

# An Argumentation Practice Based on STEAM for the Chemistry Education of Gifted

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## 1. Introduction

With the dizzying changes and developments of the 21st century, STEM education first started in the United States to gain an advantageous position in the global market by educating qualified high school and college graduates who are adapting to these innovations (Breiner et al. 2012). The acronym of STEM means teaching and learning in the fields of science, technology, engineering, and mathematics. It usually includes educational activities for the integration of these disciplines with each other in each stage of education (Gonzalez and Kuenzi 2012). According to Sanders (2009), STEM is defined as inquiry and design for solutions to students' problems in daily life or areas of their interest by integrating technological design with scientific research.

The STEM educational policy took place rapidly in educational environments, but some experts in the art community and beyond have suggested that art should be integrated into this combination to make the combination of science, technology, engineering, and mathematics stronger (Robelen 2011). In addition, traditional STEM degrees focus on convergent skills, whereas art degrees focus on divergent skills (Land 2013). In history, a sharp distinction between disciplines has not been made since the ancient Greeks. From this point of view, if a synergetic balance is established between art and science, it is needed to provide this integration (Piro 2010). Thus, it could be said that the transition period from STEM to STEAM started in enhancing the education platform to better prepare students for both analytical and creative thinking (Land 2013).

It would be useful to underline that the science, technology, engineering, arts, and mathematics (STEAM) amalgamation is not a teaching method; it is just an educational guide. Therefore, a proper teaching method must be selected for the STEAM process. Argumentation, which is based on inquiring and criticizing processes, could be offered as a proper teaching method for STEAM education. Argumentation is conducted in effective speech communication to improve critical thinking (West 1994). Argumentation is also "the coordination of evidence and theory to support or refute an explanatory conclusion, model, or prediction" (Suppe 1998,

cf., Osborne et al. 2004, p. 995). Engaging students with an argumentation process requires the use of an argument pattern. A basic argument pattern from the literature could be given as Walton's proposal (Walton 2006). Walton proposed using three premises to justify a conclusion as an argument pattern.

On the other hand, for nearly a century, scholars have sought to understand, measure, and explain giftedness. Giftedness is the manifestation of performance that is clearly at the upper end of the distribution in a talent domain, even relative to other high-functioning individuals in that domain (Subotnik et al. 2011); therefore, the education of gifted students requires some characteristics. First, gifted students need a daily challenge in their specific areas of interest. Second, opportunities should be given to gifted students to work independently in their areas of interest and talent. Third, subject-based and grade-based acceleration must be provided to gifted students according to their educational needs. Fourth, gifted students' socialization and learning needs with their like-ability peers must be taken into consideration too. Fifth, for specific curriculum areas, instructional delivery must be differentiated (Rogers 2007). For differentiating instructional delivery, by transferring higher-level lesson contents to the current class and using the remaining time by narrowing the subjects for different topics, students' independent longitudinal studies on the topic of their interests and summer programs running after the school term could be offered as programming options—in other words, enrichment.

In the literature, for differentiating gifted students' learning domains, especially in chemistry education, it was suggested to construct teaching domains giving the chance to gifted students to learn by experiencing in order to enhance their critical and upper-cognitive thinking (Taber 2010; Umar 2017). Demircioglu et al. (2012) utilized context-based learning on acid-base topic for improving gifted students' meaningful concept learning as an enrichment study. In other enrichment research, the 5E model was utilized on a change of matter subject for correcting gifted students' misconceptions of the same subject; a common knowledge construction model was utilized on acid-base subject for helping gifted students develop positive attitudes towards lessons (Demircioglu et al. 2014, 2016; Demircioglu and Vural 2016).

However, in the national literature, there are also chemistry enrichment argumentation studies based on different teaching activities such as "living statues", "prototype constructions", "black box experiments", "case studies", "forensic chemistry experiments", and "chemistry-toxicology experiments". In an argumentation-based living statues study, a teacher of gifted students, who is also an international living statue, and her daughter modeled Marie Curie and her daughter Irene as living statue performances. Another teacher of gifted students conducted

