



Gifted Students' Beliefs about Knowledge and Learning

Oğuzhan Nacaroglu¹, Oktay Kızıkcapan^{2*}

¹Science Teacher, Science and Art Center, Turkey

²Department of Educational Sciences, Faculty of Education, Nevşehir Hacı Bektaş Velî University, Turkey

Corresponding author: okizkapan@nevsehir.edu.tr

ABSTRACT Epistemological beliefs can be defined shortly as beliefs about the source, certainty, organization of knowledge, and beliefs on ability and speed of learning. Word association tests (WAT) are practical alternative assessment and evaluation tools that can reveal students' thoughts on different concepts. In this regard, this research aims to investigate the gifted students' beliefs about "knowledge" and "learning" concepts by using WAT. Phenomenology design was utilized in the research. The study was carried out with 118 gifted students studying at Science and Art Center in Turkey's Central East Anatolia Region in the 2018-2019 academic year. The word association test was used as a data collection tool. In this context, participants were given the concepts "knowledge" and "learning" and asked to write their associations about these concepts. They were then asked to make a sentence about each concept. Deductive content analysis was used to analyze the data. The research findings revealed that most students have sophisticated epistemological beliefs in specific knowledge, simple knowledge, source of knowledge, and quick learning dimensions. However, it has been found that the number of students in the sophisticated and naive categories of innate ability dimension is approximately equal.

Keywords Gifted Students, Epistemological Beliefs, Word Association Test, Science Education

1. INTRODUCTION

Defining knowledge is a complicated issue for philosophers and scientists since the classical Greek era (Alavi & Leidner, 2001; Eroğlu & Güven, 2006). Since then, knowledge has been viewed from various views: a state of mind, an object, a process, a condition of accessing information, or a capability. For example, Plato defined knowledge as "justified true beliefs". Although some other researchers criticize this definition (e.g., Gettier, 1963; Nozick, 1981; Popper, 1979), it is commonly used in philosophical and scientific environments (Chisholm, 1982). On the other hand, another term to define is learning. Unfortunately, the word "learning" is rarely described explicitly by researchers. This situation could be due to the lack of consensus on what constitutes learning. Learning may be defined as the process of bringing about behavioral changes in an individual (Ertürk, 1993), and there are multiple theories of how these changes occur. Among these, Piaget, Bruner, Gagné, and Ausubel's learning theories are frequently referred to in science education (Özmen, 2004).

An individual's perception of knowledge and learning and his/her beliefs in gaining knowledge are of great importance in defining an individual (Chan, 2003). In this regard, the concept of epistemology comes to the fore as a discipline trying to explain what knowledge is and how it is

acquired (Palmer & Marra, 2004; Schommer, 1994). Epistemological belief is expressed as philosophical assumptions regarding the source, scope, limits, acquisition, and knowledge criteria (Hofer & Pintrich, 1997; Mason & Bromme, 2010).

Epistemological beliefs are subjective belief systems about the source, certainty, creativity, and learning of knowledge. In literature, there are competing theories on epistemological/ epistemic beliefs. In one strand, William Perry and other researchers coming after him (Magolda, 1992; King & Kitchener, 1994; Kuhn, Cheney & Weinstock, 2000) claim that epistemological beliefs are one-dimensional. On the other strand, some researchers claim that epistemological beliefs are multi-dimensional, and these dimensions are more or less independent from each other (Schommer, 1990; Hofer & Pintrich, 1997). There are also some discussions between the researchers in the second strand. Schommer (1990) defines an epistemological belief system consisting of five dimensions: simple knowledge, specific knowledge, innate ability, omniscient authority, and quick learning. However, Hofer and Pintrich (1997) criticize Schommer's model

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claiming that two of Schommer's dimensions are not about epistemological beliefs. They are rather about beliefs about learning. Hofer and Pintrich (1997) suggest their epistemic belief model consisting of four dimensions under two categories based on this criticism. They named the categories as nature of knowledge (simplicity of knowledge and certainty of knowledge) and knowing (source of knowledge and justification). Another group of researchers (Greene, Azevedo & Torney-Purta, 2008) criticizes both strands models. Green et al. (2008) explained a new theory named "epistemic and ontological cognition." This theory claims that justification constitutes the core of epistemic beliefs. Unlike Hofer and Pintrich's (1997) model, justification of knowing cannot be considered as one dimension. Thus, this model's dimensions are personal justification, justification by authority, simple knowledge, and certain knowledge. Among all these models, Schommer's model is adopted in this study for pragmatic reasons. Schommer's model has dimensions about the nature of learning, which is essential in science education settings.

Educational processes and epistemological beliefs should not be considered independently from each other (Tickle, Brownlee & Nailon, 2005). As the epistemological beliefs of individuals develop, their learning sensitivity and achievement also increase (Hofer & Pintrich, 1997; Cheng, Chan, Tang, & Cheng, 2009). Studies show that epistemological beliefs are closely related to learning, teaching processes, construction of knowledge, transfer of knowledge to daily life, and academic achievement (Atasoy, 2020; Aydın & Geçici, 2017; Belet & Güven, 2011; Conley, Pintrich, Vekiri, & Harrison, 2004; Hammer, 1997; Harteis, Gruber & Hertramph, 2010; Hofer, 2000; Qian & Alvermann, 2000). Individuals with sophisticated epistemological beliefs use effective learning strategies for complex academic processes, insist on solving problems and adopt a deep learning approach (Deryakulu, 2004; Trautwein & Lüdtke, 2007). Similarly, Dahl, Bals, and Turi (2005) reported that students' beliefs in simple knowledge and innate ability dimension affect their preferences of cognitive and metacognitive learning styles. Indeed, while beliefs about the simple knowledge dimension are essential in selecting rehearsal and organizational strategies, beliefs about innate ability affect selecting detailed and critical thinking strategies. Beliefs in both simple knowledge and innate ability dimension are essential for metacognitive monitoring and self-regulation strategies.

