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Investigation of Students' Personal Epistemologies in the Judgments of Truth about the Social and Physical World Considering Their Grade Level and Gender

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Abstract

Students' epistemological beliefs are important in science education as developed epistemological beliefs facilitate learning, reasoning skills, academic performance, and engagement in debates. This study specifically addresses two issues about personal epistemology: grade level and gender. As a theoretical framework, the developmental view was adopted in this study and the Epistemological Belief Instrument developed by Kuhn et al. (2000) was used to collect data. Therefore, personal epistemology was defined in three hierarchical categories: absolutism, multiplism, and evaluativism. Two domains of personal epistemology which are physical truth and social truth were studied in this study. A total of 430 students ranging from primary school to the university level participated in the study. The relationships between grade level, gender, and personal epistemology were analyzed by use of the chi-square test of independence. The findings showed a significant relationship between grade level and judgment of social truth with a small effect size. The same relation was also observed between gender and judgment of social truth. On the other hand, no significant relationship was observed between gender and the judgment of physical truth, and between grade level and the judgment of physical truth. We think that the findings contribute to understanding the nature of personal epistemology regarding developmental level and gender.

Keywords: Personal epistemology, epistemological beliefs, gender, grade level

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Introduction

Epistemological beliefs are the beliefs about the theory of knowledge (the direct translation of Greek words episteme and its derivation logos, epistemology, refers to the theory of knowledge according to Kitchener, 2011) and epistemic beliefs are the beliefs about knowledge. The students have epistemic beliefs rather than epistemological beliefs, but the term epistemological beliefs has been commonly used to refer to their epistemic beliefs (Greene et al., 2016).

Epistemological belief studies started with personal epistemology which deals with how people view knowledge and knowing (Elby et al., 2016). Personal epistemology has three waves which are the developmentalist view, cogntivist view, and contextualist view.

Developmentalist View

The first wave is the developmental perspective rooted in Perry's (1970) studies. According to Kuhn et al. (2000), people experience three hierarchical levels. People are absolutists in the early years of life and they believe that knowledge exists outside of the self and does not change. Then, they pass to the multiplist level believing that people construct knowledge, knowledge equals opinion, but there are no standards to evaluate them. In the end, people reach the evaluativist stance that they use criteria to decide which knowledge claim produced by different points of view is more valid than others (Kuhn et al., 2000). According to this view, a person has one of these three levels, therefore, epistemological belief is uni-dimensional for the developmental view. However, a person's epistemological belief can change from one judgment domain to another. According to Kuhn et al. (2000), there are five different judgment domains which are pleasingness (personal taste), beauty (aesthetic), good (value), truth about the social world, and truth about the physical world. While a person has an absolutist belief in one judgment domain (e.g., the physical world), the same person can have a multiplist belief in another (e.g., the social world). Specifically, personal taste deals with people's preferences based on personal characteristics and it is easy for people to have multiplist beliefs regarding personal taste (e.g. liking a specific food). The beauty domain is about a person's selection of whether something looks good or not. Similar to personal taste, it is easy to have multiplist beliefs in this domain (e.g. selecting the best painting among the alternatives). Value judgment, on the other hand, is about people's epistemological beliefs in the judgment of what is important in life (e.g., taking personal responsibilities). Although it is not as easy as the previous two domains, people can still reach the multiplist beliefs in the value judgment domain. The truth about the social world domain refers to people's epistemological beliefs in social life issues like the theories explaining children's language learning. Having the multiplist stance is difficult compared with the previous three judgment domains (e.g. personal taste). The last judgment domain is the truth about the physical world and it is about natural life issues (e.g. different theories explaining the structure of atoms).

Cognitivist View

The second wave is the cognitivist perspective stemming from Schommer's (1990) studies. While epistemological belief is seen as one holistic belief from the developmental perspective, it is seen as a set of constructs from the cognitivist perspective. According to Schommer (1990), epistemological beliefs are a set of independent and multidimensional beliefs. These beliefs are autonomous and there are five separate dimensions. The first one is certain knowledge which means the absolute knowledge is certain and it is reached at the end. The second one is simple knowledge which means knowledge includes different pieces. The third one is omniscient authority meaning that knowledge can only be accessed through an authority. The fourth one is quick learning which refers to whether learning occurs quickly or not. The last dimension is the innate ability which focuses on the belief that learning ability is gained through years or comes from birth. In later years, Schommer-Aikins (2002) explained that the last two dimensions which are quick learning and innate ability are about the beliefs about learning rather than epistemological beliefs. Therefore, Schommer's (1990) ideas about personal epistemology can be evaluated considering the first three dimensions which are certain knowledge, simple knowledge, and omniscient authority. By the way, all these three dimensions have negative meanings. For example, the ones who believe that knowledge is certain and simple, and knowledge comes from external authority have naïve epistemological beliefs.

Following Schommer's (1990) ideas; Hofer and Pintrich (1997) defined personal epistemology in four different dimensions. The first dimension is simplicity vs. complexity. The ones having naïve beliefs in this dimension believe that knowledge is a collection of bits (simplicity), but the ones having sophisticated beliefs believe that knowledge is an interconnection of ideas. The second dimension is certainty (naïve belief) vs. tentativeness (sophisticated belief). Accordingly, people with certainty believe that knowledge is fixed and absolute, but those who think that knowledge is tentative accept the idea that knowledge evolves. The third dimension is about the source of knowledge. Accordingly, the ones having naïve ideas for this dimension believe that the source of the knowledge is external, and produced outside of the person while others who have sophisticated beliefs in this dimension believe that knowledge is internal and originated inside the knower through their own meaning-making. The last dimension is multifaceted (sophisticated) vs. simplistic (naïve) justification for knowing. While people with multifaceted beliefs use multiple criteria (fitting with evidence, coherence with other knowledge, and credibility of experts) to justify and evaluate knowledge, people with simplistic justification for knowing beliefs evaluate the knowledge claims superficially (Hofer & Pintrich, 1997).

Contextualist View

The third wave of personal epistemology is the contextualist perspective. According to this perspective, our interactions in different contexts affect our epistemological beliefs; therefore, the context has a vital impact on epistemology. The context is defined as physical settings, but this physical setting can create different contexts if the material, social, and cultural spaces change in that setting. Another factor affecting context is time. Similar to the cognitivist view, the contextualist view claims that a person's epistemological belief changes from one context to another, epistemological beliefs are multiple-dimensional depending on the number of contexts that a person has interactions. As a result, we can claim time and physical settings including different spaces (e.g. social space) form context and this context shapes epistemological beliefs (Pintrich, 2002).