the argumentation process for gifted students, based on living statues' historical science stories for teaching the students the nature of science. The gifted students' pre- and post-drawings showed that their nature of science images improved as "The scientists could be woman too", "Science requires a teamwork; science could not be done alone", and "The scientists could gain knowledge through argumentation too; not only gain through experiments" (Akyol and Tüzün 2020). Harut et al. (2019) made gifted students model "Prof. Dr. Fuat Sezgin's prototypes" in their research. After modeling the prototypes, the gifted students criticized the prototypes' functions by constructing arguments. The research's results showed that not only the gifted students' critical thinking was improved by enhancing their argument construction skills but also their recognition of an internationally famous scientist (Prof. Dr. Fuat Sezgin) was improved by modeling his prototypes. Tüzün and Tüysüz (2019a) researched gifted students' critical thinking skills through a black box experiment arguing process. First, the gifted students argued the black box experiments, and then they had the chance to criticize their own thinking processes through conducting the experiments again but this time without black boxing. Therefore, the gifted students' critical thinking skills were improved as a result of the study. In a study for encouraging gifted students to criticize chemistry through an online enrichment application, forensic chemistry/science case studies were used. The gifted students argued each of the seven case studies in an online argumentation process, and through the process, the gifted students could justify their claims by evidence and warrants, or they rebutted the others' claims by counter-claims and counter-warrants. The study enhanced the gifted students' critical thinking with the help of making them construct arguments and counter-arguments in an online argumentation process (Tüzün and Tüysüz 2019b). In another study making gifted students conduct forensic chemistry experiments/forensic analysis and then argue the analysis' result, the gifted students' argument construction skills were improved, as well as their critical thinking skills (Tüysüz and Tüzün 2019). According to national ethical standards, daphnia is a microscopic organism allowed for use in experiments at schools. Tüzün and Tüysüz (2019c) made gifted students study the environmental effects on daphnia as another enrichment study. The gifted students investigated the organism's heart beat number per ten seconds in a drop of water under a microscope because the organism is glassy. Then, the students investigated the organism's heart beat number per ten seconds in a drop of vinegar assimilating an acid rain-exposed environment under a microscope. The heart beat number per ten seconds was multiplied by six for transmuting the number per minute. This was to ensure the organism did not suffer and could continue its life. The gifted students

argued the difference between the heart beat numbers in water and in vinegar environments on the basis of toxicology. Not only the gifted students' argument construction skills were improved by this research but also a very different teaching domain was modeled for further international researchers. However, there are no chemistry enrichment studies in the literature about argumentation practice based on STEAM. Therefore, in this study, it was aimed to construct a chemistry enrichment argumentation practice based on STEAM. Here, it would be useful to explain why the discipline was chosen as chemistry because some students are not able to learn chemistry properly due to its submicroscopic nature (Nakhleh 1992). Therefore, in appropriate argumentation-based teaching domains, students could learn the basic concepts by arguing them, through improving their argument construction skills. More specifically, it was aimed to enhance gifted students' argumentation skills by making them complete the missing part of a chemistry animation scenario based on STEAM and then reconstruct it as an argument as an enrichment in this study. It was also aimed to fill the gap in the literature with the help of this study. The research question was constructed as "How could argumentation skills of gifted students be enhanced by an argumentation practice based on STEAM?" The significance of the study could be stated as being a guide for educators studying in the field of education of the gifted for offering alternative programming options with the help of this "argumentation practice based on STEAM" study's detailed description. On the other hand, constructing a guide for educators studying in the field of education of the gifted for offering alternative programming options with the help of argumentation practice is so important because according to Kopnina (2020), for sustainable development and education, critical pedagogy, which formed the basis of the current study, is so important too. As UNESCO (2017) emphasized, it is needed to change the way individuals think and act. This requires quality education and learning for sustainable development at all levels and in all social contexts, which were also the current study's target too (cf. Hofman-Bergholm 2020).

## **2. Materials and Methods**

### *2.1. Theoretical Framework: Case Study*

This study employed a case study as the theoretical framework. "For the most part, the cases of interest in education and social service are people and programs. Each one is similar to other people and programs in many ways and unique in many ways. We are interested in them for both their commonality and uniqueness. We seek to understand them. We would like to hear their stories" (Stake 1995, p. 1). This framework is especially suited for this study since the case of interest is

“completing the missing parts of chemistry animation scenarios based on STEAM and reconstructing them as arguments” as a programming option, and “the effect of the program on gifted students’ concept images and argumentation skills” as the influence on the people dimension.

### *2.2. Setting and Participants*

The study was conducted with 12 gifted students at a school for the gifted in Ankara province in Turkey. The context of the study was a workshop for the gifted which gave an opportunity to investigators to construct an independent enrichment domain for the chemistry education of the gifted. A workshop group of 12 students met for two hours per week for four weeks, totaling an eight-hour period for this study. The willingness of the gifted students for this enrichment was the criterion for the determination of the participants of this study. Six participants were female, and the other six participants were male.