Besides its importance in general pedagogy, epistemological beliefs are also an essential component of science education. Researches in science education showed that epistemological beliefs play an essential role in learners' informal (Sadler & Chambers, 2004; Schommer-Aikins & Hutter, 2002) and scientific reasoning skills (Zeineddin & Abd-El-Khalick, 2010), nature of science views (Akerson & Buzzelli, 2007; Akerson, Morrison & Roth McDuffie,

2006; Deng, Chen, Tsai, & Chai, 2011), argument construction (Öztürk Yılmaz-Tüzün, 2017), constructivist learning environment perceptions (Saylan, Öner-Armağan & Bektaş, 2016), acceptance of evolution (Deniz & Donnelly, 2011; Hokayem & BouJaoude, 2008; Sinatra, Southerland, McConaughy, & Demastes, 2003) and cognitive understanding in physics (Gök, 2018). Students who hold dualist epistemological beliefs are said to view scientific laws and knowledge as certain and proven, not understand the role of inference in science, and believe that scientists are not creative or subjective (Akerson & Buzzelli, 2007; Akerson et al., 2006). Hence, when the relationship between students' epistemological beliefs and these critical aspects of science education is accepted, evaluating these beliefs becomes critical.

Epistemological beliefs are affected by individual and socio-cultural factors (Khine, 2008). In other words, when determining the epistemological beliefs of individuals, many factors such as their age, developmental characteristics, interests, and cultural development should be taken into account (Wang, Zhou & Shen, 2016). In this regard, due to the difficulties in determining the epistemological beliefs of young students, epistemological belief studies in educational sciences are primarily conducted with teachers and teacher candidates (Aslan, 2017; Dorsah, Shahadu & Kpemuonye, 2020; Mardiha & Alibakhshi, 2020; Lee & Jhun, 2020; Rott, 2020; Tanrıverdi, 2012). However, there has been an increase in studies aimed at determining the epistemological beliefs of younger students in recent years (Atasoy, 2020; Feucht, 2017; Sung, Shin & Kim, 2020; Üztemur & Dinç, 2018). Nevertheless, there is still a lot to learn about what children believe regarding knowledge and knowing. For example, a group of students with few studies on their epistemological beliefs is gifted students.

Gifted students are defined as individuals who learn faster than their peers, are prominent in creativity, art, and leadership, have special academic ability, can understand abstract ideas, love to act independently in their interests, and show high performance (Ministry of National Education [MoNE], 2015). In other words, they differ from their peers in cognitive and affective aspects. Gifted students attend Science and Art Centers (SACs) in their out-of-school times in Turkey. SACs aim to educate gifted students attending pre-school, primary, elementary, and post-secondary schools to become aware of their abilities and use their capacities at the highest level. Students go through five different programs in SACs. These are orientation, support education, recognizing individual skills (RIS), developing special skills (DSS), and project production and management programs (Project). In the orientation program, students are introduced to the school, teachers, education program. In support programs, students diagnosed with general mental ability receive enriched education in all fields/disciplines. RIS is a

program conducted for students diagnosed with general mental ability to help them realize their abilities. DSS is a program conducted to develop the special skills of students who have completed the RIS program. Finally, in project production and management programs, students carry out individual or group projects in a field/discipline in line with their interests, wishes, and abilities under the guidance of an advisor. There is a hierarchy among these programs, and students complete support, RIS, DSS, and Project programs, respectively, starting from the orientation program. The duration of these programs may differ among SACs (MoNE, 2015). As of 2020, the number of SACs has reached 182 in Turkey, and 63.000 students attend these centers (MoNE, 2020).

Regarding the epistemological beliefs of gifted students, there are numerous researches in the literature. These researches are primarily conducted in western countries (Gallagher, 2019; Schommer, 1993a, 1993b, 1998; Kalman, Sobhanzadeh, Thompson, Ibrahim, & Wang, 2015; Chen & Pajares, 2010; Schommer & Dunnell, 1992, 1997). In Turkish literature, although there is a significant body of research on epistemological beliefs, these researches are conducted mostly with students who were not gifted (Aşut & Köksal, 2015; Atasoy, 2020; Atasoy & Küçük, 2020; Aydemir, Aydemir & Boz, 2013; Aydın & Geçici, 2017; Balantekin, 2013; Boz, Aydemir & Aydemir, 2011). However, the number of research focusing on the gifted students as a sample quite limited (Dönmez & Yalmançı-Yücel, 2020; Uçar, 2018). Considering each student have epistemological baggage which supports or hinders his/her performance (Schommer, 1993a), gifted students may have different epistemological baggage than their peers. In this direction, Schommer and Dunnell (1992) report that gifted students' epistemological beliefs become more sophisticated compared to non-gifted in the later stages of their high school education. Therefore, this study is expected to contribute to the literature on gifted students' epistemological beliefs. Learning about the epistemological beliefs of gifted students is essential in guiding these students correctly, understanding their skills and needs, and using appropriate methods and techniques in their education (Hammer, 1997).