Background Variables

Background variables like gender, grade level, socio-economic status, and parental education affect epistemological beliefs (Paulsen & Wells, 1998). Previous research results on the relationship between gender, grade level, and epistemological beliefs yielded inconsistent results. For example; Orhan (2022) found no significant effect of gender on the epistemological beliefs of high-school students whereas Marzooghi et al. (2008) reported some significant differences between males and females in terms of speed of learning as part of epistemological beliefs. Likewise, the studies seeking the relationship between grade level and epistemological beliefs had inconsistent results. Theoretically, epistemological belief improves with increasing grade level and some studies supported this expectation (Kuhn et al., 2000). For example; Schiefer et al. (2022) reported that lower grade level students' epistemological belief profile included absolutistic, evidence-based, and multiplistic levels, but students at higher grade levels had more sophisticated epistemological beliefs. This means that students at lower grade levels either focused on only evidence and thought there was one correct knowledge ignoring the different perspectives. Therefore, such students hold absolutistic beliefs that solely depend on the evidence, so absolutist belief was also evidence-based. Likewise, some other students from the lower grade levels just focused on the different perspectives, but they did not concern evidence, so such students held the multiplist beliefs. To sum up, lower grade level students hold naïve epistemological beliefs (i.e., absolutist and multiplist beliefs) as they did not evaluate the evidence considering different views. On the other hand, the higher grade level students held the evaluativist beliefs which means they held sophisticated beliefs because these students considered both evidence and different views. In other words, they could coordinate the objective and subjective dimensions of knowing and knowledge. On the other hand, Kuhn et al. (2000) reported that even some of the fifth-grade level students held evaluativist beliefs (i.e., sophisticated beliefs) and some of the 12th-grade level students held absolutistic beliefs (i.e., naïve beliefs) which mean that epistemological beliefs might not improve with increasing grade level. Because of these inconsistent results for the effect of gender and grade level on epistemological beliefs, this study specifically addresses these two

background variables (e.g. gender and grade level) effect on epistemological beliefs to contribute to relevant literature.

Theoretical Relationship between Three Waves of Epistemological Beliefs and Background Variables

Three Waves of Epistemological Beliefs and Gender

According to Pintrich (2002), the gender and epistemological beliefs relationship differs in three waves. For example; the developmentalist view theoretically thinks that gender should not be separated from a person's views and they are not independent structures. In other words, the developmentalist view advises us to approach from a holistic perspective when we evaluate people's epistemological beliefs. Otherwise, people's epistemological beliefs are interpreted with a reductionist perspective (Pintrich, 2002). The contextualist view's approach to the background variables is similar to the developmentalist view. Accordingly, the relationship between background variables including gender and epistemological beliefs is susceptible to the context for the contextualist wave. Therefore, the relationship between gender and epistemological beliefs can not be generalized (Pintrich, 2002). The cognitivist view, on the other hand, is more open to seeking a relationship between separate variables like gender and independent epistemological beliefs (e.g. certainty belief). These explanations might stem from the different worldviews of these three waves. Accordingly, the developmentalist and contextualist views are in line with qualitative research and focus on a holistic perspective, but the cognitivist view is consistent with quantitative research, so it is open to seeking the relationship between separated variables and epistemological beliefs (Pintrich, 2002).

Three Waves of Epistemological Beliefs and Grade Level

Theoretically, all three waves agreed on the idea that epistemological beliefs improve over time (Pintrich, 2002). According to the developmentalist view, people have more sophisticated beliefs and the development is supported by this wave at most. Furthermore, there are some endpoints for the development stages in the developmentalist view like the absolutist level. On the other hand, different dimensions like certainty and simplicity develop for the cognitivist view, and the development of different dimensions is independent of each other. For example; while a person has more sophisticated beliefs in certainty, the same person might hold less sophisticated beliefs in simplicity. However, these different beliefs do not integrate and can not pass to the higher levels as opposed to the developmentalist wave (Pintrich, 2002). Although the development is not very clear for the contextualist wave, the development is still supported by contextualism. Accordingly, the context can change and it becomes more sophisticated and this makes the resources more sophisticated. Then, people use these resources and their epistemological beliefs improve. For example; the knowledge and sources are presented in a sophisticated way at the university. Therefore, theoretically, the students reaching more sophisticated sources in university have more sophisticated epistemological beliefs compared to the students from different grade levels (e.g. middle school, high school) that do not have sophisticated sources (Pintrich, 2002).

Literature Review

Gender and Personal Epistemology

Gender and personal epistemology relation has been examined many times but revealed inconsistent results. Furthermore, the cognitivist approach dominated the research where Schommer's ideas and epistemological beliefs components were used. We provide a summary of the research examining gender's relationship with personal epistemology at the domain-general level.

Researchers mainly used Schommer's five independent dimensions of epistemological belief which are the stability of knowledge (people see knowledge in a continuum from tentative to unchanging), the structure of knowledge (accepting knowledge from simple isolated pieces to complex and integrated concepts), source of knowledge (from accepting authority as the source of knowledge to the accepting observation and causation as the source of knowledge), speed of knowledge acquisition (quick learning to gradual learning), and control of knowledge acquisition (fixed at birth to lifelong

improvement) (Schommer, 1990; Schommer-Aikins, 2002). Some of these studies did not find a significant relationship between gender and epistemological beliefs (e.g., Yakışan & Karaşah, 2016). For example; Aslan and Şimşek (2021) found no significant relationship between gender and epistemological beliefs for 8th-grade students and claimed that epistemological beliefs are gender-neutral constructs. Likewise, Orhan (2022) reported no significant relationship between gender and high-school students' epistemological beliefs. In another study, Ren (2006) conducted a cross-cultural study among undergraduate students and reported no significant relationship between gender and epistemological beliefs. Although these studies reported no significant relationship between gender and epistemological beliefs, some other research pointed out some significant relationship between gender and epistemological beliefs. For example, Marzooghi et al. (2008) found female undergraduate students had more sophisticated epistemological beliefs than males, but their beliefs in the speed of learning and simplicity of knowledge are not different from males' beliefs. Next, Paulsen and Wells (1998) reported another difference by claiming undergraduate males' beliefs about the simplicity of knowledge are more sophisticated than females and females had more sophisticated beliefs about the nature of learning in terms of fixed ability and quick learning. In another study, Ismail et al. (2012) reported gender did not significantly relate to the combined epistemological beliefs, but undergraduate males had more sophisticated beliefs in the innate ability to learn. Other epistemological beliefs were not related to gender in their research. Although all these research adopted a cognitivist approach and used Schommer's independent and multiple beliefs for personal epistemology, Kuhn et al. (2000) followed the developmental approach which sees personal epistemology as a single and holistic belief having different stages (e.g. absolutist level, multiplist level, evaluativist level) and examined different groups' epistemological beliefs (e.g. 5th-grade level students, undergraduate level students, etc.), and reported no significant relationship between gender and the developmental level of epistemological beliefs. In another study, Baxter Magolda (1992) examined epistemological gender differences and she followed female and male undergraduate students throughout their university careers. Baxter Magolda (1992) reported males and females have the same development, but they have different development patterns. Accordingly, epistemological development includes four steps which are absolute knowing, transitional knowing, independent knowing, and contextual knowing. These four steps are in the hierarchy and the first two steps correspond to absolutism in the development wave, independent knowing is similar to multiplism in the development wave, and contextual knowing refers to evaluativism. Males' epistemological development included the following stages: They have *mastering patterns* at the absolute knowing level which means they take the knowledge from outside, focus on success, and interact with others. Then, they have the *impersonal pattern* in the transitional knowing which means they discuss with others without focusing on his ideas. Next, they are in the *individual pattern* during the independent knowing which means they focus on their own thinking when listening to the others. On the other hand, females' epistemological development includes the following patterns: First, they have *received a pattern* in absolute knowing. They either obtain knowledge themselves or receive it from the teacher. Second, they are in the *interpersonal pattern* in the transitional knowing. Females focus on the relationships and collect data in this pattern. At the independent knowing level, they have *interindividual patterns* and they use others' ideas to clarify their ideas. For the contextual knowing level, Baxter Magolda (1992) reported no different pattern was observed among male and female undergraduates because very few participants reached this level, but still, Baxter Magolda (1992) pointed out different genders converge to each other in the contextual knowing level because the development of epistemological beliefs in the previous levels for each gender facilitated this convergence in the most sophisticated level (i.e., contextual knowing). To sum up, it can be claimed that gender's relationship with epistemological belief is not well-known.

