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Review Article

## What are the competences & difficulties of school students in writing material-based & multi-perspective argumentations in geography classrooms?

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Abstract: The competence to argue is fundamental for participation in social discourse and for responsible action, as different actions can be evaluated, weighed and justified through argumentation. Such argumentation skills should be acquired in geography lessons. These lessons often deal with societal debates such as migration, climate change and sustainability, which are characterised by a certain multi-perspectivity. Since different types of materials are often used in geography lessons, this study is dedicated to material-based, multi-perspective written argumentation. First, a model is presented in which a set of didactic requirements for material-based, multi-perspectival argumentation on space use conflicts in geography lessons is presented. Then the results of a small study are presented in which seventeen 8th grade students wrote argumentative texts about a space use conflict. The results show that the students incorporated correct, but limited information from the material into their arguments. The arguments were mostly thematically appropriate, but imprecise. They found it easier to use the continuous text materials than the discontinuous text materials. Students also had difficulty presenting their argumentation in a multi-perspective way, but were able to express their own opinions about the conflict. These results can help to understand where teachers can better support their students in writing

Keywords: written argumentation, students' competence, multi-perspectivity, material-based, space-use conflict, inclusive geography teaching.

Accepted: 0908/2023 Published: 10/08/2023

Received: 27/04/2023

Revised: 29/06/2023

DOI: 10.48088/ejg.k.hin.14.3.055.067



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#### Highlights:

- Model for didactic requirements for material-based, multi-perspective argumentation,
- Students' competences when writing a material-based, multi-perspective argumentation.
- Difficulties of students in writing a material-based, multi-perspective argumentation.
- Use of support material for writing a material-based, multi-perspective argumentation.
- Referring to material in a written argumentation about a space-use conflict.

#### 1. Introduction

The competence to argue is a prerequisite for responsible action by social individuals in both the private and public spheres (Budke & Meyer 2015, p. 9f.). In social conflicts that are carried out through discourses, there are various actors who have different positions and reasons to support their views (Engelen & Budke 2021, p. 295f.), which are often referred to as arguments. Such discourses are thus not mono-perspective, but bi- or multi-perspective. It is expected that many topics of such public discourses, such as the failure of climate protection measures or the crisis of natural resources, will gain importance in the future (World Economic Forum 2021, p. 87). Similar topics such as climate change and resource conflicts are also dealt with in geography lessons (German Society for Geography (Deutsche Gesellschaft für Geographie (DGfG) 2020, p. 5). Teaching argumentation skills is therefore a component of geography lessons and part of the German national educational standards for this subject. Thus, as part of the competence "communication", students should be able to "analyse and compare the logical, technical and argumentative quality of statements" (ibid., p. 31). As part of the competence "judgement/evaluation" they should also be able to "critically evaluate relevant facts/arguments [and] reflect on value standards" (ibid., p. 31). Argumentation is also part of the tasks used in geography lessons. In the highest requirement area (reflection and problem solving), students should be able to "develop complex basic ideas in an argumentative coherent way and present them in context" and "make a reasoned judgement/formulate a reasoned opinion on a given problem by weighing pro and con arguments" (ibid., p. 33). The aim is for students to acquire competences that enable them to form their own opinions on specific situations and to justify their own positions through argumentation (Budke & Meyer 2015, p. 16). In geography lessons, students acquire basic information that can be used as factual evidence in arguments by using different materials such as maps, diagrams, pictures and texts. This approach is also called "material-based" (Abraham et al. 2015, p. 4). Similarly, individuals need to base (some of) their decisions in their personal lives "on information available [to them] through the press and other media" (Osborne et al. 2004, p. 995). Especially in a democratic society, it is important for young people to be able to evaluate this information (Roberts 2013, p. 72), as individuals in a democracy have the freedom to make decisions about their own lives. Furthermore, through the topics covered in geography lessons, students understand both their "own identity and the identity of others as a structural element of the harmonious coexistence of humans" (Galani 2016, p. 22).



However, since there is currently little empirical research on material-based multi-perspective argumentation in geography classrooms, the focus of this study is to fill this research gap. The aim of this study is to identify the skills and difficulties students have in writing material-based multi-perspective argumentation in geography classrooms. The study therefore addresses the following question: What are the competences and difficulties students have in writing a material-based, multi-perspective argumentation in the geography classroom?

The paper begins with a review of the literature on argumentation, followed by an explanation of the research methods used and how the qualitative data from the 17 8th graders in this study were collected and analysed. Then the results of this study are presented, which show that the students used limited but correct information from the materials provided in their texts. They seemed to find it easier to obtain and use information from materials with continuous texts than from materials with discontinuous texts. They were able to present their own opinion, but lacked competence in writing their argumentative text multi-perspectively. The results are then discussed and finally recommendations are made to support students' competences in writing a multi-perspective, material-based argumentation in geography lessons.

#### 2. Current Research

In the following section, we will first discuss where research on argumentation in the classroom is (2.1) and then both material-based argumentation (2.2) and multi-perspectival argumentation (2.3). Then, based on the research presented, we present a model developed to explain the didactic requirements of written material-based multi-perspectival argumentation (2.4).