Another concern to be considered in examining the epistemological beliefs is the measurement tools. According to Duell and Schommer-Aikins (2001), initially lengthy and in-depth interviews were mainly used to determine the epistemological beliefs. However, due to the challenges regarding the interpretation, grading, validity, reliability, affordability of the interviews, in later studies, paper and pencil scales and questioners were developed by different researchers based on different epistemological beliefs models (See Duell & Schommer-Aikins, 2001). Although there are specific measurement tools found in the literature, scales can be open to misunderstandings and misinterpretations when used with children. Thus,

measuring children's epistemological beliefs is difficult (Brownlee, Curtis, Spooner-Lane, & Feucht, 2017). Also, some researchers claim that due to cultural differences, standardized scales are not reliable tools to identify epistemological beliefs (Chan & Elliott, 2002). In this manner, it can be said that "no single instrument may be the definitive measure of epistemological beliefs" (Schommer, 1993a). Therefore, alternative measurement tools are also used in determining epistemological beliefs (Briell, Elen, Depaepe, & Clarebout, 2010; Brownlee et al., 2017). For example, Üztemur and Dinç (2018) examined the epistemological beliefs of middle school students using an alternative measurement tool and used the draw-write-tell technique. Similarly, Atasoy (2020) examined middle school students' epistemological beliefs by using concept cartoons. In this study, as another alternative measurement tool, Word Association Test (WAT) is used to examine the epistemological beliefs of gifted students.

WAT is seen as an alternative assessment and evaluation tool (Taşdere, Özseveç & Türkmen, 2014) that reveals students' thoughts (Bahar, Johnstone & Sutcliffe, 1999). Being used to examine emotional connections in psychology, WAT is an effective technique to reveal information systematically organized in individuals' minds (Yun, 2020). WAT is also used in determining the relationships between concepts (Atasoy, 2004) and highly preferred in science and social studies education (Cebesoy & Karisan, 2020; Du, Wu & Lan, 2019; Ekici & Kurt, 2014; Kalaycı, 2020; Mahrör & Mahmut, 2020). While using WAT, students are asked to write the word or group of words that come to their mind within the framework of a stimulus word in a very short time and then form a sentence (Çetinkaya, Sönmez & Topçam, 2020; Kostova & Radoynovska, 2010). When the relevant studies are examined, it is seen that the WAT is used to determine students' cognitive structures (Çetin & Timur, 2020; Ozer, 2020), conceptual changes (Hovardas & Korfiatis, 2006), and perceptions (Uluçınar Sağır, 2017). For example, WAT was used to determine the perceptions of students from different levels on the concepts of environmental pollution (Kalaycı, 2020), technology (Çetin & Timur, 2020), AIDS (Ekici & Kurt, 2014), social studies, and social sciences (Deveci, Köse & Bayır, 2014) and current, resistance and voltage concepts (Balbağ & Karademir, 2020). Based on these studies, it can be concluded that the WAT is an effective tool in revealing the cognitive structures of the students. Therefore, it can be said that WAT is influential in determining the misconceptions, cognitive structures, and perceptions of individuals. Considering the developmental levels and ages of the students, it is vital to use an alternative technique to reveal the epistemological beliefs of gifted students.

In the light of information given, in the present study, the aim is to determine the epistemological beliefs of the gifted students studying at the Science and Art Center

Table 1 Demographic information about participants

Demographic Information	f	%
Gender		
Girls	44	37.28
Boys	74	62.72
Age		
6-10	41	34.74
11-15	70	59.32
16-20	7	5.94
Program being Studied		
Support Education	41	34.74
RIS (Recognizing Individual Skills)	43	36.44
DSS (Developing Special Skills)	27	22.88
Project	7	5.94

(SAC) through revealing their thoughts about the concept of "knowledge" and "learning" by using WAT. For this purpose, the research question is determined as "What are the epistemological beliefs of gifted students studying at SAC in a city in the Eastern Anatolia Region of Turkey?"

2. METHOD

2.1 Research Design

This study is designed as phenomenological research. Phenomenology is one of the qualitative research method designs intended to make sense of people's views (Creswell, 2013). It is used to investigate events, situations, and facts that we do not understand in-depth (Copley, 2002). In addition, it focuses on revealing how individuals remember and make sense of a concept or phenomenon from their experiences (Patton, 2018). This study aimed to determine their epistemological beliefs by examining the thoughts of the gifted students studying at SAC on the concept of "knowledge" and "learning" and the meanings they attribute to these concepts. For this reason, phenomenology design was chosen as a qualitative research design.

2.2 Study Group

This study was carried out with 118 gifted students studying at SAC located in a province in the Eastern Anatolia region of Turkey in the 2018-2019 academic year. In phenomenology research, small groups of participants are preferred to have a deeper understanding of the participants' opinions about the facts and events (Smith & Osborn, 2009). However, the number of participants has been kept high in the study since it is aimed to determine the cognitive structures of the students who continue their education in different education programs at SAC by using WAT. Therefore, when studies using WAT as a data collection tool are examined, it is seen that the number of participants is kept relatively high (Bahar, Johnstone & Sutcliffe, 1999; Ekici & Kurt, 2014; Yun, 2020). In this direction, information about the gender, the age of the participants, and the program they studied at SAC are given in Table 1.