Grade Level and Personal Epistemology

Grade level is another background variable that is related to epistemological beliefs. Theoretically, researchers from different views (e.g. cognitivist, developmental) agreed that epistemological beliefs develop with age (Pintrich, 2002). Marzooghi et al. (2008) consistently reported that freshman undergraduates held more naïve beliefs in the innate ability and simplicity of knowledge than seniors. Likewise, Schiefer et al. (2022), in their meta-analysis, reported lower grade-level students' profiles were absolutistic, evidence-based, and multiplicity, but the elder students held more sophisticated epistemological beliefs. Similarly, Ismail et al. (2012) reported undergraduate students from different

grade levels have different epistemological beliefs in quick learning and innate ability of learning beliefs. In opposition to theoretical expectations, on the other hand, some research did not report such differences in epistemological beliefs depending on the grade level. For example; Yenice (2015) did not find any differences in epistemological beliefs caused by grade levels. Likewise, Peter et al. (2016) reported only people with advanced education should be at the evaluativist level (e.g. sophisticated beliefs), however, even young learners can be at the evaluativist level which is a shred of evidence that grade level may not affect the epistemological beliefs. Peter et al. (2016) also added that students from the same grade level may have different epistemological beliefs showing grade level may not relate to the epistemological beliefs. The same situation can be seen in Kuhn et al.'s (2000) study. Accordingly, Kuhn et al. reported 35 % of the 5th-grade students were at the evaluativist level (i.e., sophisticated beliefs) in the judgments of truth about the social world domain and 20 % of them were at the evaluativist level in the judgments of truth about the physical world domain whereas 14 % of the 12th-grade students were at the absolutist level (i.e., naïve beliefs) in the judgments of truth about the social world domain and 19 % of them were at the absolutist level in the judgments of truth about the physical world domain. This evidence shows that even if the grade level increases, the epistemological beliefs may not improve. Such reports also blur the relationship between the grade level and epistemological beliefs.

Significance of the Study

The study has four main significance. First, the previous personal epistemology studies mainly adopted Schommer's ideas, and the instruments used to assess personal epistemology mainly included a continuum from absolutism to multiplism. While absolutist view like "knowledge is certain" has been seen as naïve belief, the multiplist view like "knowledge is tentative" has been seen as a sophisticated belief. However, the evaluativist view that focuses on objective standards to assess multiple ideas is ignored in such instruments although the evaluativist view represents sophisticated epistemological beliefs (Peter et al., 2016). Furthermore, Peter et al. (2016) reported that multiplist ideas include naïve beliefs like absolutist views and do not refer to sophisticated beliefs. The absence of evaluativist ideas in previous personal epistemology instruments, therefore, shadows the capacity of measuring epistemology beliefs for these instruments. At this point, we thought that using Kuhn et al.'s (2000) personal epistemology instrument could be useful to assess personal epistemology correctly as this instrument focuses not only on absolutist and multiplist views but also evaluativist views. Therefore, the first significance of this research is to measure personal epistemology more accurately compared with previous research as this research deals with evaluativist views unlike most of the previous research.

The second significance is about the development aspect of personal epistemology. According to Pintrich (2002), all personal epistemology models (e.g. cognitivist, developmental) agreed on the idea that personal epistemology develops through time from naïve beliefs to sophisticated ones. However, how this development occurs is not well known and can not be explained by the models except the developmental model. The developmental model explains the development of personal epistemology with three stages having end-points. According to Kuhn and Weinstock (2002), we follow three stages starting from the absolutist stage which is followed by the multiplist stage, and the evaluativist stage at the end. The balance between objective and subjective dimensions of knowledge improves our epistemological beliefs when we reach the evaluativist stage. On the other hand, such an explanation is not available for cognitivist and contextualist views. For example, epistemological beliefs are multidimensional for cognitivist views and a person may have developed beliefs in the certainty aspect and naïve beliefs in the source aspect, but the cognitivist view cannot explain why we have conflicting epistemological beliefs (naïve belief for one belief and sophisticated belief for another). Likewise, contextualist belief cannot explain the development because we cannot observe the development of the beliefs when the context changes (Pintrich, 2002). Because of these reasons, the current study used the developmental view as the theoretical framework. In this way, we believe that this study fits with the developmental aspect of epistemological beliefs.

The study has another significance in the development aspect of epistemological beliefs. Yang and Tsai (2012) reported that personal epistemology studies should be carried out with young learners to understand epistemological beliefs' developmental nature. However, when we examine the previous

research examining the developmental nature of epistemological belief, we can see that previous research included grade levels that are very close to each other (e.g. Ismail et al., 2012; Marzooghi et al., 2008; Yenice et al., 2015) that impede us from understanding the developmental nature of epistemological beliefs and these studies mainly included undergraduate students and were not carried out with young students. On the other hand, the current study brings different grade levels (primary school, middle school, high school, and undergraduate) together. This wide range of grade levels lets us better understand the developmental nature of epistemological beliefs.

The last significance of this study is related to gender and epistemological beliefs' relationship. There are two views about the effect of gender on epistemological beliefs. According to the first view, gender does not affect epistemological beliefs and gender orientation (femininity vs. masculinity) is more important than gender in terms of epistemological beliefs. On the other hand, the second view claims that epistemological beliefs can change depending on gender. For example; males and females may not understand knowledge in the same way and their implicit theories about knowledge can be different from each other (Pintrich, 2002). Consistent with these two diverging ideas, the literature showed inconsistent results for the effect of gender on epistemological beliefs. Some of these studies found an effect of gender on epistemological beliefs (e.g., Ismail et al., 2012), and some of them did not (e.g., Ren, 2006). By studying the relationship between gender and epistemological beliefs, this study may add to the current literature.