## 2.1. Argumentation in class

Argumentation has been explored over a long period of time. The beginnings of discussions on this topic date back to antiquity (Budke & Meyer 2015, p. 9) and more recently have also been the subject of didactic research with students (school children) (cf. among others von Aufschnaiter et al. 2008; Jiménez-Aleixandre & Erduran 2007; Kuckuck 2015; Uhlenwinkel 2015). As already mentioned, argumentation forms the basis on which social individuals have a responsibility for their actions, since different options can be evaluated, weighed and justified through argumentation (Budke & Meyer 2015, p.10).

Argumentation serves to logically justify one's own point of view on a certain topic and can often be used to convince another person of one's own opinion or to reach an agreement (Budke & Meyer 2015, p.10). Therefore, such a skill can also be seen as a problem-solving method that forms the basis for peaceful conflict resolution (ibid., p.10f.). Furthermore, argumentation can serve to promote other competences, including the competence to form an opinion (Kuckuck 2015, p. 77), to reflect (Budke & Meyer 2015, p. 14) and to think critically (Leder 2015, p. 140). Furthermore, social and affective competences can be promoted through argumentation, which includes finding compromises and consensus or solutions as well as dealing with contradictory views and views that differ from one's own (Budke & Meyer 2015, p. 13ff.). Furthermore, communication and action skills can be promoted (Leder 2015, p. 140).

Argumentation can therefore be seen as a tool for participating in public discourse, which "is essential to full and equal participation in society" (Maude 2017, p. 36). No individual in a society will be able to avoid arguing in the long run, so it is of great importance to learn the competence to argue well (Bonnett 2011, p. xii). This means that students should acquire the competence to argue in geography classes as preparation for discourses in their daily lives, because the skills students should acquire in this subject include thinking, reasoning and deciding how to live as "citizen[s] in the context of the global economy and culture" (Solem et al. 2013, p. 221).

The competence to argue and the skills learnt in acquiring argumentation competences are also relevant outside school and at international level. For example, the competence framework of UNESCO includes the competence to take "ownership for actions and decisions" (United Nations Educational, Scientific and Cultural Organisation (UNESCO) n.d., p. 14) and to seek "relevant information before making [those] decisions" (ibid. p. 26). UNESCO's New Social Contract for Education, which addresses education for a more sustainable and equitable future, also presupposes the competence of individuals to negotiate (UNESCO 2021, p. 74). The Organisation for Economic Co-operation and Development's (OECD) Learning Compass 2030, which aims for students to "learn to navigate by themselves through unfamiliar contexts" (OECD, 2019, p. 2), also finds the training of skills based on argumentation competences such as positively influencing people or resolving conflicts.

This study focuses on the written form of argumentation, which involves writing a textual product. Such written argumentation is particularly demanding for students (Budke 2021, p. 58). Arguing in a written text means that there is no direct counterpart with whom an argumentative exchange takes place in real time. The person writing the argument must therefore not only represent their own perspective, but also anticipate possible counterarguments from the other person in their argumentation (Spiegel 2011). By using appropriate procedural expressions, e.g. when naming the controversy "... deals with the issue ..." or when weighing up arguments "on the one hand... on the other hand...", the use of language and grammar is developed, which in turn supports "the mental clarification and understanding of the respective controversy" (Feilke & Tophinke 2017, p. 12) in the context of a written argument.

Previous research has shown that students' arguments are often of low complexity (Riemeier et al. 2012, p. 168). Moreover, students mainly present data that support their own opinions (Riemeier et al. 2012, p. 169; Sampson et al. 2013, p. 32). Furthermore, students often generalise their arguments using limited information and have problems justifying their evidence (ibid. p. 32). They find it difficult to provide evidence for their chosen reasons (Duschl & Ellenbogen 2009, p. 115) and when they argue about geographical content, they predominantly use non-geographical and subjective arguments (Uhlenwinkel 2015, p. 58). Furthermore, students often bring in their own experiences and feelings about the topic (von Aufschnaiter et al. 2008, p. 114/126f.). Kuckuck (2014, p. 73ff.) analysed 22 textbooks from various publishers from the two federal states of Brandenburg and North Rhine-Westphalia for secondary level I and II of the Gymnasium and found that spatial conflicts are only explicitly dealt with on about 2 % of the textbook pages. A textbook analysis by Budke (2011, p. 256ff.), who examined the frequency of argumentation tasks in 18 textbooks for grades 5 to 10 in the federal states of North Rhine-Westphalia and Brandenburg/Berlin, came to similar conclusions. Of 5784 tasks examined, 361 (6.7 %) were argumentation tasks. The results of these two analyses indicate that both space use conflicts and argumentation have little weight in geography lessons and that students rarely come into contact with such content and tasks in geography lessons.