Knowledge.....	Learning.....
Knowledge	Learning
Knowledge	Learning
Sample Sentence:	

Figure 1 Sample page layout

According to Table 1, 37.28% of the participants are girls, and 62.72% are boys. Likewise, there are 41 participants between the ages of 6-10, 70 participants between the ages of 11-15, and 7 participants between the ages of 16-20. Among these participants, 34.74% receive support education, 36.44% RIS, 22.88% DSS and 5.94% project production and management program.

2.3 Data Collection Process

In this study, WAT was used as a data collection tool. In this context, the participants were asked to write the connotations that come to their minds about the concepts of "knowledge" and "learning" as a stimulus word, and then they were asked to form a sentence about these concepts. Before using WAT, the participants were asked, "*What do you think about the concepts of knowledge and learning?*", "*What are the characteristics of knowledge and learning for you?*" It was ensured that the participants thought about 10 minutes before the application and became aware of their cognitive structures regarding the concepts of knowledge and learning. Before the research data was collected, explanations were made about the WAT to increase the participants' familiarity with the test. A preliminary study was conducted with the participants using the term "SAC" as a stimulus word. Then, participants were asked to complete the test in 1 minute for each concept in the data collection. The sample page layout of the test is given in Figure 1.

2.4 Data Analysis

The data were analyzed by using content analysis. Content analysis is based on the interpretation of the codes created under themes and categories in a cause-effect relationship (Yıldırım & Şimşek, 2013; Wimmer & Dominick, 2000). Content analysis may be used in an inductive or deductive manner. The inductive approach is recommended, especially when there is no entirely constructed theory and when little is known about the phenomenon you study (Lauri & Kyngäs, 2005). On the other hand, deductive content analysis is based on an earlier theory or model; therefore, it progresses from general to particular (Burns & Grove 2005). In this study, the participants' associations for the concepts of "knowledge" and "learning" in the WAT were coded. The codes were collected under categories named as naive or sophisticated under themes. Schommer's (1990) model uses names of the themes as simple knowledge, certain knowledge, innate ability, omniscient authority, and quick learning. In this

Table 2 Themes, categories, and codes

Certain Knowledge	
Sophisticated	Naive
Tentative (34), Socially embedded (14), Can be improved (9) Limitless (5), Development (4),	Unchangeable (27), Limited (6), Certain (4)
Omniscient Authority	
Sophisticated	Naive
Experts are not needed (32), Created by individuals (27), Thinking (24), Connected with learning (22), Working (22), It is research (18), It is Learning (18), It is obtained through research (12), Concrete and provable (12), Being realized (9), Begins with an idea (7), Curiosity (6), Infinite (6), Imagination (5), Designing (5), Provable (4), Obtained by thinking (4), Experience (3), Obtained by various methods (3), Discovery (2), Experiment (2), Invention (1) Hypothesis (1), It happens as a result of events (1)	Transferred by experts (14), Experts are needed (12), Books (7), Transference (5), Teacher (3), Objective thinking (2), Scientist (2), Internet (1), Constitution (1)
Simple Knowledge	
Sophisticated	Naive
Complex (28), Intertwined (32), Interrelated (4)	Concise (10), Easy (9), Simple (9), Abstract (9), Easily forgotten (1)
Quick Learning	
Sophisticated	Naive
It is a process (33), It requires much work (28), Endeavor (17), Gradual (14), Time is required (13), It is an action (8), Repeat is important (8), It is research (7), It is curiosity (7) It is obtained by living (5), It is difficult to learn (4), Patience is required (3), It is learned gradually (1), There are many methods (1), It is patience (1), It is complex (1)	Happens instantly (32), Memorization (9)
Innate Ability	
Sophisticated	Naive
It is necessary to work (24), It depends on the person (9), Experience required (4)	Intelligence is important (24), It is mind (7), Logic (4), Talent (2), putting knowledge into the brain (1), Ambition (1)

regard, deductive content analysis was used in data analysis. The answers given to the "knowledge" concept were coded under certain knowledge, simple knowledge, and omniscient authority themes; the answers given to the "learning" concepts were coded under quick learning and innate ability themes.

In the data analysis process, papers were examined, and inappropriate papers were removed from the analysis, participants' answer sheets were numbered, categories were determined, validity and reliability were checked, and the data were interpreted by calculating the frequencies of the concepts. In addition, concept maps were created for each dimension according to the cut points determined in the data analysis. For any key concept in WAT, 3-5 numbers below the most frequent answer are used as the cut-point. The answer frequency above the cut-point is placed in the concept map, and concept maps are drawn by decreasing the cut-point to certain intervals (Bahar, Johnstone & Sutcliffe, 1999).

2.5 Validity and Reliability Study

Many aspects were considered to ensure validity in this research. In this context, coding of data and categorization of the data analysis processes were explained in detail (Daymon & Holloway, 2003). Opinions of students that best reflect that category in each category were directly reported in the findings (Wiersma & Jurs, 2005). The findings were discussed concerning the previous studies

and compared to the previous findings. (Ratcliff, 1995). In order to ensure the reliability of the study, the codes and categories specified in the study were evaluated by two expert researchers who carried out studies in the field of educational sciences (Miles & Huberman, 1994). As a result of the analysis, Miles and Huberman's (1994) formula [$\text{Reliability} = \text{consensus} / (\text{consensus} + \text{disagreement}) \times 100$] was used to check the inter-rater reliability, and the reliability coefficient was calculated as 89%, which ensured the reliability of the study.