Theoretical Framework

We used Kuhn et al.'s (2000) and Kuhn and Weinstock's (2000) ideas for personal epistemology and therefore, we adopted a developmental view in this study. According to Kuhn and Weinstock (2002), epistemological beliefs include three hierarchical stages which are absolutist, multiplist, and evaluativist levels. The lowest level is absolutist and absolutist people see knowledge objectively. Knowledge is located in the external world, and it is knowable with certainty. After the absolutist level, people reach to multiplist level. One important characteristic of this level is the source of knowledge is the knowing subject; therefore, knowledge is uncertain and subjective. However, there is no objective standard and conflicting claims are not evaluated at this level. The highest level is the evaluativist level where people see knowledge as uncertain and evaluated. Evidence and arguments are used to evaluate claims. In this development process from absolutism to evaluativism, the claims are seen as copies of reality (in absolutism) at the beginning, then they are accepted as opinions (in multiplism) and they are seen as judgment (in evaluativist) at the end. Kuhn and Weinstock (2002) also added that our epistemological beliefs change depending on the content domain. These content domains are personal preferences, aesthetics, value, the physical world, and the social world. As these five content domains are too broad, we believe that we might miss some important points if we study all these content domains. Therefore, we specifically focused on participants' epistemological beliefs in the judgments of truth about the social world and physical world. The judgments of truth about the social world domain include beliefs about social issues like "why criminals continue to crime" and the judgments of truth about the physical world domain are related to the beliefs about explanations of physical laws and theories like "the composition of atoms" (Kuhn et al., 2000). Similarly, Nussbaum et al. (2008) focused on only the judgments of truth about the physical world domain in their research which they focused on scientific argumentation and social interaction.

According to Kuhn and Weinstock (2002), passing from the absolutist belief to the multiplist belief is the most difficult for the judgments of truth about the physical world domain, and the judgments of truth about the social world domain follow the judgments of truth about the physical world domain. On the other hand, passing to multiplist beliefs for other content domains is easier compared with the judgments of truth about the social and physical world domain. When passing from the multiplist beliefs to the evaluativist beliefs is considered, this passing is easiest for the judgments of truth about the physical world domain and the judgments of truth about the social world domain follow the judgments of truth about the physical world domain. Passing from the multiplism to evaluativism is harder for other content domains including personal taste, aesthetics, and value judgment.

In this study, we specifically focus on the relationship between epistemological beliefs and background variables which are gender and grade level in the judgments of truth about the social and

physical world domain, and this study is not interested in the change of students' beliefs, and no treatment was implemented to change their beliefs. As this study focused on the relationship between gender, grade level, and epistemological beliefs, the study has two research questions:

1. What is the relationship between gender and epistemological beliefs regarding the judgments of truth about the social and physical world domains?

2. What is the relationship between grade level and epistemological beliefs regarding the judgments of truth about the social and physical world domains?

For these research questions, we hypothesize that gender is not significantly related to epistemological beliefs as epistemological beliefs are gender-neutral constructs, but we also hypothesize that epistemological beliefs improve when the participants' grade level increases because epistemological beliefs improve with maturity, education, and experience (Kuhn & Weinstock, 2002).

Method

Research Design

This quantitative research is an example of a correlational research design as it seeks the relationships between background factors (e.g. gender) and epistemological beliefs in the judgments of truth about the social and physical world domains. Kuhn et al. (2000) defined epistemological beliefs in three stages (e.g. absolutist), therefore the beliefs in the judgments of truth about the social and physical world domain are two categorical variables each of which has three levels. Likewise, gender and grade level are another two categorical variables in this study where gender has two levels (male, female) and grade level has four levels (primary school, middle school, high school, and undergraduate). As a result, this study has four variables and all of them are categorical.

Sample

A total of 430 students participated in the study and the participants were from different grade levels. Accordingly, 112 students were from primary school (58 females, 54 males), and the data was collected from grades 3-4 as younger students could not understand the instrument. In this process, we first met with the participants' teachers and asked them whether their students could understand and answer the questions because these teachers were experts and knew the students' cognitive capacity. Then, we selected students from different grade levels in K-4 and asked them to read the questions loudly and explain their understanding. Both students' explanations and teachers' advice led us to think that this instrument is useful for the students enrolled in the 3rd and 4th grade levels. Likewise, 105 students were enrolled in middle schools ranging from grades 5-8 (58 females, 47 males). A total of 120 high school students from grades 8-12 (70 females and 50 males) participated in the study and 93 undergraduate students from the primary school department (i.e., Elementary School Teacher Education Programme) (86 females, 7 males) of a private university located in Ankara. Therefore, the study's target population is students from different grade levels (primary school, middle school, etc.) in Ankara. The convenient sampling strategy was used to save time, energy, and cost and the data was collected from Çankaya and Yenimahalle districts; therefore, the accessible population is students from different grade levels in these two districts of Ankara. The study was conducted in the fall semester of 2022-2023 and the data collection process lasted two months.

Data Collection

Kuhn et al.'s (2000) Epistemological Belief Instrument was used to collect data. After we got permission from Kuhn to use the instrument, we translated it into Turkish. In the translation and adaptation process, we followed the PISA 2021 translation and adaptation guidelines (Organisation for Economic Co-operation and Development [OECD], 2022). First, the authors were the coordinators of the translation and adaptation process and we presented the guidelines used by PISA 2021 to the two translators. The translators were academicians from the English Language Education Department. These translators were trained for the guideline and personal epistemology. We asked them to follow the guidelines when they translated the epistemological belief questionnaire and reminded the general characteristics of the epistemological beliefs. For example, when they translated the alternative for the

absolutist level, they were asked to protect the structure of the sentence including the idea that only one of the presented views is correct. During translation, general themes remained the same in line with the guidelines. For example; if the theme is the theories of atoms, it was also the same with the Turkish translation. The translators also worked as adaptors in this process. For example, the translators changed people's names because of cultural differences. For example; the names Robin and Chris were replaced with Rafet and Caner in the Turkish version. After the translators completed the transition and adaptation process, we as coordinators reconciled the two independent translations. In reconciliation, we asked for assistance from an expert in Turkish Education who was also an academician. The expert checked the language, grammar, and content of the items for both translations. Then, we selected the items that better represent the original item considering the suggestions of the Turkish language expert, the content of the original questionnaire, and the characteristics of epistemological beliefs. Next, we consulted a domain expert from the Educational Science department who has expertise in epistemological beliefs and this expert checked the translated and adapted questionnaire with the original one in terms of personal epistemology. In this way, the final form of the Turkish version of the questionnaire was prepared. Then, we reached students from different grade levels including primary school, middle school, high school, and university, and asked them to read the questionnaire loudly and tell us what they understood from the items. Next, we interviewed these selected students by asking questions found in the questionnaire, and their answers to the interview questions were the same as their written responses. A similar process was also followed by Kuhn et al. (2000) when they followed the epistemological belief questionnaire. Accordingly, Kuhn et al. (2000) started their work with individual interviews and then they prepared this questionnaire using interview questions. Kuhn et al. (2000) reported that the results obtained from the questionnaires were similar to the interview results.

