided to exclude items 8, 9, 21, and 28 since they were thought to affect the internal consistency of the scale negatively.

2. Factor Analysis

a. Exploratory factor analysis

To determine whether the Perception Scale for Chemistry and Daily Life Relationship data set is suitable for multivariate statistics, Kaiser-Meyer-Olkin (KMO) sample suitability coefficient and Barlett Sphericity test values were identified. The results of the Barlett Sphericity Test conducted within the scope of the validity study of the scale were significant at a 0.0001 level [$\chi 2 = 9266$; $p < 0.01$)], Kaiser-Meyer-Olkin sample value is 0.96. In other words, the results of the Barlett Sphericity Test, which checks whether the data and sample size are suitable and sufficient for the selected analysis and whether the data come from a multivariate normal distribution, are well above the acceptable level (Hair et al., 2006).

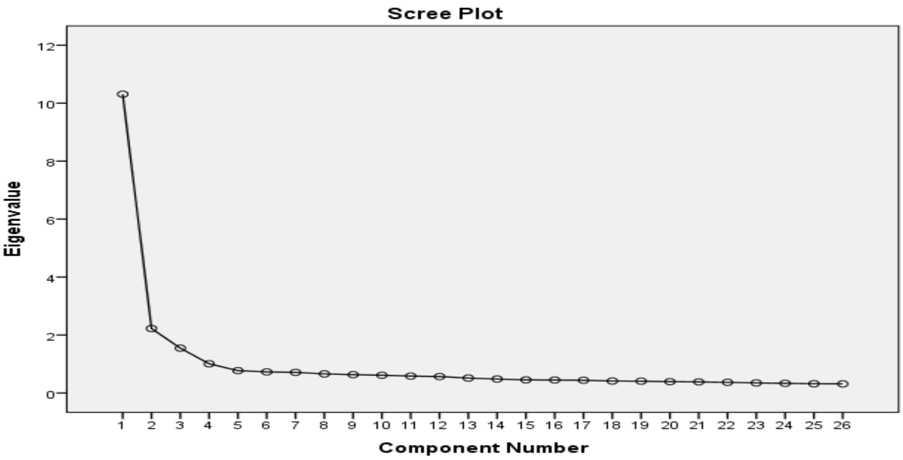


Figure 1: Perception scale for chemistry and daily life relationship scree plot

As it is seen that the point where the curve decreases rapidly in Graph 1 is where the fourth factor is located, it was thought that the scale should remain as four factors. These findings show that the data obtained from the research group are suitable for factor analysis.

Table 2: Perception scale for chemistry and daily life relationship factor analysis

Factors	Factor Loading	Eigenvalue	% of Varance	Mean	F	Alpha	p
Factor 1		10.3	39.6	3301	263.2	.91	.0001

Factors	Factor Loading	Eigenvalue	% of Varance	Mean	F	Alpha	p
I11	666						
I10	.662						
I18	.604						
I15	.600						
I17	.585						
I12	.549						
I6	.544						
I7	.501						
I19	.493						
I13	.476						
Factor 2		.22	8.56	3.4	62.60	.87	0001
I25	.751						
I24	.730						
I26	.716						
I29	.675						
I23	.674						
I30	.644						
Factor 3		1.54	5.95	2.7	25.3	.87	0001
I16	.799						
I20	.775						
I27	.771						
I22	.754						
I14	.735						
Factor 4		1.00	3.2	3.2	205.5	.81	0001
I2	.748						
I1	.725						
I3	.692						
I4	.687						
I5	.574						

Kaiser-Meyer-Olkin Sample Measurement = 0.96; Explanation rate of the total difference: 58.08