All rules within the scope of publication ethics were followed in the research. In addition, the ethics committee approval was obtained from Nevşehir Hacı Bektaş Veli University Ethics Committee. (Date: 02/03/2020, No: 28.02.2020/E.6052)

3. FINDINGS

In the research, WAT was used to reveal the cognitive structures related to "knowledge" and "learning" concepts. In this section, themes, categories, and codes for the concepts of "Knowledge" and "Learning" are presented in Table 2.

The frequency of each association is given in Table 2, and student associations unrelated to knowledge and learning concepts are not included in the table (Torkar & Bajd, 2006). Association frequencies in each category are listed from highest to lowest. In addition, each theme

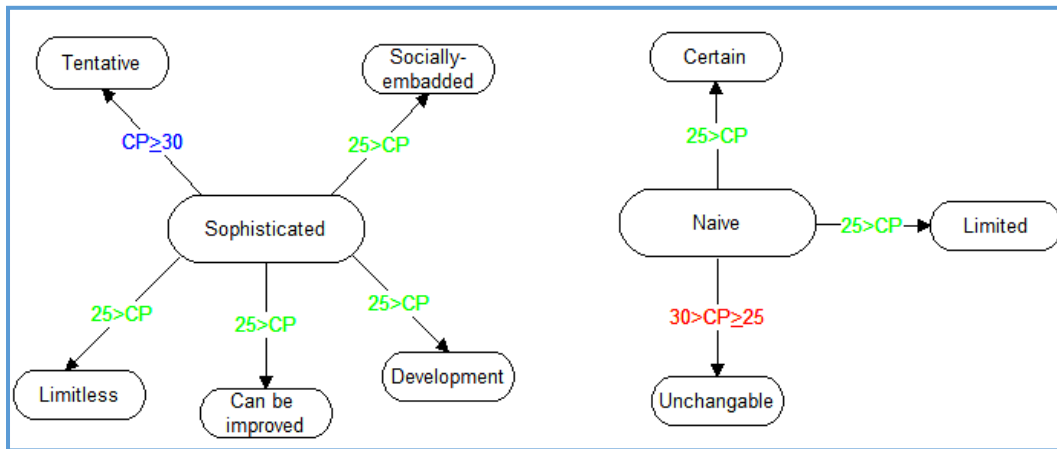


Figure 2 Students' associations about particular knowledge dimension

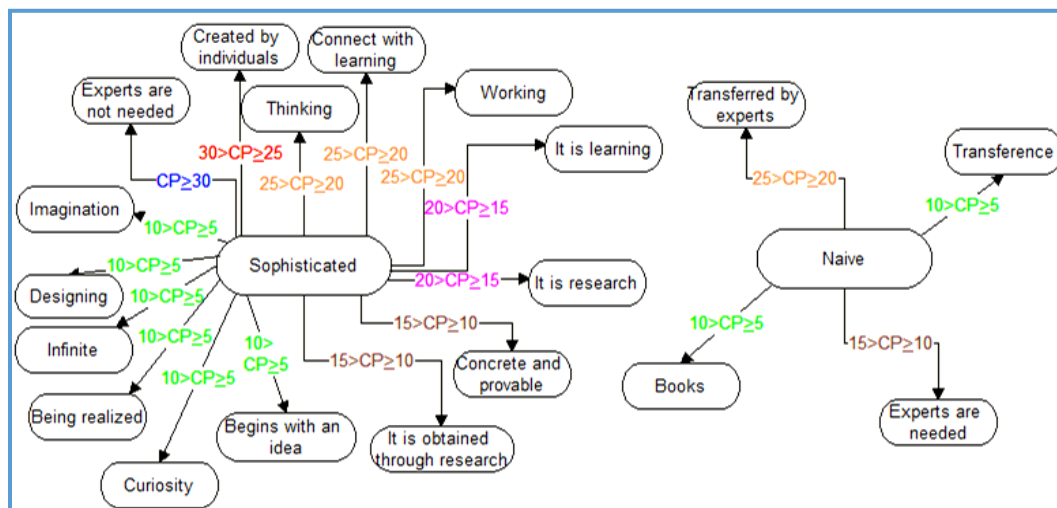


Figure 3 Students' associations about omniscient authority dimension

belonging to the concept of "knowledge" has been categorized as "advanced" and "novice" with reference to Schommer (1990).

In the "certain knowledge" regarding the "knowledge" concept, most of the participants fall under the "sophisticated" category (f = 66). While the participants focus on the concept of tentativeness, they stated that the knowledge is improvable, unlimited, and open to development. On the other hand, in the "naive" category, they focused on certainty. For this category, it was observed that participants state that knowledge is limited and certain. The concept map of a certain knowledge theme is given in Figure 2.

Sample sentences of the participants on the theme of "certain knowledge" are as follows:

Knowledge does not change for me (P2)

In my opinion, knowledge is something we can have if we try (P1)

Knowledge is based on discovery and experimentation (K14)

To me, knowledge is a resource that can develop and be produced (K56)

Knowledge is the most important part of life (K101)

In my opinion, knowledge is essential and can change (P59)

Knowledge is a concept that can change and develop (K73)

Knowledge is something that comes later and changes (K79)

In the second theme of the "knowledge" concept, which is determined as the "omniscient authority", most of the participants fall under the "sophisticated" category (f = 256). Sophisticated participants focus on the idea that there is no need for an expert for knowledge, while the participants in the naive category adopt the idea that experts hand down the knowledge.