#### 2.2. Material-based Argumentation

Material-based writing is text production with reference to various existing documents (Schüler 2017b, p. 12). Students gather information from these materials and use them as a basis for writing their own texts (Abraham et al. 2015, p. 4). Material-based argumentation is mainly researched from a German didactic perspective (cf. e.g., Becker-Mrotzeck 2017; Schüler 2017a/2017b). Geography textbooks consist of different



types of materials (Erzner 2013, p. 59) and a variety of materials are often used in geography lessons, but most frequently discontinuous texts (Huber & Stallhofer 2010, p. 223f.) and material-based tasks (Budke et al. 2021, p. 173). Therefore, material-based writing is of great importance in this subject, although it has not been the focus of research in geography didactics so far. To form arguments in material-based writing, students first read and process information from different sources and source types (texts, diagrams, tables, etc.) and then combine the information in a written text (Schüler 2017a, p. 1) by creating a persuasive text based on this information (Philip 2021, p. 153). The use of discontinuous forms of presentation is valuable on various levels because the subject matter can be understood more easily and better through the combination of different materials and a change of forms of presentation has a motivating effect on the students (Wey 2022, p. 32f.). However, a number of competences are also required of students, such as evaluating and selecting relevant information, generating relations between documents and forming connections. In addition, the information must be arranged linguistically in an argumentative structure (Philip 2021, p. 164ff).

In material-based argumentation, the students' prior knowledge of the content is also important and can be deepened by working with materials (Jost & Wieser 2017, p. 28). Students should already have prior knowledge of text structures and text procedures and have already tested and practised them (ibid., p. 29). To support students in writing a material-based argumentation, Schwerdtfeger and Budke (2021, p. 32), among others, have suggested support measures that students can use when extracting information from the materials, such as structuring aids in the form of tables ("planning posters"). Such aids and tasks can also be used to distinguish between students' reception of information and production of argumentative texts (Schüler 2017b, p. 14f.).

Currently, there is a gap in research on what skills students have in terms of material-based argumentation in geography classrooms and what typical challenges they face in developing and using these skills. One exception is an earlier empirical and exploratory study by Schwerdtfeger and Budke (2021), which investigated students' material-based written argumentation skills in inclusive geography classrooms. The study revealed some difficulties students had in writing a material-based argumentation. Although students mostly used the information in the material correctly, they only used a small part of the information presented in their own writing and lacked depth. They also found it difficult to link information from the materials (ibid., p. 28ff.). The question of how much material can and should be used by students in material-based writing tasks has been discussed theoretically rather than empirically so far (Jost & Wieser 2017, p. 29). However, there has also been insufficient research into the demands placed on students in this context and how the competences required for this can be taught and tested in class (Schüler 2017a, p. 1).

#### 2.3. Multi-perspective Argumentation

The subject of geography deals with both society and physical-material space and the interaction between the two (DGfG 2020, p. 5). In addition to the acquisition of factual knowledge, judgement and problem-solving skills are required, for example in topics such as environmental protection, economic development, resource use, international cooperation and urban and spatial planning. On this basis, a range of action strategies must be developed to tackle societal problems (DGfG 2020, p. 5). A conflict over the use of a particular space arises "when there are simultaneously different interests in the use of space in a place that cannot be reconciled with each other" (Pütz & Willi 2015, p. 71). Such a conflict thus exists between at least two parties who want to use a certain space in different ways that are mutually exclusive. One way to address and resolve these conflicts peacefully is through argumentation. The actors involved can exchange different positions and perspectives regarding the conflict. The term perspective means "to look through a matter from a certain angle" (Rhode-Jüchtern 1996, p. 7) and to respect the existence of other perspectives. A change of perspective is important in order to be able to represent reality in its "pluralistic nature" (ibid. p. 5ff.). Accordingly, multi-perspectivity means a variety of different ways of looking at things, which can be incorporated into different arguments and weighed against each other in a written argument. It is important that students express and justify their own perspective, but also recognise that their own perspective is one of several ways of looking at an issue (Duncker 2005, p. 13ff.). Reality is pluralistic and therefore requires consideration from different perspectives (Rhode-Jüchtern 1996, p. 5).

The consideration of multi-perspectivity is an important component of a geographical argumentation and can be understood as a "quality criterion" (Budke et al. 2015, p. 285ff.). However, previous research has shown that many students have difficulties in representing multiple actors of a conflict in a written argument (Schwerdtfeger & Budke 2021, p. 29), which is of great importance for the representation of the multi-perspectivity of a conflict.

#### 2.4. Material-based multi-perspective Argumentation

In order to write a successful material-based multi-perspective argumentation in geography lessons, various didactic requirements have to be taken into account, which are summarised in a model below (see figure 1). Since argumentation is about negotiating a contentious issue (Spranz-Fogasy 2006, p. 28), the actors involved must be identified by the students (1 in figure 1). In order to show the multi-perspectivity of a conflict, students must be able to present and explain the positions and perspectives of the actors involved (2 in figure 1). Students must also be able to relate the arguments of the actors to each other (Spiegel 2011, p. 39) (3 in figure 1). To do this, "students must compare and link the different arguments of the actors involved and their positions, and weigh the consequences of possible decisions [...]" (Engelen & Budke 2021, p. 295). Furthermore, students should be able to form their own opinion on the conflict and justify their position in a comprehensible way (4 in figure 1). In doing so, they should avoid simply making a list of pro and con arguments and pay attention to the "expertise and quality of the arguments presented" (Feilke & Tophinke 2017, p. 6). In a written argumentation, it is also important to present any controversy on the topic in question. For example, counter-arguments to one's own thesis must be integrated into the argumentation (Feilke & Tophinke 2017, p. 7ff.; Spiegel 2011, p. 39). The reference material (5 in figure 1) can be understood as a framework and foundation on which the multi-perspective argumentations build. It is important that students understand the information taken from the material, as it has to be used in the context of the argumentation for the formulation of evidence (Schwerdtfeger & Budke 2021, p. 22).