### *2.3. Instruments*

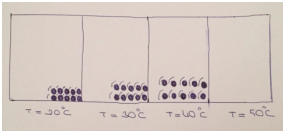
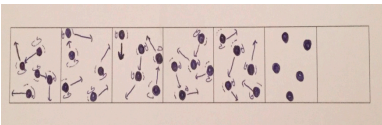
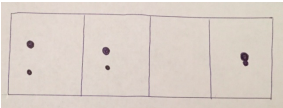
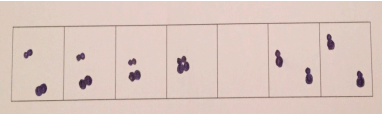

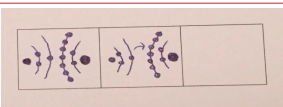
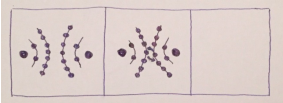
Seven different worksheets were used as data collection tools. In each of the worksheets, first, gifted students were asked to draw the missing part of each chemistry animation scenario and then to criticize their drawings as arguments on the basis of Walton’s (2006) argument pattern components, consisting of a conclusion with three premises; in other words, justifying a claim with three different warrants. The worksheets are provided in Table 1.

The instruments’ content validity was checked by two experts in science education. The instruments’ reliability was guaranteed by the same educators’ coding and categorizing consistency through the data analysis process.

### *2.4. Data Collection Process*

Before the application process, STEAM, chemistry animation scenarios, argumentation, and argument concepts were explained to the gifted students. Then, chemistry animation scenarios, each with a missing part, were given to the students. The students argued each of the chemistry animation scenarios in small groups. They criticized their own and others’ thinking strategies through these small group discussions about the chemical concepts for constructing scientifically proper images about the concepts in their mental schemes. Additionally, they then individually drew the missing parts of the chemistry animation scenarios. At the end, they individually reconstructed their drawings as arguments on the basis of Walton’s (2006) argument pattern components of conclusion, premise, premise, and premise.

**Table 1.** The worksheets of the study.

Chemistry Animation Scenarios Each with a Missing Part	First Part	Second Part
	<p>Draw the missing part of the scenario for the movements of the solid phase of matter's particles for increased temperature.</p>	
	<p>Draw the missing part of the scenario for the movements of the gas phase of matter's particles.</p>	
	<p>Draw the missing part of the scenario for the combining reaction.</p>	
	<p>Draw the missing part of the scenario for the replacement reaction.</p>	<p>Reconstruct your drawing as an argument on the basis of Walton's (2006) argument pattern with conclusion, premise, premise, premise components.</p>
	<p>Draw the missing part of the scenario for the dissolution of sodium chloride (NaCl) salt in water (H<sub>2</sub>O).</p>	
	<p>Draw the missing part of the scenario for the formation of ionic bonding for lithium fluoride (LiF).</p>	
	<p>Draw the missing part of the scenario for the formation of covalent bonding for fluorine molecule (F<sub>2</sub>).</p>	

## 2.5. Data Analysis

Content analysis was utilized for the gathered data.

First, the gifted students' drawings were coded, and then categories were constructed and frequency-percentage calculations were performed. Additionally, students' arguments were coded on the basis of Walton's (2006) argument pattern components of conclusion-premise-premise-premise only if the arguments were scientifically correctly constructed by the gifted students. The categories were formed

with the arguments' existing code combinations; frequency-percentage calculations were performed.

For the data collection tools' content validity, two researchers checked the data collection tools. For the data collection tools' reliability, two different researchers coded and categorized the gathered data; whenever their analyses contradicted each other, they came to an agreement by recoding and recategorizing. Using two different independent researchers for coding and categorizing also provided the study's researcher triangulation for validity. Additionally, making students draw the missing parts of the chemistry scenarios and reconstruct the scenarios as arguments provided data triangulation for validity. For qualitative research, triangulations are very important for validity of the research.

Additionally, in this study, in accordance with the STEAM pedagogy, the students were exposed to chemical problems such as finding solutions for missing parts of scenarios and then, as the art part, drawing the missing parts. Therefore, before reconstructing the chemistry scenarios as arguments, an application was put forth on the basis of the STEAM philosophy.