The sophisticated participants expressed their thoughts as experts are not needed, knowledge created by the individuals, thinking, connected with learning, working, knowledge is research, knowledge is learning, knowledge is obtained by research, concrete and provable, learning later, begins with an idea, curiosity, infinite, imagination, designing, provable, obtained by thinking, experience, obtained by various methods, discovery, experiment,

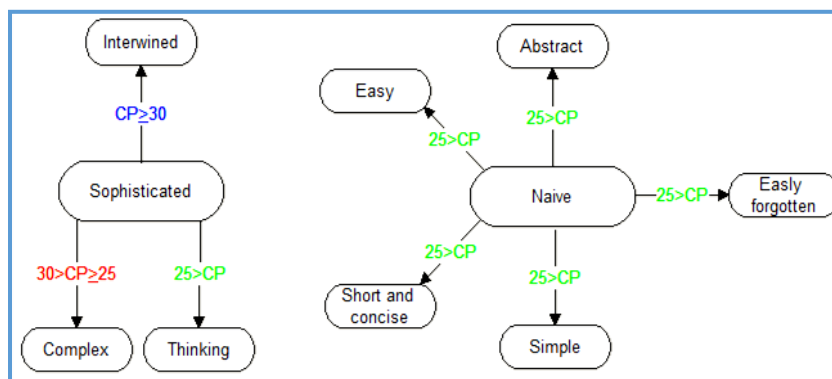


Figure 4 Students' associations about simple knowledge dimension

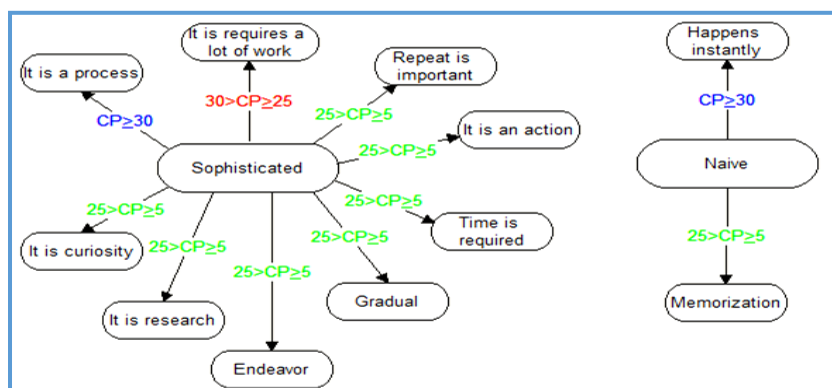


Figure 5 Students' associations about quick learning dimension

invention, hypothesis, it happens as a result of events. In the naive category of omniscient authority, the participants stated their thoughts with the expressions such as experts are needed, books, transference, teacher, objective thinking, and scientist. The concept map of the theme of omniscient authority is given in Figure 3.

Sample sentences of the participants on the theme of "omniscient authority" are as follows:

Knowledge depends on experience in life (K71)

Curiosity is important to access knowledge (K88)

The horizons of the individual expand as new knowledge is learned (K94)

Knowledge and learning are directly proportional (K96)

For me, knowledge starts with thinking (K104)

Knowledge is, in my opinion, an important thing that experts give us (K102)

Most of the participants in the third theme, which is named "simple knowledge" belonging to the concept of "knowledge", fall under the "sophisticated" category ($f = 64$). While the participants in the "sophisticated" category of simple knowledge theme focus on the complexity of the knowledge, participants in the "naive" category express that the information is concise. The sophisticated participants expressed their thoughts with the phrases such as complex, intertwined, and interrelated. In the naive category of simple knowledge, the participants stated their thoughts with concise, easy, simple, abstract, and easily forgotten

expressions. The concept map of the simple knowledge theme is given in Figure 4.

The sample sentences of the participants on the "simple knowledge" theme are as follows:

Knowledge is a part of life and is related to each other (K70)

The knowledge we gain involuntarily is linked to each other (K115)

Knowledge is the most important thing we need in our lives (K72)

In my opinion, knowledge is the development of the feeling of wondering about something through education (P6)

Knowledge is an effort to learn what is not learned (K9)

Knowledge starts from a specific part of our lives and shapes our lives (K108)

Most of the participants in the fourth theme, which is determined as "quick learning", fall under the category of "sophisticated" ($f = 152$). Sophisticated participants focus on the idea that learning takes place slowly and gradually, while the participants in the naive category adopt the idea that learning is a gradual process. The sophisticated participants expressed their thoughts as learning is a process, learning requires much work, tentative, gradual, time is essential, learning is an action, repeat is important, learning is research, learning is curiosity, learning is achieved through living, it is difficult to learn, patience is required, learning is learned gradually, there are many methods, learning is patience, learning is complex. On the other hand, in the