As a rule, there is no right or wrong positioning in geographical argumentation on social problems. Rather, the argumentation is "judged by the extent to which it contains multi-layered perspectives, complex justifications and differentiated perceptions" (Budke et al. 2015, p. 276).

The question of the extent to which students actually fulfil the didactic requirements presented for written material-based, multi-perspective argumentation and which requirement area is particularly difficult for them to implement has not yet been empirically investigated. The present study addresses this research gap.



# 2. Explain actors' positions and 1. Present actors perspectives on the conflict (Who is involved?) (How do the actors feel about the conflict/what do they want to achieve and why?) Multiperspective argumentation 4. Formulate own opinion and 3. Formulate arguments of the justify position actors, relate them to each other and formulate counter-arguments (How do I feel about the conflict and why?) 5. Include material (Where does the information come from?)

Figure 1. Didactic requirements for a material-based, multi-perspective argumentation on a problem/conflict (own presentation).

## 3. Method

The following section explains the method used to answer the questions about students' competences and difficulties in writing multiperspective argumentations in geography classes. First, the sampling is explained and the data collection is presented. Then the evaluation procedure is explained and illustrated with text examples. This school was chosen because it is a comprehensive school. We assumed that the students are heterogeneous in terms of their learning levels and competences and therefore we expected greater diversity in their argumentative writing skills. For this reason, the school had already been selected for a previous study (Schwerdtfeger & Budke 2021) (in a different class) and there was already contact with the class teacher. Before the study, the school, the teacher, the parents and the participating students were informed about the project and its aims. The data was collected anonymously by the University of Cologne. The students knew that they were always part of the study and all their questions about the study were answered.

#### 3.1. Sampling

This exploratory study analyses the written material-based, multi-perspective argumentation skills of students in an 8th grade class in Cologne, Germany. The study was conducted in an inclusive 8th grade class at a comprehensive school in Cologne. The students were between 14 and 15 years old. Seventeen students took part in the survey. Three students had special educational needs either in the area of "learning" or "emotional and social development".

### 3.2. Data collection

The survey was conducted on two consecutive days (see figure 2). On day 1, the project and the people involved were introduced to the students and a short thematic introduction to the space use conflict took place, where the actors were introduced and positioned on the sliding scale on the blackboard with the help of the students. In addition, the students were asked to position themselves (by a show of hands) on the scale. The first day ended with the presentation of the working materials and tasks for the next day. In the following intervention, the students had a little less than four hours to work on the materials and write an argumentation.



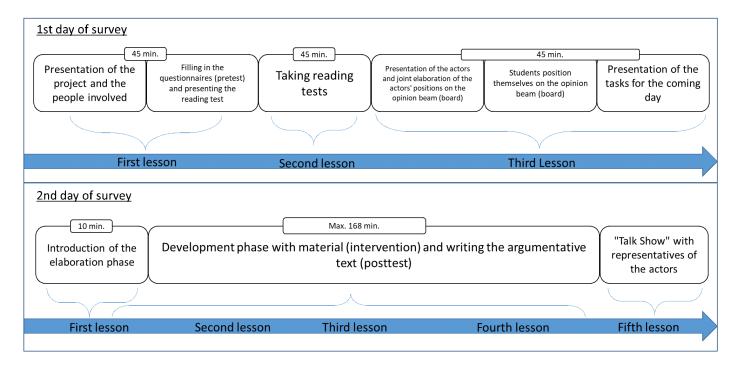


Figure 1. Survey schedule (own illustration).

In the course of the teaching intervention, the students were given eight different materials and the task of writing a material-based argumentation in the form of a letter to the mayor of Cologne (see figure 3).

Here you will find eight different materials that you can use to form your own opinion on the topic. The goal is to write a **letter to Mayor Henriette Reker** and convince her of your opinion. In the letter, you should present the conflict and explain and justify your opinion.

Figure 2. Assignment for the students.

The materials were produced as part of the SpiGu project in cooperation with the Institute for German Language and Literature II at the University of Cologne. A variety of different types of materials were created in order to analyse later which of these materials made it easier for the students to use the information. These eight materials included two maps (one of the city of Cologne and one of the exact section of the park where the expansion is planned); a photo showing the current use of the park; a table with the results of a signature collection; a diagram showing the ratio between youth teams and professional teams of the club; a letter to the editor in the form of a newspaper article; and two conversations in the form of speech bubbles between two actors in the conflict each. Among other things, these materials introduced the five different actors and presented their positions and perspectives on a real space-use conflict in Cologne. The conflict on which the assignment focused was about the planned expansion of the training ground of the football club 1. FC Cologne in a park in Cologne, the "Gruenguertel" (Green Belt). The students were also given tasks to solve in the materials. These were to help them better understand the information in the respective materials. In addition to the main materials, the students received three support materials (available online: https://www.ilias.uni-koeln.de/ilias/goto\_uk\_pg\_415403\_5079681.html). The aim of these support materials was to guide the students in completing the tasks and to help them write the argumentation. However, the focus of this study was not on the assessment of these support materials, but on the students' competences to cope with the didactic requirements of a material-based, multi-perspective argumentation as presented in the model (see figure 1 in chapter 2.4).