The instrument includes 15 items and 5 content domains, so each content domain includes three specific items to assess participants' epistemological beliefs. The Turkish form of the instrument is presented in the Appendix 1. After completing the formation of the epistemological belief instrument, ethical permissions were obtained from the institution's human research ethics committee.

Each item includes two sub-questions in the given content domain. Accordingly, the first question assesses whether participants hold absolutist epistemological beliefs or not. In this question, two ideas are presented in that domain, and whether only one of the ideas is correct or both can be correct is asked. If the participant selects the alternative that only one idea is correct, the participant's belief is coded as absolutist for that item because absolutist people believe that the knowledge is certain and there is always one correct answer. If the participant selects the "both ideas can be correct" alternative, the second sub-question is asked. The second sub-question assesses whether participants hold multiplist or evaluativist beliefs. If participants select the alternative that "one of these ideas cannot be more accurate than another", they are coded as multiplist because multiplist people believe that different ideas cannot be compared with each other. On the other hand, if participants select the alternative that "one of these ideas can be more correct than another", they are coded as evaluativist because evaluativist people believe that different ideas can be compared with each other considering some criteria and some ideas can be more correct than others as a result of such evaluation (Kuhn et al., 2000). According to Kuhn et al. (2000), evaluativist belief is hierarchically better than multiplist belief and absolutist belief is more naïve compared with the other two beliefs (e.g., multiplist belief).

As each content domain includes three items, participants' answers to these items determined participants' epistemological beliefs in that domain. If participants hold the same epistemological belief in all three items, they are coded in that belief (e.g. evaluativist). Likewise, if participants hold one epistemological belief in two items and they hold another epistemological belief in one item out of three, their epistemological beliefs were coded as the belief that is consistent with the two items. For example; if a participant holds the evaluativist belief in two items and holds the multiplist belief in one item, this participant was coded as evaluativist in that content domain. The same coding process was also done by Kuhn et al. (2000). Next, we observed that some participants held three different epistemological beliefs in one content domain because their answers to all three items were different from each other. In other words, some participants hold evaluativist beliefs in one item, multiplist beliefs in another item, and absolutist beliefs in another item when all these three items are part of the

same content domain (e.g. the judgments of truth about the social world domain). These participants were not coded in terms of epistemological beliefs (e.g. evaluativist) and they were removed from the coding process as participants did not have certain epistemological beliefs in that content domain.

Data Analysis

This study sought the relation between gender and beliefs in the judgments of truth about the social world domain, gender, and beliefs in the judgments of truth about the physical world domain, grade level, and beliefs in the judgments of truth about the social world domain, and grade level and beliefs in the judgments of truth about the physical world domain. As all these variables are categorical and we sought the relationship among them, four different chi-square tests of independence were conducted. A total of 430 students participated in the study; however, we could not detect 30 students' beliefs in the judgments of truth about the physical world domain as their answers to three items of this domain were different from each other. Therefore, chi-square tests were held considering other 400 students for the relation between beliefs in the judgments of truth about the physical world domain, gender, and grade level. Accordingly, we could not detect 10 primary school students' data (9 %), 12 middle school students' data (11 %), 2 high school students' data (2 %), and 6 undergraduate students' data (6 %) for grade levels. Moreover, 16 of these unidentified data belonged to the females (6 %) and 14 of them belonged to the males (9 %).

Likewise, we could not detect 51 participants' beliefs in the judgments of truth about the social world domain; therefore, chi-square tests assessing the relation between beliefs in the judgments of truth about the social world domain, grade level, and gender were carried out for 379 students. Accordingly, we could not detect 18 primary school students' data (16 %), 12 middle school students' data (11 %), 14 high school students' data (12 %), and 7 undergraduate students' data (8 %) for grade levels. While 26 of them were female (10 %), 25 of them were male (16 %) participants.

Limitations

The study has three limitations. First, a convenient sampling strategy was used to select the sample. If random sampling had been selected, the generalizability of the finding could have been better. Second, participants' epistemological beliefs were assessed by the use of only one data collection tool which was the Epistemological Belief Instrument (Kuhn et al., 2000). If various types of data collection tools like interviews, and class observations had been used, the data obtained from the questionnaire could have been triangulated and the trustworthiness of the study could have been better. Third, some participants' answers to different items of the same content domain varied. For example, they had an evaluativist view in one item, a multiplist view in another item, and an absolutist view in another item. For such cases, we could not determine the epistemological belief of that participant in the given content domain and we did not use their data in data analysis. Therefore, alternative data collection tools that accurately measure such participants' epistemological beliefs could be used to remedy this limitation.

We also have three assumptions in this study. Firstly, we assume that participants honestly and seriously answered the Epistemological Belief Instrument (Kuhn et al., 2000). Secondly, we assume that the developmental view, which was this study's theoretical framework, accurately reflects the personal epistemology. Finally, we assume that the Epistemological Belief Instrument (Kuhn et al., 2000) is an accurate measurement tool to assess participants' epistemological beliefs.

Findings

The study has two research questions. While the first research question examines the relationship between gender and epistemological beliefs in the judgments of truth about the social and physical world domain, the second research question investigates the relationship between grade level and epistemological beliefs in the judgments of truth about the social and physical world domain. Two chi-square tests of independence were carried out for each research question and the results are presented as follows:

Gender and Epistemological Beliefs

Gender and Beliefs in the Judgments of Truth about the Social World Domain

Table 1 presents the descriptive statistics regarding students' gender and their epistemological beliefs (e.g. evaluativist) in the judgments of truth about the social world domain.

Table 1.
Gender and Epistemological Beliefs in the Judgments of Truth about the Social World Domain

Epistemological Beliefs in the Judgments of Truth about the Social World Domain				
Gender	Absolutist	Multiplist	Evaluativist	Total (n= 379)
Female	29 (11.8 %)	84 (34.1 %)	133 (54.1 %)	246
Male	34 (25.6 %)	35 (26.3 %)	64 (48.1 %)	133

According to descriptive statistics (Table 1), female students' epistemological beliefs seem to have more sophisticated beliefs than male students as the percentage of evaluativist belief is 54.1 % for females and 48.1 % for males. Likewise, the percentage of multiplist belief for females is higher than for males (34.1 % vs. 26.3 %). Next, males seem to have more absolutist beliefs than females (25.6 % vs. 11.8 %).