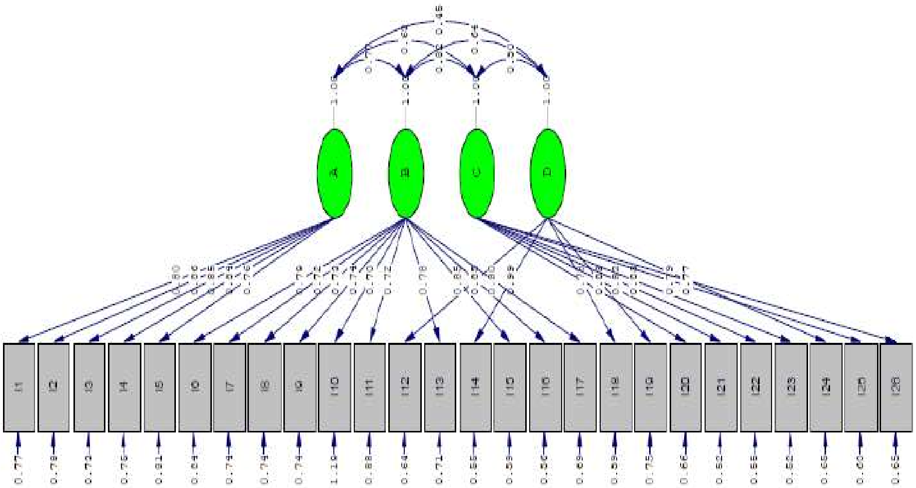
As seen in Table 2, the factor loads of the items are well above the acceptable values. As a result of the rotating process performed using the varimax vertical rotation technique of KGYAÖ, it has been determined that the eigenvalue is four factors greater than 1.00, and the factor load values of the items vary between 0.476 and 0.799. In addition, the contribution of the factors to the total variance was 39.6% for the first factor, 8.56 for the second, 5.95 for the third, and 3.20 for the fourth. The total contribution of 4 factors to variance is 58.08%. According to Scherer et al. (1988), the variance explained in the social sciences is between 40% and 60%. Therefore, the announced high variance rate means that the scale has a strong factor structure.

As a result of factor analysis, variables collected under four factors were determined. The factor is named "Awareness, Development, Interest and Consciousness." In the research, Pearson Moments Product Correlation Coefficients among the sub-dimensions were calculated to support that all four sub-dimensions of PSCDLR measure the same feature. As the result of the correlation analysis, positive correlations were determined between the factors of the scale (r = .72, r =.56 r =.66, r = 44, p = 0.0001). The consistent factor structure of the developed scale supports its validity. In other words, it can be said that factor variables are complementary to each other. As the findings obtained as a result of the factor analysis indicated that the scale items were valid and measured the same structure, the confirmatory factor analysis studies of the PSCDLR were started.

b. Confirmatory factor analysis

Information about the nature of social and psychological measurements may increase with exploratory factor analyzes, but these analyzes may not be sufficient or valuable to obtain detailed information. For this reason, many studies include both exploratory and confirmatory factor analyses, as they contain known and unknown variables. After explanatory techniques are applied to reveal the factor pattern related to the measurement tool, it is desirable to examine the model with confirmatory techniques (Çokluk et al., 2010).

Based on this view, exploratory factor analysis was used to determine the construct validity of the scale developed in the research. However, it was decided to perform confirmatory factor analysis to determine whether the model obtained from exploratory factor analysis supports the expected theoretical structure. The data obtained in the study (7308) is also the recommended size in structural equation modeling, which is the research method at this stage (Kline, 2005). The data collection tool developed to determine student perceptions of the relationship between chemistry and daily life displays a 4-dimensional structure consisting of 26 items. The path diagram obtained when confirmatory factor analysis of these four factors is performed is shown in Figure 2.



(*A: Factor1, B: Factor:2, C: Factor3, D: Factor 4*).

Figure 2: Perception scale for chemistry and daily life relationship path diagram

As seen in Figure 2, the difference between the expected covariance matrix and the observed matrices was significant at a 0.01 level. In addition, it was determined that the obtained $\chi 2/df$ result was 2.76, and this value indicated a perfect fit (Kline, 2005; Sümer, 2000). The RMSEA value of 0.05 is another finding that supports the perfect fit (Brown, 2006: Jöreskog & Sörbom, 1993; Raykov & Marcoulides, 2006; Schumacker & Lomax, 1996). When analysis of the fit indices continued, GFI was determined as 0.93 and AGFI as 0.91. In other words, GFI and AGFI indicate a good fit (Hooper et al., 2008). Other findings that support perfect fit are the standardized RMR's fit index of 0.50 and NNFI and CFI fit indexes of 0.98 (Brown, 2006; Byrne, 1998; Tabachnick & Fidell, 2001). Therefore, it can be said that the confirmatory factor analysis results support that the scale has a 4-dimensional structure.