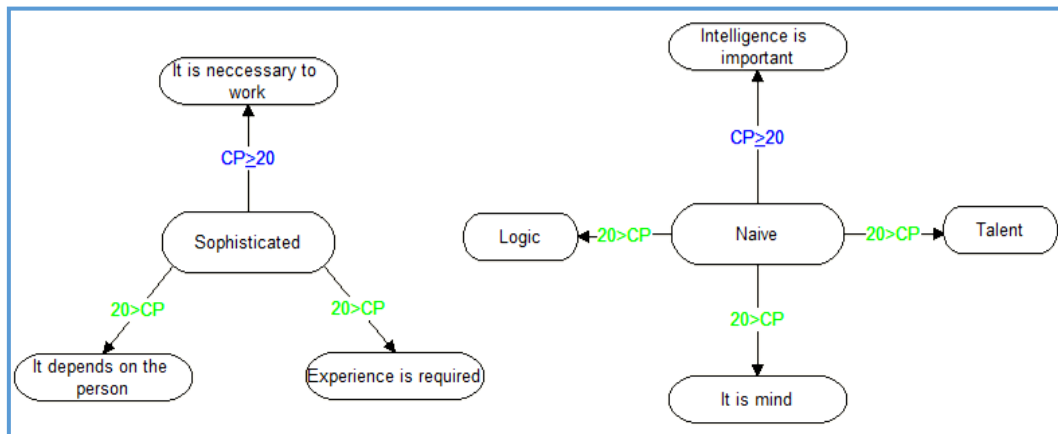


Figure 6 Students' associations about innate ability dimension

naive category of quick learning, the participants stated their thoughts with the expressions such as memorization and learning happens instantly. The concept map of the theme of quick learning is given in Figure 5.

In the fifth theme determined as "innate ability", most of the participants are under the "naive" category (f: 39). For this theme, while the sophisticated participants focus on the idea that hard work is essential, naive participants emphasize intelligence. The sophisticated participants expressed their thoughts as working is needed, experience is required, and learning depends on the person. In the naive category of innate ability, the participants stated their thoughts with the expressions such as intelligence, mind logic, talent, brain, and ambition. The concept map of the innate ability theme is given in Figure 6.

The sample sentences of the participants on the theme of "innate ability" are as follows:

- Success is achieved by trying and effort (K80)
- Intelligence is important to be knowledgeable (K62)
- For me, knowledge is research (K66)
- In my opinion, we access to knowledge ourselves (P27)

4. RESULTS AND DISCUSSION

This research aims to examine the epistemological beliefs of gifted students using WAT. Content analysis was employed for the associations obtained to reveal the cognitive structures of the students' "knowledge" and "learning" concepts. As a result of the content analysis, five themes, in consistence with the adopted theory (i.e., Schommer's (1990) epistemological belief system), were determined as "certain knowledge", "omniscient authority", "simple knowledge", "quick learning" and "innate ability" (Table 2). Furthermore, when the data were analyzed, it was seen that categories related to the five dimensions of Schommer's (1990) epistemological belief model were formed.

Likert-type scales are the most frequently used data collection tools to determine students' epistemological beliefs (Boz, Aydemir & Aydemir, 2011; Elder, 2002; Evcim, 2010; Duell & Schommer-Aikins, 2001, Kızıkan

& Bektaş, 2020; Schommer-Aikins, Mau, Brookhart, & Hutter, 2000; Yılmaz-Tüzün. & Topcu, 2010). In addition, it is seen in the literature that scales prepared for different grade levels, especially students in older classes, are also used in younger age groups (Başer-Gülsoy, Erol & Akbay, 2015; Yeşilyurt, 2013). Also, data collection tools such as interview (Feucht, 2017; Saylan-Kırmızıgül & Bektaş, 2019), sketch (Mansfield & Clinchy, 2002), draw-write-tell (Brownlee et al., 2017; Üztemur & Dinç, 2018), and concept cartoons (Atasoy, 2020) were used to determine the epistemological beliefs of students from different grade levels. In the present study, it was seen that WAT could be used to determine the students' epistemological beliefs as an alternative measurement tool. At the end of the research, the epistemological beliefs of the students were grouped based on Schommer's (1990) model as naive or sophisticated. In using WAT, participants were given a stimulus word and then asked to respond verbally or in writing with the first word that comes to their minds. Researchers may conclude from the participant's cognitive system structure by examining the relationship between responses and classifying them (Suzuki-Parker & Higginbotham, 2019). The words that evoke in the students' minds about the stimulating words and their explanations afterward reflect their epistemological beliefs. As a result of the study, the epistemological beliefs of the gifted students could be determined inductively, without using a scale prepared following a predetermined theoretical background. Moreover, the beliefs determined were compatible with Schommer's epistemological beliefs model. Therefore, WAT is at least as applicable as the widely used scales in determining the epistemological beliefs of gifted students.

4.1 Specific Knowledge and Omniscient Authority

Within the scope of the research, each theme is explained and compared with the relevant literature and discussed. For example, it has been observed that under the "certain knowledge" theme, there are many associations regarding the changeability of knowledge. According to this result, it can be said that participants have sophisticated

beliefs about the tentative nature of knowledge (Schommer, 1990). In addition, under the "omniscient authority" theme, many associations show that students think experts do not have authority on knowledge, and individuals can produce knowledge through experience and inquiry. In literature, while some of the previous researches support our findings (Başer-Gülsoy, Erol & Akbay, 2015; Feucht, 2017; Sadiç, 2013; Boz, Aydemir & Aydemir, 2011), some other studies reported that students hold naive or moderate beliefs in these dimensions (Aşut & Köksal, 2015; Atasoy, 2020; Gök, 2018; Üztemur & Dinç, 2018). Research that has opposite results state standardized exams as the reason for the naive beliefs (Atasoy, 2020).

On the other hand, it is stated in studies supporting our findings that students become less dependent on authority as age, experience, education, and family support increase (Schommer, 1990; 1993a, 1998; Schommer & Dunnell, 1992). Also, students who do not prefer external sources such as books and teachers as the source of scientific knowledge hold beliefs that experimentation and observation play a role in forming knowledge. That proof and inquiry play a role in the justification process (Sadiç (2013). Based on this, it can be said that the reason for gifted students' sophisticated epistemological beliefs in specific knowledge and omniscient authority dimension may be the use of student-centered methods such as project-based, inquiry-based, problem-based teaching at SACs. Because research revealed that students' epistemological beliefs could be developed by using instructional strategies in which students are active, information is constructed by them, and learning is dependent on students' participation (Deryakulu, 2004). Researchers also report that students do workshops, experiments, hands-on activities, and rich material and activity opportunities at SACs (Epçaçan & Oral, 2019).