Then, the chi-square test for independence was conducted to see whether there is a significant relation between gender and epistemological beliefs in the judgments of truth about the social world domain. The test indicated a significant relationship between gender and epistemological beliefs in the judgments of truth about the social world domain, $\chi 2$ (2, n = 379) = 12.128 p = .002, phi = .18, with small effect size (.18 < .30, Pallant, 2011, p. 220).

Gender and Beliefs in the Judgments of Truth about the Physical World Domain

Table 2 shows the percentages of students' epistemological beliefs in the judgments of truth about the physical world domain considering their gender.

Table 2.
Gender and Epistemological Beliefs in the Judgments of Truth about the Physical World Domain

Epistemological Beliefs in the Judgments of Truth about the Physical World Domain				
Gender	Absolutist	Multiplist	Evaluativist	Total (n= 400)
Female	66 (25.8 %)	71 (27.8 %)	119 (46.4 %)	256
Male	36 (25.0 %)	34 (23.6 %)	74 (51.4 %)	144

According to descriptive statistics, the percentage of males was higher than that of females in terms of evaluativist beliefs in the judgments of truth about the physical world domain (% 51.4 vs. % 46.4). On the other hand, the percentage of female participants having multiplist beliefs was higher than males (% 27.8 vs. % 23.6). On the other hand, a quarter of both males and females held absolutist beliefs in the judgments of truth about the physical world domain. The chi-square test for independence was conducted to see whether there is a significant relationship between gender and epistemological beliefs in the judgments of truth about the physical world domain. According to test results, no significant relationship was revealed between gender and beliefs in the judgments of truth about the physical world domain $\chi 2$ (2, n =400) = 1.078 p = .58, phi = .05.

Grade Level and Epistemological Beliefs

Grade Levels and Beliefs the Judgments of Truth about the Social World Domain

Table 3 provides information about the percentages of participants' epistemological beliefs in the judgments of truth about the social world domain considering the grade levels (e.g. primary school).

Table 3.
Grade Level and Epistemological Beliefs in the Judgments of Truth about the Social World Domain

	Epistemological Beliefs in the Judgments of Truth about the Social World Domain			
Grade Level	Absolutist	Multiplist	Evaluativist	Total (n= 379)
Primary School	23 (24.7 %)	24 (25.8 %)	46 (49.5 %)	93
Middle School	24 (25.8 %)	30 (32.3 %)	39 (41.9 %)	93
High School	13 (12.3 %)	27 (25.4 %)	66 (62.3 %)	106
Undergraduate	3 (3.4 %)	38 (43.7 %)	46 (52.9 %)	87

According to Table 3, the percentage of the evaluativist level was highest in favor of high school students (62.3 %) and undergraduate and primary school students followed them (52.9 % and 49.5 %). The percentage of middle school students having the evaluativist level was the lowest (41.9 %).

Undergraduate students held the multiplist belief at most with 43.7 % and one-third of middle school students held multiplist beliefs. On the other hand, a quarter of the participants from primary school and high school held multiplist beliefs.

A quarter of middle school and primary school students were at the absolutist level, and more than one-tenth of the high school students were in this stance. On the other hand, only three undergraduate students were at the absolutist level.

The chi-square test for independence was conducted to see whether there is a significant relationship between grade level and epistemological beliefs in the judgments of truth about the social world domain, and the results showed a significant relationship $\chi 2$ (6, n =379) = 29.09 p = .00, Cramer's v = .20 with small effect size (.20 < .30, Pallant, 2011, p. 220).

Then, we conducted follow-up chi-square tests (2x2) to understand whether there is a significant relationship between grade levels and epistemological beliefs in the judgments of truth about the social world domain when we specifically focus on two groups (e.g. primary school vs. middle school). We found no significant relationship between grade level and epistemological beliefs when we just consider primary school and middle school $\chi 2$ (2, n =186) = 1.264 p = .53, phi = .08. Likewise, no significant relationship was found when primary school and high school were considered $\chi 2$ (2, n =199) = 5.701 p = .06, phi = .17. On the other hand, there was a significant relationship between grade level and epistemological beliefs for primary school and undergraduate level $\chi 2$ (2, n =180) = 18.37 p = .00, phi = .32 with medium effect size (.30 <.32 <.50, Pallant, 2011, p. 220.) and for middle school and undergraduate level $\chi 2$ (2, n =180) = 17.67 p = .00, phi = .31 with medium effect size (.30 <.31 <.50). Similarly, we found a significant relationship between grade level and epistemological beliefs when only middle school and high school were considered $\chi 2$ (2, n =199) = 9.56 p = .008, phi = .22 with small effect size (.20 < .30, Pallant, 2011, p. 220). Lastly, a significant relationship between variables was observed when high school and undergraduate levels considered $\chi 2$ (2, n =193) = 9.91 p = .007, phi = .23 with a small effect size (.20 < .30, Pallant, 2011, p. 220).

Grade Levels and Beliefs in the Judgments of Truth about the Physical World Domain

Descriptive statistics for different grade levels regarding epistemological beliefs and the judgments of truth about the physical world domain are presented in Table 4:

Table 4.
Grade Level and Epistemological Beliefs in the Judgments of Truth about the Physical World Domain

	Epistemological Beliefs in the Judgments of Truth about the Physical World Domain			
Grade Level	Absolutist	Multiplist	Evaluativist	Total (n= 400)
Primary School	23 (22.5 %)	23 (22.5 %)	56 (55.0 %)	102
Middle School	25 (26.9 %)	27 (29.0 %)	41 (44.1 %)	93
High School	39 (33.0 %)	25 (21.2 %)	54 (45.8 %)	118
Undergraduate	15 (17.2 %)	30 (34.5 %)	42 (48.3 %)	87

According to Table 4, percentages of the evaluativist beliefs were similar in different grade levels, and nearly half of the students from each grade level held evaluativist beliefs. Primary school students had

the highest percentage with 55 %. Similarly, different grade levels held a common percentage regarding the multiplist beliefs. Accordingly, a quarter of undergraduate students held multiplist beliefs in the judgments of truth about the physical world domain, and middle school students followed them. On the other hand, two-tenths of the high school and primary school students had the multiplist belief. Regarding the absolutist level, one-third of high school students and a quarter of middle school students had an absolutist view. Primary school students followed these two groups with 22.5 % and undergraduate students had the lowest percentage (17.2 %) in terms of absolutist belief in the judgments of truth about the physical world domain. The chi-square test for independence was carried out for the relationship between grade level and epistemological beliefs in the judgments of truth about the physical world domain and no significant relationship was found between grade level and epistemological beliefs in the judgments of truth about the physical world domain $\chi 2$ (6, n =400) = 11.01 p = .088, Cramer's v = .12.