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3. Reliability Study of the Feedback Scale Scores

In the study, Cronbach Alpha reliability coefficients and item-total correlations were calculated for the whole scale and each sub-dimension to reveal the internal consistency of the experimental scale prepared to determine students' perceptions about the relationship between chemistry and daily life. Cronbach Alpha (α) reliability coefficient, as a result of statistical analysis conducted to question the consistency of the experimental scale, was determined to be 0.93. Also, for the first sub-dimension of Cronbach Alpha (α), reliability coefficients of sub-dimensions of PSCDLR it was determined as 0.91, 0.87 for the second sub-dimension, 0.87 for the third sub-dimension, and 0.81 for the fourth sub-dimension. Nunnally (1967) states that the scale is highly reliable if the reliability of a scale is $0.80 \leq \alpha < 1.00$ depending on the alpha (α) coefficient.

In this case, it can be said that the items in PSCDLR are consistent with each other and show the same feature. In addition, test-retest reliability was examined to determine the consistency of the PSCDLR. In the statistical analysis of the data, the trial scale was applied to 120 students twice every 15 days, and as a result of the analysis, the correlation coefficient was found as 0.82. In other words, it has been determined that the relationship between the scale items has reached a high and significant level. According to all these results, PSCDLR is acceptable and reliable for research in social sciences.

C. Result and Discussion

The necessity of measuring in sciences arises from relying on actual observations in experimental and theoretical studies (Baykul, 2000; Turgut & Baykul, 1992). This requirement can be met by performing scale development studies. This study aims to develop the Perception Scale for Chemistry and Daily Life Relationship for high school students. The sample of the different provinces in Turkey research (59 provinces) was created by 7308 high school students. In order to develop a valid and reliable data collection tool in the study, an initial item analysis was performed. Two-item analysis techniques can be applied for the same data sets, but this two-item analysis should lead to the same result (Hair, Black, Babin, Anderson, & Tatham, 2006).

For this reason, item-total correlation-based item analysis and upper and lower 27% rule were used in the study. This two-item analysis led us to the same conclusions. In item analysis, items that show a high correlation with all scale scores are items that can measure the object the scale tries to measure. While these items are included in the scale, others are excluded from the scale (Ghiselli et al., 1981, p. 414). For this reason, it was decided to exclude some items from the study since they negatively affected the scale's internal consistency.

Factor analysis is evidence used to support the validity of the structure that indicates whether the test is in one or more structures. Items in each group define the general factor, and items are asked to reflect the structure (Dooley, 1995, p. 93). For this reason, the factor analysis technique was used to determine the construct validity of the PSCDLR. KMO is related to the suitability of the sample and the correlation between scale items. It is acceptable for the value to be above 0.60. It being higher than this indicates the applicability of factor analysis and that the correlations between items are considerable (Ntoumanis, 2001, p. 140). Since the results obtained from the study were well above the acceptable level, it was decided that the data obtained from the research group were suitable for factor analysis.

There are two essential criteria for deciding how many factors the scale will have. The first is to look at Kaiser's values (eigenvalue) being large at 1, and the second is to look at Scree Plot graphically (Bryman & Cramer, 2001, p. 267). In the study, both criteria were used, and the results were examined separately. One of the standard methods used in transforming factors is the varimax transformation, and this method is used to distinguish between items that are not related or independent from each other (Bryman & Cramer, 2001, p. 268). According to the analysis results based on these views, it has been revealed that the

Perception Scale for Chemistry and Daily Life Relationship has become a factor in forming a 4-dimensional structure. Also, the scale's Cronbach Alpha (α) reliability coefficient was determined to be 0.93. After the exploratory factor analysis was carried out to get an idea about the structure of the Perception Scale for Chemistry and Daily Life Relationship, the structure obtained was checked by confirmatory factor analysis. These findings concluded that the scale obtained was valid and reliable in determining student perceptions about the relationship between chemistry and daily life. High scores on the scale indicate that the student's perception of the relationship between chemistry and daily life is positively high. Each factor of the scale can be evaluated as a separate scale. For example, the high awareness score of the student shows that that student is conscious of the relationship between chemistry and daily life.