#### 3.3. Data analysis

The students' argumentative texts were analysed with regard to the didactic demands for material-based, multi-perspective argumentation, which are presented in the model (figure 1 in chapter 2.4). The procedure for this analysis is explained below using text examples from the students' texts. Since the students' texts were qualitative data, they had to be quantified in the analysis. The quantification of qualitative and thus more complex data is often necessary in order to recognise patterns and to be able to represent frequencies (Vogl 2017, p. 287ff.), whereby the focus of the analysis was on the extent of the information contained in the materials that the students included in their argumentations.

#### 3.3.1. Analysis of the presentation of the actors

In order to determine whether the students represented the actors relevant to the conflict, it was investigated whether the students named the actors depicted in the material in their text (see 1 in figure 1 in chapter 2.4). For this purpose, the texts were analysed to see whether the names of the respective actors were included. The naming of an actor was considered to be included if either the exact name of the actor was



included or if a name that did not exactly match the actor presented in the material was included in the students' texts if the context of the student text correctly indicated which actor was meant. For example, when "[...] the citizens who usually spend their time there [...]" (108II) was mentioned, this was considered to be a mention of the actor "residents". If the name was too far removed from the name of the actor in the material, for example "a football club" (104II), this was not considered a mention of the actor.

#### 3.3.2. Analysis of the presentation of the positions and perspectives of the actors on the conflict

A comparison was made between our expectations and the students' texts. It was analysed whether the students correctly represented the positions of the actors in the conflict, how many perspectives they explained in total in their text and whether they wrote their argumentations with a mono-, bi- or multi-perspective (see 2 in figure 1).

The position of an actor had to be described by the student using the words "in favour", "against" or "neutral" in relation to the planned expansion of the training ground in the Green Belt, as explicitly described by one student, for example: "The board and the youth players of the 1. FC Cologne are in favour and the citizens of the Green Belt are against it" (118II). By using the terms "in favour" and "against" when naming the respective actor and the object of the conflict, the student clearly states the position of the actor. In addition, implicit formulations of the position were also allowed, such as "if Cologne is allowed to expand the training ground" (111ICa). In this example, the use of the word "allowed" shows that this actor is in favour of the expansion. In this example, the student has identified the actor's position on the planned expansion. Although "Cologne" is not the correct name of the actor, the context, as described above, showed that the student meant the actor "1. FC Cologne". Furthermore, the student had already named the "1. FC Cologne" correctly in their text before.

Furthermore, it was analysed whether the students had correctly represented the perspective, i.e. the argumentatively justified position of the respective actor. In contrast to the position in the conflict, which is characterised by a clear ".. is in favour", "... is against" or "... is neutral", the perspective reflects a certain view of the effects of the conflict. The perspective was analysed by reproducing the arguments of the respective actor from the materials. However, the actor did not have to be named.

For example, if one or more arguments about the conflict were mentioned by the actor NABU (Nature and Biodiversity Conservation Union), the student represented the perspective of the NABU. The perspective of the NABU was presented in the following text example: "It would be bad for nature and for insects, it will not be a normal meadow anymore, it will be an artificial turf field, which would also be bad for the ecosystem [...]" (113II). This argument against the expansion of the training ground in the Green Belt describes the perspective of NABU, i.e. the negative ecological consequences, without explicitly naming the actor. Moreover, the NABU is not explicitly referred to as "against" the expansion in this example. Therefore, this section of the text does not count as positioning.

In order to determine the number of perspectives of the actors that the students took into account in their argumentation, it was analysed which arguments of the actors they included in their texts. A distinction was made between mono-perspectival (one perspective), bi-perspectival (two perspectives) and multi-perspectival (three or more perspectives) approaches. A mono-perspective argumentation is for example "[...] For some time there has been a conflict between the players of 1. FC Cologne and the fans and residents of the district. The conflict is based on the fact that the training ground of the 1. FC Cologne was to be extended. The place where the expansion is to take place is a very popular place for walking or running, which is why the residents of the area do not want this" (112II). Although three actors are mentioned in this example ("1. FC Cologne", "youth players" and "residents"), only the position and perspective of the residents is supported by the information provided: the "place is a very popular place for walking or running".

In some cases, the arguments were imprecisely formulated so that they could not be clearly assigned to one actor, especially when the statements of the individual actors overlapped. The statement: "through the expansion, the 1. FC Cologne can train more and also perhaps become better" (111ICa) could be assigned to both the youth player and the board, but was not presented as a biperspective argumentation in this example. Similar overlaps occurred with the actors NABU and the citizens' Green Belt initiative. In such cases, the statement was evaluated as one perspective.

#### 3.3.3. Analysis of the formulation, relating of the arguments and naming of counter-arguments

It was analysed whether the students integrated the arguments of the actors they had found in the materials into their texts (3 in figure 1 in chapter 2.4). Following Toulmin (2003), we counted a statement as an argument if it contains an opinion in the form of a claim and a reason (warrant and grounds), such as the following sentence: "The 1. FC Cologne speaks in favour of expanding the training ground because the construction of sports facilities on the site in the Green Belt was already planned almost 100 [years] ago" (101II).