### **3. Results**

#### *3.1. The Gifted Students' Drawings Analysis*

The gifted students' drawings for the missing parts of each animation scenario were coded, categories were constructed, and frequency-percentage calculations were performed. The findings are shown in Table 2.

In Table 2, it can be seen that for the first animation scenario, 100% of the gifted students could draw the missing part of it scientifically correctly. For the second, third, fourth, fifth, sixth, and last animation scenarios, 75%, 100%, 100%, 92%, 75%, and 92% of the gifted students could draw the missing part of the animation scenarios scientifically correctly, respectively. Therefore, the gifted students' drawings analysis showed that they were able to mentally construct proper concept images after small group discussions.

**Table 2.** Analysis of the gifted students' drawings.

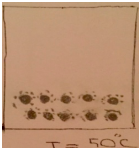

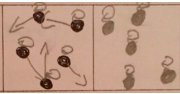
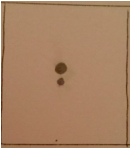
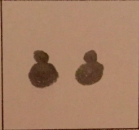
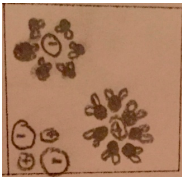
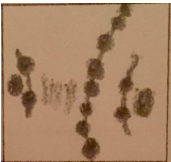
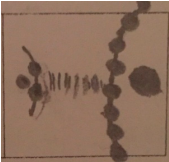

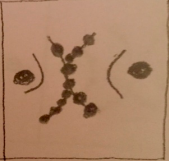
The Animation	Scientifically Correct Drawings		Partly Correct Drawings	
	Codes	f-%	Codes	f-%
1. The solid phase of matter's particles movements	<p>Raising the vibration movements of solid particles code Raising the space among the particles of solid phase of matter code G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, G12</p>  <p>G3</p>	12-100%	-	-
2. The gas phase of matter's particles movements	<p>Gas particles' vibration, moving about and sliding past each other movements code Flexible collisions among gas particles and the walls of the container code G1, G2, G3, G4, G5, G6, G10, G11, G12</p>  <p>G1</p>	9-75%	<p>Not being able to show vibration movements of gas particles code Not being able to show sliding past each other movements of gas particles code G7, G8, G9</p>  <p>G8</p>	3-25%
3. Combining reaction	<p>Being able to draw particle sizes relatively code Proper geometry for reaction code G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, G12</p>  <p>G2</p>	12-100%	-	-
4. Replacement reaction	<p>Flexible reaction in proper geometry code Being able to draw proper products code G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, G12</p>  <p>G12</p>	12-100%	-	-



Table 2. Cont.

The Animation	Scientifically Correct Drawings		Partly Correct Drawings	
	Codes	f-%	Codes	f-%
5. The dissolution of sodium chloride (NaCl) salt in water (H <sub>2</sub> O)	Hydrating each ion of salt with six water molecules code Hydrating sodium ion of salt with six water molecules and with each molecules' hydrogen sides code Hydrating chloride ion of salt with six water molecules and with each molecules' oxygen side code G1, G2, G3, G4, G5, G7, G8, G9, G10, G11, G12	11-92%	-	-
				
	G10			
6. The formation of ionic bonding for lithium fluoride (LiF)	Electron giving-taking code Being able to properly draw nucleus, atomic shells, and electrons code G1, G2, G3, G4, G5, G7, G8, G11, G12	9-75%	Drawing with missing nucleus or atomic shells or electrons code G6, G9, G10	3-25%
				
	G11		G10	
7. The formation of covalent bonding for fluorine molecule (F <sub>2</sub> )	Electron sharing code Being able to properly draw nucleus, atomic shells, and electrons code G1, G2, G3, G4, G5, G6, G8, G9, G10, G11, G12	11-92%	Drawing with missing electrons code G7	1-8%
				
	G2		G7	

In Table 2, frequency is shown by *f* and percentages by %. For each of the categories, the students' drawings are shown by G, G for the shortening of "gifted student". For each of the categories, illustrations from students' drawings are shown too. Additionally, as can be seen in the table, a gifted student did not produce a drawing for the fifth animation scenario's missing part.

### 3.2. The Gifted Students' Arguments Analysis

The gifted students reconstructed each of their drawings as arguments. The arguments were coded on the basis of Walton's (2006) argument pattern components of conclusion, premise, premise, and premise only if the arguments were scientifically correct. The students constructed arguments consisting of code combinations formed the categories. Additionally, frequency-percentage calculations were performed. The findings are shown in Table 3.