4.2 Simple Knowledge

In the simple knowledge dimension, it can be interpreted that the majority of the participants have sophisticated epistemological beliefs. This conclusion can be drawn from the students' associations that knowledge is complex and interrelated. It can be said that gifted students have developed their beliefs in this dimension through their education at SAC. Conley et al. (2004) stated that students learning in constructivist environments are more likely to have more sophisticated epistemological beliefs than those in teacher-centered classrooms. In a supportive manner, Schommer and Dunnell (1992) reported that gifted students' epistemological beliefs in the simple knowledge dimension are sophisticated.

On the other hand, it is noteworthy that some studies in literature examining the epistemological beliefs of participants at different class levels generally did not address the simple knowledge dimension (Boz, Aydemir & Aydemir, 2011; Kurt, 2009; Olgun, 2018; Sadiç, 2013; Tüken, 2010; Yenice & Özden, 2013). However, having

sophisticated beliefs in the simple knowledge dimension is quite noteworthy for science education because it is argued that individuals who believe that knowledge is organized in mind as isolated pieces tend to use rote learning (Schommer, Crouse & Rhodes, 1992). Also, students who believe knowledge is simple will have difficulty comprehending the ambiguous aspects of tasks that require analytical decisions, perseverance, and appropriate self-regulated learning. Moreover, in some academic contexts, seeing knowledge as simple can restrict subsequent conceptual change (Lodewyk, 2007). Thus, as seen in the study, gifted students have sophisticated beliefs in the simple knowledge dimension. Therefore, it can be said that they do not prefer rote learning; instead, they tend to use organizational learning strategies and construct connections between what they learn and what they already knew. Also, they will probably be more likely to use metacognition and self-regulation strategies (Dahl, Bals & Turi, 2005; Tortop, 2015).

4.3 Quick Learning and Innate Ability

Based on the associations of the participants in terms of quick learning and the innate ability on learning, it can be said that the participants have sophisticated epistemological beliefs in the quick learning dimension but have moderate beliefs in the innate ability dimension. While some of the participants had sophisticated beliefs that learning is a process, it happens gradually. It is necessary to learn; an equal number of participants stated that intelligence is essential in learning. In one of the studies in the related literature, Olgun (2018) found that middle school teachers had beliefs that learning depends more on effort than on ability. On the other hand, Köse and Dinç (2012) stated that the participants believe learning depends on ability. Studies on this subject show that as students' beliefs in the effect of innate ability and quick learning decrease, their grade point averages increase (Schommer, 1993b). This means students who hold sophisticated epistemological beliefs in the innate ability and quick learning become more successful. In addition, in a study conducted with university students, researchers determined that students who have sophisticated beliefs in the dimension of quick learning better understand complex academic texts (Schommer, 1990; Schommer, Crouse & Rhodes, 1992). Also, Dahl, Bals, and Turi (2005) reported that students with naive epistemological beliefs in the innate ability dimension do not tend to use elaboration, critical thinking, metacognitive, and self-regulation strategies.

On the one hand, the current study participants frequently stated that learning takes place by working hard in the process; on the other hand, they emphasized the importance of intelligence in learning. The researcher, teachers, parents, and all other stakeholders should consider the findings of the present study because the participants were the students studying at the SAC and

were identified as "gifted" students. This definition may have caused them to make associations with a belief in this direction. Therefore, while defining these students, we should consider the risk that these students may ignore working by paying too much attention to intelligence.

5. CONCLUSION AND SUGGESTIONS

To sum up, the research results have shown that WAT can be used as an alternative measurement tool to determine the epistemological beliefs of gifted students. Based on the result obtained by using WAT, it can be concluded that the gifted students studying at SAC have sophisticated epistemological beliefs in the dimensions of certain knowledge, simple knowledge, omniscient authority, and quick learning dimensions, medium level beliefs in the dimension of innate ability. Therefore, these students are expected to have the desired approach to work and develop metacognitive knowledge (Schommer, Crouse & Rhodes, 1992). In addition, it can be interpreted that gifted students with sophisticated beliefs in the dimensions of quick learning and innate ability will be more willing to accept difficulties, learn from their mistakes and provide continuity in their learning (Dweck & Leggett, 1988). Therefore, it is expected that gifted students with sophisticated epistemological beliefs can overcome difficulties and learn from mistakes. However, further studies should be conducted if gifted students having sophisticated beliefs adopt these desired competencies in their academic lives.

When the studies examining the epistemological beliefs of gifted students in the literature are examined, it is seen that the students' development differs in the sub-dimensions of epistemological beliefs (Aşut & Köksal, 2015; Schommer & Dunnell, 1997). Therefore, it is thought that there is a need for new researches to be carried out with gifted students from different age groups using different types of measurement tools. In addition, studies can be carried out to determine how the epistemological beliefs of the students reflect on their behaviors that can be observed in the classroom; in other words, what kind of differences are seen between the affective characteristics of students with sophisticated and naive epistemological beliefs such as class participation, attitude, motivation, and self-efficacy.

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