A reason was also counted as an argument if the student's claim was not explicitly mentioned or if it referred to the opinion/assertion already mentioned, for example, through expressions such as "in addition", "moreover" or "furthermore" used by the same student as in the example above in their text: "Furthermore, for the Elsa-Brändström-Realschule, which is an elite school of football, there would be a better connection to the school and football because it is right next door" (101II).

If two or more reasons for an opinion/assertion overlapped strongly in content, the statements were only counted as one argument, such as here: "On the other hand, there are many members in the club who could use four new sports fields. Also, training pitches are important because there are too few pitches at the moment and they have to share them" (101II). In this example, both sentences state that more pitches should be created for the many members. Therefore, these two sentences were counted as one argument.

It was also analysed whether the students related their arguments to each other. Relating arguments involves contrasting, comparing, weighing and/or invalidating them. It was important that students did not only list pro and con arguments and that they did not only name the arguments that supported their own thesis. Instead, they also had to name and refute counter-arguments, i.e. arguments that contradicted their own opinion or position. To analyse whether the students did this, we looked at whether they used procedural expressions to weigh up, such as "Although...", "Nevertheless...", "On the one hand... on the other hand" etc. In the following example, the student contrasted several arguments: "It would be bad for nature and for insects, it will no longer be a normal meadow but an artificial turf pitch, which would also be bad for the ecosystem, nevertheless it would of course be good for the players of 1. FC Cologne, but also bad because people would no longer have free space [...]" (113II). Here there is a juxtaposition and an attempt to weigh the two arguments ("nevertheless"), but neither a comparison of the two arguments nor a rebuttal of one of them was made.



According to Budke et al. (2020), various aspects were taken into account when evaluating the quality of the arguments. First, it was analysed whether the argument was complete. That is, whether the student's statement contained both an opinion/claim and a reason (warrant and grounds). Furthermore, all arguments were evaluated in terms of their relevance to the problem. Another criterion was the adequacy of the warrant, i.e. whether the ground is linked and the opinion is logical/correct. In addition, the arguments were examined for their validity, i.e. whether the cited ground is correct. Finally, the complexity and conditions of the arguments were assessed, i.e. whether the student had integrated spatial or temporal conditions into their arguments or whether they had taken into account other exceptional conditions, e.g. for whom the argument is valid.

#### 3.3.4. Analysis of the formulation of a students' own opinion and the justification of the a student's position

How the students positioned themselves on the conflict (see 4 in figure 1 in chapter 2.4) and whether and how they justified their opinion was analysed on the basis of the expression of their own opinion in the text. Positioning was recognised in the analysis by expressions such as "I am against it", but also "it would not make sense", "in my opinion …", "I think that …", etc. To check whether the students justified their opinion, the texts were analysed to see whether the presentation of their opinion was linked to a justification, using expressions such as "because…" or "therefore…". Their opinion could also be presented as a conclusion after they had given arguments in favor or against the planned expansion.

In the following example, the student expressed their opposition to the expansion of the training ground in their text. After describing different perspectives of different actors (1. FC Cologne, youth players, NABU) and stating their arguments in favour or against the expansion, they came to a conclusion: "[...] Based on the statements of the nature conservation members, I have come to the opinion that the training ground of 1. FC Cologne should not be extended [...]" and continued with the reason: "[...] because of nature and the people who spend their free time there [...]" (101II).

The student has clearly stated and justified their own opinion by referring to the arguments of the "NABU" already mentioned and adding another justification ("because of nature and the people..."), which reflects the perspective of the "residents" using the expression "because of".

#### 3.3.5. Analysis of the presentation of the actors

Finally, it was analysed whether the students refer to the presented material in their argumentative texts (5 in figure 1 in chapter 2.4). A distinction was made between implicit and explicit references to material. If the information from the respective material was used without directly referring to the material, the reference was considered implicit. The material reference was considered explicit if the information was presented with direct reference to the source. An explicit material reference was rated higher than an implicit material reference in this study. An example of a direct reference is the following quote from a student text: "The 1. FC Cologne speaks in favour of expanding the training ground because the construction of sports facilities on the site in the Green Belt was already planned almost 100 [years] ago" (101II). "The 1. FC Cologne speaks..." is used as a direct reference to the source. Admittedly, this is not a direct reference in the classical sense, such as "In material M3 it says ..." or "on the map ... can be seen". However, since the example is taken from the material showing a conversation between two actors, "speaks" was accepted as a direct reference to the source. An example of an indirect reference to the source can be found in the following quote: "Although it is a great pity that the trees have to be torn down and nature in general is damaged, [...]" (105II). This example is an indirect rather than a direct reference to the source, as the information is reproduced from the material but no reference is made to the source.

Sometimes the students' arguments were so imprecisely formulated that they could have been attributed to two different materials, as aspects of the arguments of two actors sometimes overlapped. The actors "board of the 1. FC Cologne" and "youth players" as well as the actors "resident" and "citizens' Green Belt initiative" have similar arguments. To decide which of the materials the information came from, the context in which the student presented this argument was considered and on this basis a material was assigned. If this was not possible, both possible materials were assigned, as we assumed that the information was mixed or combined. A reference was not counted as material use if the students only listed the actors or described the conflict, but only if they included further information from the materials in their texts.

## 4. Results

#### 4.1. Presenting the actors

The materials presented to the students included five actors who take different positions on the conflict. The representation of these actors was measured by the mention of each actor's name in the students' texts. The majority of students named between one and three actors (see table 1).