**Table 3.** Analysis of gifted students' arguments.

The Animation Scenarios	Categories—f- %				
	-	C	CP	CPP	CPPP
1. The solid phase of matter's particles movements	1-8% G6	5-42% G1, G4, G8, G10, G11	4-33% G3, G5, G7, G12	2-17% G2, G9	-
2. The gas phase of matter's particles movements	-	6-50% G1, G4, G5, G6, G8, G9	4-33% G3, G7, G10, G11	2-17% G2, G12	-
3. Combining reaction	-	1-8% G4	3-25% G3, G6, G10	8-67% G1, G2, G5, G7, G8, G9, G11, G12	-
4. Replacement reaction	-	2-17% G6, G8	-	7-58% G3, G5, G7, G9, G10, G11, G12	3-25% G1, G2, G4
5. The dissolution of sodium chloride (NaCl) salt in water (H <sub>2</sub> O)	-	3-25% G6, G11, G12	2-17% G4, G7	6-50% G1, G3, G5, G8, G9, G10	1-8% G2
6. The formation of ionic bonding for lithium fluoride (LiF)	-	3-25% G3, G4, G6	1-8% G7	6-50% G1, G2, G5, G8, G10, G11	2-17% G9, G12
7. The formation of covalent bonding for fluorine molecule (F <sub>2</sub> )	-	1-8% G6	7-59% G5, G7, G8, G9, G10, G11, G12	4-33% G1, G2, G3, G4	-

In Table 3, frequency is shown by f, percentages by %, conclusion code by C, and premise code by P. Additionally, the conclusion category is shown by C, conclusion-premise category by CP, conclusion-premise-premise category by CPP, and conclusion-premise-premise-premise category by CPPP. For each of the categories, the students' arguments are shown by G, G for the shortening of "gifted student".

In Table 3, it can be seen that for the first animation scenario, 50% of the gifted students could justify their claims with at least one premise or more. For the second, third, fourth, fifth, sixth, and last animation scenarios, 50%, 92%, 83%, 75%, 75%, and 92% of the gifted students could justify their claims with at least one premise or more, respectively. Therefore, the gifted students' arguments analysis showed that they could justify their claims with premises. Additionally, their argument construction success increased through the animation scenarios, which suggests

their argumentation skills were improved too. For backing up the given findings, examples from gifted students' arguments are provided below.

1. The solid phase of matter's particles movements:

Gifted student coded by 2 (G2): When the temperature increases, the solid phase of matter's particles much more vibrate (conclusion). Therefore, the space among the particles increase (premise). On the other hand the particle sizes remain the same (premise).

2. The gas phase of matter's particles movements:

G12: Gas particles vibrate, move about, and slide past each other (conclusion). The space among the particles is too much (premise). The particles also collide flexibly with the walls of the container (premise).

3. Combining reaction:

G12: A new compound formed. For example, it could be calcium sulfur (conclusion). Two different atoms reacted. For example, calcium and sulfur reacted (and formed ionic bonding) (premise). A new particle was formed from the reactants (premise).

4. Replacement reaction:

G1: New particles were formed (conclusion). We pictured the stage of product forming (premise). The particles did flexible-collisions for reaction (premise). Additionally, proper geometry was needed for reactions to occur (premise).

5. The dissolution of sodium chloride (NaCl) salt in water (H<sub>2</sub>O):

G9: Water particles hydrate the salt ions (conclusion). Each positive ions of salt were hydrated with six water particles and with each particle's oxygen side (premise). Each negative ions of salt were hydrated with six water particles and with each particle's hydrogen side (premise).

6. The formation of ionic bonding for lithium fluoride (LiF):

G5: The atoms did electron giving-taking (conclusion). Lithium atom gave an electron to fluorine atom (premise). Fluoride ion with negative charge formed (and lithium ion with positive charge formed and also ionic bonding between ions was formed) (premise).

7. The formation of covalent bonding for fluorine molecule (F<sub>2</sub>):

G11: After the formation of covalent bonding the bonding atom's last shell electrons were equal to eight (conclusion). The atoms shared their electrons for covalent bonding (premise).

#### 4. Discussion

In this study, gifted students were given the task to complete the missing parts of chemistry animation scenarios based on STEAM and then reconstruct them as an argument as an enrichment. At the end of the study, it was found that gifted students were able to complete the missing parts of the chemistry animation scenarios in order to construct proper concept images. Then, they reconstructed their drawings as arguments; therefore, it could be said that their argumentation skills were enhanced based on their increasing success of arguing the missing parts of the chemistry animation scenarios with the help of justifying their conclusions with premises.