Discussion

This study examined the relationship between background variables (gender and grade level) and epistemological beliefs in the judgments of truth about the social and physical world domain. The study found no significant relationship between gender and epistemological beliefs consistent with the majority of the previous research (Aslan & Şimşek, 2021; Er, 2013; Kuhn et al., 2000; Orhan, 2022; Ren, 2006; Yakışan & Karaşah, 2016). On the other hand, few previous research results were inconsistent with the current study (Marzooghi et al., 2008; Paulsen & Wells, 1998; Ismail et al., 2012). Pintrich (2002) reported two ideas explaining the gender and epistemological beliefs relations and explained that gender either has no relation with epistemological beliefs and the more important thing can be gender orientation (femininity or masculinity) or gender can be related to epistemological beliefs as females and males understand the knowledge in different ways and their epistemological beliefs may diverge because of their gender differences. Our results supported the first explanation that gender has no relation to epistemological beliefs. Similarly, Baxter Magolda (1992) reported males and females have similar epistemological beliefs but they have different patterns when acquiring these beliefs.

The second topic of the study was the relationship between grade level and epistemological beliefs in the judgments of truth about the social and physical world domain. Prior to the study, we hypothesized that epistemological beliefs improve with increasing grade level which means that primary-level students would hold the absolutist beliefs and the number of evaluativist beliefs would increase with increasing grade level from primary school to the undergraduate level. This expectation was observed for the beliefs in the judgments of truth about the social world domain to some degree. For example, we found a medium effect size regarding the relationship between grade level and epistemological beliefs in the judgments of truth about the social world domain when primary school students and undergraduate students were considered. The same effect size was also observed when middle school students and undergraduate students were considered. In line with this, we observed a small effect size for the relationship between grade level and epistemological beliefs when high school students were taken into account with middle school students and undergraduate students. Using this information, we claim that students start changing their epistemological beliefs in the judgments of truth about the social world domain in high school. For example, high school students held evaluativist beliefs with the highest percentage (62.3 %) and they started losing the absolutist beliefs (12.3 %) which is the most naïve stage for epistemological beliefs. We claim that major change in the beliefs in the judgments of truth about the social world domain happens at the undergraduate level as medium effect size indicates. In this grade level, only 3 undergraduate students held absolutist beliefs in the judgments of truth about the social world domain. While 84 students out of 87 passed to the higher epistemological beliefs, 38 of them were in the multiplist beliefs and could not pass to the evaluativist beliefs whereas 46 students could pass to the evaluativist level. Losing the absolutist level is an achieving task for the judgments of truth about the social world domain because it is not easy to pass from the absolutist level to the multiplism in the judgments of truth about the social and physical world domain, unlike the other three content domains like the personal taste (Kuhn & Weinstock, 2002). At this level, students obviously consider alternative ideas and multiple perspectives on social issues like the human population and pass to the multiplist level. While some of the undergraduates just respect multiple perspectives on social issues and do not discuss the ideas further (i.e., the

multiplist), some undergraduates continue challenging different ideas to decide which perspective is more accurate (i.e., the evaluativist). Similarly, Schiefer et al. (2022) reported lower grade students hold absolutist beliefs more and students from higher grade levels hold more sophisticated beliefs. Schiefer et al. (2022) explain this situation as such: when grade level and academic level increase, the epistemic climate changes. For example; students make critical discussion and critical thinking, compare different approaches, and find their own solutions to the problems. As a result, these educational activities done in higher grade levels like high school and undergraduate might improve students' epistemological beliefs in the judgments of truth about the social world domain.

Although we found a statistically significant relationship between grade level and epistemological beliefs in the judgments of truth about the social world domain, we did not find any relationship between grade level and epistemological beliefs in the judgments of truth about the physical world domain. This result suggests that increasing grade level does not guarantee an increase in epistemological beliefs when the judgments of truth about the physical world domain are considered. In line with this, Kuhn and Weinstock (2002) found that older people may also have naïve epistemological beliefs, therefore, education and age do not bring evaluativist beliefs. On this point, Kuhn and Weinstock (2002) reported that the first rule to have evaluativist beliefs is to value reasoned argument, and to accept reasoned argument is the way reaching us to knowledge and informed understanding. Therefore, the classes starting from the early years of education should provide opportunities for students to engage in activities in which they produce and defend their claims. During this practice, students evaluate the claims and discuss different ideas in a social context (Kuhn & Weinstock, 2002). In other words, argumentation practice where students compete and construct ideas to reach a consensus is vital to improve epistemological beliefs (Ryu & Sandoval, 2012).

In this study, we also observed that primary school students held the evaluativist with the highest percentage (55 %) for the judgments of truth about the physical world domain. Similarly, Peter et al. (2016) reported that even young learners can have evaluativist beliefs, and students from the same grade levels can have different epistemological beliefs. This situation makes the relationship between grade level and epistemological beliefs questionable (Peter et al., 2016). There can be explanations for why young learners hold sophisticated epistemological beliefs. For example; Ozkal et al. (2010) reported that middle school students having working mothers, educated parents, a separate study room, and families possessing high socio-economic status generally have more sophisticated scientific epistemological beliefs compared to their counterparts. The same can also be true for our sample, but we do not have enough data to assert such claims. Kuhn and Weinstock's (2002) explanations about the development of epistemological belief can also support this finding. Accordingly, children start to think knowledge comes from external sources at the age of three and they become absolutists. When they are 4 years old, they start to think that knowledge is the construction of the human mind and it is subjective. They reach the multiplist level in 5 and 6 years when they accept the conflicting beliefs, but still, they do not think that the people are the source of knowing, so they are absolutist to some extent in these years. Then, they can pass to the multiplist and evaluativist levels (Kuhn & Weinstock, 2002). Our result for the percentage of evaluativist primary school students is consistent with this explanation because primary school students in this study might follow the same pathway until they were 6 years old and some of them may reach the evaluativist level in the following three or four years (Note: primary school participants were 10 or 11 years old in this study.)

Implications

This study provided evidence that gender is not related to epistemological beliefs (Kessel, 2013; Pintrich, 2002). Therefore, we advise teachers from different lessons (e.g. science, social science) to give gender bias in their thinking. For example, female students were not more absolutistic than males in this study. However, if teachers believe that girls can learn as passive listeners and boys can learn by doing, this class environment may lead girls to think that knowledge is certain and found outside of the self. Therefore, they could have absolutistic beliefs. On the other hand, boys who actively engage in the knowledge construction process might think that knowledge is constructed by human beings through inquiry and so they might hold higher epistemological beliefs like multiplism or evaluativism. In short, teachers' beliefs and their practice, not students' gender, may cause differences between girls

and boys in terms of their epistemological beliefs (Scantlebury & Baker, 2013). Fortunately, the students in this study did not differ in epistemological beliefs, so we infer that their teachers do not have a gender bias in their teaching.