**Table 1.** Presenting the actors (number of actors mentioned in the students' texts).

Numbers of actors named	Percentages of students (n = 17)
No actors	6 %
One actor	24 %
Two actors	35 %
Three actors	29 %
Four actors	0 %
Five actors	6 %



The most frequently named player was 1. FC Cologne (76%). More than half of the students named the youth player of the 1. FC Cologne (65%) and the residents (53%). Both the NABU (12%) and the citizens' Green Belt initiative (6%) were rarely mentioned.

When naming the actors, it also became apparent that the students, with the exception of the actor 1. FC Cologne, regularly did not use the correct name of the actor from the material. In most cases, however, it was clear from the context of the text which actor the students were referring to, but the terms, such as "many people" (107II), were imprecise.

#### 4.2. Identifying the actors' positions and perspectives on the conflict

With the exception of the 1. FC Cologne, the positions of the actors in the conflict were rarely reproduced by the students (see table 2). However, when the actor was named and positioned, the positioning was always correct.

**Table 2.** Positioning the actors in the students' texts.

Actors	Percentages of students	Percentages of students (n = 17)			
	Not named	Named but not positioned	Named and positioned		
1. FC Cologne	24 %	35 %	41 %		
Resident	47 %	41 %	12 %		
NABU	88 %	6 %	6 %		
Citizens' Initiative	94 %	6 %	0 %		
Youth Player	41 %	53 %	12 %		

Since there were five actors with different perspectives in the material, the students could have presented five perspectives, i.e. views on the expansion based on arguments. In fact, however, a maximum of four external perspectives were presented. On average, each student presented 1.88 external perspectives. However, this was a presentation of one or a few aspects from the perspective of one actor and not a comprehensive presentation of their perspectives.

The results of the study show that about one third of the students wrote a multi-perspective argumentation (35 %) by presenting either three or four external perspectives. 6 % of the students considered two external perspectives in their argumentation (biperspectival). In most texts, the students considered only one external perspective in their argumentation (53 %). Only one student did not present any perspective of the actors in their argumentation (6 %) (see table 3).

**Table 3.** Number of external perspectives (mono-, bi- and multi-perspectival) presented in the students' texts.

Number of external perspectives presented	Percentages of students (n = 17)
No perspective	6%
Monoperspective	53 %
Bi-perspective	6 %
Multiperspective	35 %

#### 4.3. Understanding the arguments of the actors, relating them to each other and formulating counter-arguments

When analysing the number of arguments mentioned, a heterogeneous picture emerged. The students formulated between zero and seven arguments in their texts. However, it could be seen that most students (4 students; 24 %) mentioned only one argument in their texts (see table 4), which underlines the low argumentative quality of these texts. It would have been appropriate to explain at least five arguments of the five actors (one argument per actor). However, the materials contained a much larger number of arguments per actor that the students could have included.

The results of the analysis in terms of the quality of the arguments show that they were mostly complete (claim and reason) and the content of the arguments is mostly highly relevant and fits the topic or the problem, for example in the text of one student: "Although the teams have more space, the citizens of Cologne are deprived of leisure space" (116II). In this sentence, the needs of the two conflicting parties are clearly presented: on the one hand, the need for more space on the part of the youth players of the 1. FC Cologne and, on the other hand, the need of the residents to continue to use the park for their leisure activities.

In most cases, the students at least partially succeeded in including correct evidence, such as this student: "Expanding the training ground of 1. FC Cologne would not make sense because it would harm nature in the Green Belt" (110II). Here a correct reason against the expansion of the training ground was provided - that it would harm nature. However, this is imprecise and ideally should have been elaborated further. Students



also had particular difficulty in citing spatial and temporal conditions, although these are two essential components of such an argumentation. Spatial conditions are a key aspect of space use conflicts. The temporal conditions are also important because such conflicts usually last for a long time and finding a solution is often a lengthy process (Kuckuck 2015, p. 276).

Table 4. Number of arguments in the students' texts

Number of arguments	Percentages of the students (n = 17)
No arguments	6 %
One argument	24 %
Two arguments	18 %
Three arguments	18 %
Four arguments	6 %
Five arguments	6 %
Six arguments	18 %
Seven arguments	6 %

59 % of the students mentioned counter-arguments to their own opinion or contrasted arguments in the texts. However, the arguments were rarely weighed or counter-arguments invalidated. In most cases, the arguments were a comparison or a list of advantages and disadvantages.

#### 4.4. Forming own opinion and justifying own position

Most students stated their own opinion in the text. Most of them (8) stated that they were against the expansion of the training grounds (see table 5). Three students were in favour and one took a neutral position. Two students did not position themselves clearly, so that no opinion could be identified, or they expressed contradictory opinions, e.g. "My opinion on the planning for 1. FC Cologne, I don't care, but it would be better if the club trained at the arbitrary locations, because the players want to be successful" (115II).