This research studies developing a measurement tool in which student perception of the relationship between chemistry and daily life can be determined by determining the awareness of using chemistry knowledge in daily life. For Ausubel (1963), postulate (front line) comes first, as the subjects to be taught must interact with the relevant ones in the previously acquired literary information to achieve meaningful learning. If there is no such interaction, he calls this newly-occurring learning to be memorization learning (superficial learning). The necessity of an understanding associated with daily life in the process of teaching chemistry subjects in courses came up with the context-based chemistry learning approach (Gilbert, 2006), and this model was taken into consideration both in the studies of chemistry curriculum and in the preparation of course acquisitions. However, in Turkey, despite much research on how to establish the relationship between chemistry and daily life in which the study is carried out, it is understood that this approach is not sufficiently accepted in the learning processes of the students with the feedback received (Enginar et al., 2002; Özmen, 2004; Özmen & Yıldırım, 2005; Koray et al., 2007; Özsevgeç & Ürey, 2010; Önder & Beşoluk, 2010; İngeç & Aytekin, 2010; İnci, 2019; Author, 2019; Nasırlıel, 2020).

Students add meaning to the relationship between chemistry and daily life via activities in the lessons, but they cannot make it useful in their minds. In learning strategies, they use while learning chemistry course topics, their ability to relate the knowledge they have previously learned to daily life is lacking. Students experience difficulty associating chemistry with daily life and making what they learn practical (Choi & Johnson, 2005). Just as the overall purpose of all teaching approaches, models, methods, and techniques is to ensure that the student is actively learning and valuable by increasing the quality of learning, those targeted in context-based chemistry teaching are the same. However, some inadequacies exist regarding students using chemistry and daily life beneficial relationships.

Perception, under the guidance of long-term memory, allows us to distinguish between previously known and newly learned concepts or behaviors. For a thing to be perceived and grasped correctly, it is necessary to combine all the things that come to our brains to be brought to us and configure them in a way that collectively makes sense. This configuration must be in harmony with our logic and experience. Therefore, the relationship between chemistry and daily life can be learned and functional only when correctly perceived. The students perceive that the more real this relationship, the more meaningful it will be to interpret the relationship between chemistry and daily life and use it in the required environments.

D. Conclusion

The researchers, who carried out this study, developed a measurement tool based on the idea that the perception of the relationship between chemistry and daily life should be understood correctly and carried out with the help of correct practices in teaching environments and daily life. They defined the perception of the relationship between chemistry and daily life in a 4-dimensional plane. These dimensions are "Awareness, Development, Interest, and Consciousness."

The findings concluded that the scale obtained was valid and reliable in determining student perceptions about the relationship between chemistry and daily life. High scores on the scale indicate that the student's perception of the relationship between chemistry and daily life is positively high. Each factor of the scale can be evaluated as a separate scale. For example, the high awareness score of the student shows that that student is conscious of the relationship between chemistry and daily life.

If students are expected not only to learn science but also to experience it, it is essential to accurately determine their perceptions of the relationship between chemistry and daily life. This developed perception scale has a feature that teachers can use for many purposes in teaching processes. Through this scale, chemistry teachers can benefit from having preliminary knowledge about student profiles at the beginning of the academic year by evaluating their students' perceptions of chemistry and daily life relation, their awareness of chemistry, and daily life relationship. In addition, it is thought that chemistry teachers can make more accurate decisions regarding the approaches, methods, and techniques to be applied in the course depending on the results of this scale.

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