Nakhleh (1992) stated that some students are incapable of understanding chemistry because of its submicroscopic nature. In the first part of the study, the gifted students argued each missing part of the chemistry animation scenarios in small groups, and then they individually drew their images about the missing parts. The results show that they could produce scientifically proper concept images about the chemical concepts. Therefore, it could be said that “this argumentation practice based on STEAM” teaching environment could help gifted students to be able to understand chemistry concepts by arguing their submicroscopic nature. In the literature, it was stated that in argumentation-based teaching domains, students can understand the concepts much more properly, learn the nature of science, and be able to conduct an inquiry process (Kaya and Kılıç 2008). Therefore, in this study, by giving the chance to the gifted students to experience an argumentation process, they were able to understand the concepts properly by producing proper concept images.

According to Piro (2010), educating students in the science, technology, engineering, arts, and mathematics (STEAM) amalgamation learning environment helps them to gain better questioning skills in order to develop critical thinking skills. In this argumentation practice based on STEAM study, the gifted students were able to argue the missing parts of the animation scenarios in small groups, meaning they had the chance to criticize their own and others’ thinking ways, which would probably help them to gain better argument construction skills in order to develop argumentation and critical thinking skills. According to the (Cambridge International AS & A Level Thinking Skills 9694, Syllabus, Syllabus 2020–2022), when students are able to construct scientific arguments, they are able to think critically too, as the current study results show.

In the literature, Olszewski-Kubilius and Corwith (2018) proposed using challenging curriculums and also domain-specific performance indicators for the education of the gifted. Therefore, in this study, as a challenging program option, a two-step method, which consisted of, firstly, arguing the missing parts of the

animation scenarios in small groups and then drawing the missing parts individually, and secondly, reconstructing the drawings as arguments, was utilized according to the literature. Additionally, being domain-specific performance indicators, the students' drawings and the students' arguments were used, as proposed in the literature. These two factors may have helped the gifted students to produce proper concept images and to construct scientific arguments.

On the other hand, gifted students' learning needs require "interrogating new knowledge", "thinking it through", and "linking and organizing" (Stott and Hobden 2016). This study employed an argumentation practice based on STEAM which gave the students the chance to think through new knowledge through small group discussions, interrogate new knowledge by drawing and producing proper concept images, and link and organize through argument construction.

Ziegler et al. (2012) stated that for the education of the gifted, holistic perspective and multidisciplinary approach are very important. The current study provided gifted students with a multidisciplinary approach based on the STEAM amalgamation, encouraging students to criticize their newly adopted knowledge with the help of the arts too. Then, a holistic perspective was also experienced by the gifted students by viewing the whole process as an argument.

This study was limited to researcher triangulation and data triangulation. For further research, different triangulations such as environmental triangulation or method triangulation could be offered too (Guion 2002). In Appendix A, a mini guide for educators of gifted students is provided for further studies for the replication of the current study. In addition to the above, different programming options and enrichment studies could be proposed in further research.

**Funding:** No funding was used.

**Conflicts of Interest:** The education of gifted, chemistry education, argumentation.

## **Appendix A**

### *A Mini Guide for Educators of Gifted Students for Further Studies for the Replication of the Current Study*

- Introduce "STEAM", "chemistry animation scenarios", "argumentation", and "argument" concepts to your students before the application process.
- Give the chemistry animation scenarios, each with a missing part, to your students for arguing. You can use the current study's chemistry animation

scenarios, or you can construct your own according to the concepts you prefer to teach.

- Give time to your students to argue the chemistry scenarios' missing parts in small groups. The students could build the groups, or you can, whichever you think will result in high student attendance and performance.
- Make sure your students criticize their own and others' thinking strategies. They must construct arguments and counter-arguments in groups. Whenever it is necessary, you can prompt the group discussions with proper questions such as
- "Is there anyone who wants to justify your friend's argument?"
- "Is there anyone who wants to refute your friend's argument?"
- "I'm thinking as ... How could you justify or refute me?" ...
- Then, make your students complete the chemistry animation scenarios individually.
- At the end, make your students criticize the whole process by constructing arguments. You can use Walton's (2006) argument pattern, like this study, or you may choose a much more proper argument pattern according to your students' academic needs from the literature.
- Be sure to provide feedback for your students' drawings and arguments in the following lesson. You can use the codes and categories in the current study, or you can construct your own.

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