We also found that students' grade level is related to their epistemological beliefs in the judgments of truth about the social world domain and students from high school and undergraduate level held more sophisticated beliefs. We thought that the changing epistemic climate might be a cause for change in epistemological beliefs in different grade levels (Schiefer et al., 2022). For example; students make more critical thinking in higher grade levels and this situation changes their epistemological beliefs in a desired way. On the other hand, students' maturity can also be responsible for the change in their epistemological beliefs (Kuhn & Weinstock, 2002). Therefore, we advise researchers to conduct experimental studies including the same grade level students with different teaching methods. In this way, we can understand better whether changing epistemic climate is the cause of change in epistemic beliefs because we control the maturity level of students.

Although we found a statistically significant relationship between grade level and epistemological beliefs in the judgments of truth about the social world domain, we did not find any relation for these variables in the judgments of truth about the physical world domain. We think that the lack of argumentation practice in science classes can be the cause of this situation (Ryu & Sandoval, 2012). Accordingly, there is a competition between ideas in argumentation and students use evidence to persuade others in favor of their claims (Sandoval & Millwood, 2008). When students engage in argumentation, they will notice that there can be other perspectives for the same problem, so they can pass from the absolutist level to the multiplist level. Likewise, when they evaluate the alternative ideas, they need to examine the coordination between the evidence and the ideas, so they will reach the evaluativist views (Kuhn & Weinstock, 2002). Therefore, we advise researchers to conduct experimental research including argumentation treatment, and use different content domains (the judgments of truth about the social and physical world domain) as dependent variables. Such research can inform us about the relative contribution of argumentation treatment on epistemological beliefs in different content domains.

Lastly, we focused on two content domains (beliefs in the judgments of truth about the social and physical world domain) to assess students' epistemological beliefs. However, Kuhn et al. (2000) reported there are three more content domains (personal taste, aesthetic, and value) in which people make judgments about epistemological beliefs. Future epistemological belief studies can also examine people's epistemological beliefs in these domains to more holistically understand the nature of epistemological beliefs.

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Ethics statement: In this study, we declare that the rules stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with and that we do not take any of the actions based on "Actions Against Scientific Research and Publication Ethics". At the same time, we declare that there is no conflict of interest between the authors, which all authors contribute to the study, and that all the responsibility belongs to the article authors in case of any ethical violations.

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Appendices

Appendix 1. Turkish form of Epistemological Belief Instrument

Değerli Katılımcılar;

Bu araştırma sizlerin epistemolojik inanışlarınızı yani bilgiye yönelik inanışlarınızı ölçmek için oluşturulmuştur. Ölçekte 15 adet çoktan seçmeli soru vardır ve bu sorulara yanıt vermeniz beklenmektedir. Çalışmaya katıldığınız için teşekkür ederiz.

Kişisel Bilgiler:

Okulunuz: İlkokul ☐ Ortaokul ☐ Lise ☐ Üniversite ☐

Sınıf Düzeyiniz: …….

Cinsiyetiniz: Kadın ☐ Erkek ☐

Okulunuzun
Adı:……

Eğer üniversite öğrencisi iseniz, Bölümünüz:……..

Aşağıdaki koyu ile yazılmış görüşleri göz önünde bulundurarak sorulara yanıt veriniz:

• **Rafet sıcak yaz günlerinin en güzel günler olduğunu düşünüyor.** • **Caner serin sonbahar günlerinin en güzel günler olduğunu düşünüyor.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet içine baharat konulan güvecin daha lezzetli olduğunu söylemektedir.** • **Caner içine baharat konmayan güvecin daha lezzetli olduğunu söylemektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet düğün töreninin gündüz yapılması gerektiğini düşünmektedir.** • **Caner düğün töreninin akşam yapılması gerektiğini düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet dinledikleri şarkılardan birincisinin daha güzel olduğunu düşünmektedir.** • **Caner dinledikleri şarkılardan ikincisinin daha güzel olduğunu düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet baktıkları ilk tablonun daha güzel olduğunu düşünmektedir.** • **Caner baktıkları ikinci tablonun daha güzel olduğunu düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet okudukları ilk kitabın daha iyi olduğunu düşünmektedir.** • **Caner okudukları ikinci kitabın daha iyi olduğunu düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet insanların kendileri için sorumluluk almaları gerektiğini düşünmektedir.** • **Caner insanların birbirlerine yardımcı olmak için beraber çalışması gerektiğini düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet yalan söylemenin yanlış olduğunu düşünmektedir.** • **Caner bazı durumlarda yalan söylenebileceğini düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet nüfusun aşırı artmaması için devletlerin ailelerin sahip olabileceği çocuk sayısını sınırlandırması gerektiğini düşünmektedir.** • **Caner ailelerin istediği kadar çocuk sahibi olabilmesi gerektiğini düşünmektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet'in suçluların neden suç işlemeye devam ettiği ile ilgili bir görüşü vardır.** • **Caner'in suçluların neden suç işlemeye devam ettiği ile ilgili farklı bir görüşü vardır.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet Kırım savaşının başlangıç nedeni ile ilgili olarak bir kitabın açıklamasını doğru bulmaktadır.** • **Caner Kırım savaşının başlangıç nedeni ile ilgili olarak başka bir kitabın açıklamasını doğru bulmaktadır.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet çocukların dili nasıl öğrendiğini açıklayan bir kitabın açıklamasını desteklemektedir.** • **Caner çocukların dili nasıl öğrendiğini açıklayan başka bir kitabın açıklamasını desteklemektedir.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet atomların nelerden oluştuğunu açıklayan bir kitabın açıklamalarına inanmaktadır.** • **Caner atomların nelerden oluştuğunu açıklayan başka bir kitabın açıklamasına inanmaktadır.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet beynin nasıl çalıştığını açıklayan bir kitabın açıklamasına inanmaktadır.** • **Caner beynin nasıl çalıştığını açıklayan başka bir kitabın açıklamasına inanmaktadır.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

• **Rafet bir matematik uzmanının bir matematik formülü ile ilgili kanıtlarının doğru olduğuna inanmaktadır.** • **Caner başka bir matematik uzmanının matematik formülü ile ilgili kanıtlarının doğru olduğuna inanmaktadır.** **Bu 2 görüşü düşündüğümüzde**, A veya B seçeneklerinden hangisi sizin düşüncenizi desteklemektedir? A) Bu 2 görüşten sadece biri doğrudur B) Her iki görüşün de doğruluk payı vardır.	Eğer B seçeneğini işaretlediyseniz (Her iki görüşün de doğruluk payı vardır.), Bu iki görüşten biri diğerinden daha doğru olabilir mi? Uygun olduğunu düşündüğünüz C veya D seçeneğinden birini işaretleyiniz. C) Bir görüş diğerinden daha doğru olabilir. D) Bir görüş diğerinden daha doğru olamaz.

Katılımınız için Teşekkür ederiz ☺