 Table 5. Presenting own opinion about the conflict

Own opinion	Percentages of the students (n = 17)
In favour of the expansion	17 %
Against the expansion	47 %
Neutral	6 %
Unclear or contradictory	12 %
No own opinion stated	18 %

Of the 12 students who clearly stated their opinion/position in their text, all gave at least one reason to justify their opinion. The reasons given were mostly relevant to the topic and made sense. However, they were sometimes imprecise. Some of the reasons were factual, such as "because it harms nature and there is little free space for people" (113II) and were based on information from the materials. In other cases, the students justified their opinions less factually and more emotionally, as in the following example: "because you shouldn't destroy the Green Belt for a football club that isn't even good" (104II) or "because imagine being thrown out of your houses" (107II).

#### 4.5. Including Material

The information in the materials (8 materials in total) was mostly not used by the students, with an average of 2.76 materials used by each student. When the materials were used, it was mainly correctly and implicitly (see table 6), but the information was presented in little detail and rarely precisely. There was no correct and explicit use of the data, i.e. with a reference to the source in the classical sense. The type of material (map, diagram, table, etc.) was also not mentioned by the students.

The information used in the students' texts was rarely misrepresented, with misrepresentation of information from the materials limited to three students. When this occurred, it was always with an implicit reference to the material. None of these three students had any special educational needs. The misuse of information was also limited to two different types of material: a map and a newspaper article.

Whether the information from the materials was reproduced in the text depended on the type of material. The information from the diagram was never used and the information from the table was only presented by one student. Furthermore, the students rarely reproduced (correct)



information from the maps (2 students each). They seemed to find it easier to reproduce (correct) information from a photo (9 students), a newspaper article (9 students) and from discussions presented in writing in the form of speech bubbles (8 and 11 students respectively).

**Table 6.** Use of the information from the materials in the students' texts

Use of the information from the materials	Percentages of the students (n = 17)
Correct use (explicit)	1 %
Correct use (implicit)	30 %
Wrong use (explicit)	0 %
Wrong use (implicit)	3 %
No use	66 %

#### 5. Discussion

In the following section, the results of this study are discussed in order to answer the question of what competences and difficulties students have in writing a material-based, multi-perspective argumentation in geography classes.

The study showed that the students were able to identify different actors to varying degrees. The 1. FC Cologne was named most frequently by the students (76%). The youth player (65%) and the resident (53%) were also named significantly more often than the NABU (12%) and the citizens' Green Belt initiative (6%). The fact that 1. FC Cologne was mentioned most often is probably due to the fact that this actor is the main actor and was therefore often mentioned in the description of the conflict. For example, when the students explain that the conflict is about "the 1. FC Cologne wanting to expand its training ground". The two actors, the resident and the youth player, who were mentioned more often, can be classified (according to Vasiljuk & Budke 2021) as direct, individual actors because they "pursue their own interests" (ibid. p. 21). In contrast, the other two actors, the citizens' Green Belt initiative and the NABU, which were named much less frequently by the students, represent the interests of the respective institution and can therefore be classified as direct complex actors (ibid. p. 21). One finding of this study is that students find it easier to name individual actors than complex actors. In general, the students do not seem to be aware that they have to name all actors involved in a conflict. It might also be helpful to train teachers to help students empathise with the actors, as Maier and Budke (2017, p. 58) also suggest.

It was also noticeable that the students seemed to find it more difficult to position the direct complex actors than the direct individual actors (after Vasiljuk & Budke 2021). The 1. FC Cologne (41%) was positioned most frequently by the students, while the resident, the youth player (12% each), the NABU (6%) and the citizens' Green Belt initiative (0%) were rarely or not positioned at all. When the students did, it was always correct. So it seems unlikely that the students had difficulty understanding the position. The problem is more likely to be that they are not aware that they have to state the position. In contrast, they seemed to find it easier to present the perspective of the actors in comparison, but there were greater deficits in presenting the multi-perspectivity of the conflict. Similar to Schwerdtfeger & Budke (2021, p. 32), it was found that many students also had problems in presenting and weighing several perspectives of a conflict. In this context, multi-perspectivity is a core component of a conflict and therefore essential in written argumentation, because if only one perspective is presented, the controversy of a conflict cannot be portrayed. In order to describe the conflict accurately, the opposing arguments of the actors should be compared and weighed against each other. Most students failed to do this. Identifying the controversy by relating the arguments and weighing them against each other should be covered in class.

The study also showed that in most cases the students used only a few arguments in their argumentations, although they could have taken many more arguments from the materials. Only a small part of the total information available was used by the students in their text. One reason for this could have been the amount of material the students had to deal with. With regard to the open and so far little empirically researched question of how much material should be given to the students (Jost & Wieser 2017, p. 29), the feedback from the students in this study showed that they seemed to feel overwhelmed with the eight different materials. Schwerdtfeger & Budke (2021, p. 32) also came to a similar conclusion in their study, in which students were given ten different materials. The arguments the students used in their texts were in most cases correct and appropriate to the topic, but often imprecise. When the students used the information from the materials, they did so correctly and implicitly in most cases. There was almost never explicit reference to the material. Again, the students did not seem to be aware of the need to refer to sources in their arguments. Consequently, there is a need for training on the precision of the content and the citation of sources.

The materials that were most commonly used had two things in common. First, each of these materials featured at least one actor, either as a person speaking (with a speech bubble) or as the author of a newspaper article. Secondly, the materials consisted of continuous texts. The materials from which the least information was used included the table and the diagram, but information from the maps was also rarely integrated into the texts by the students. Although using different types of materials is a central part of teaching geography, students seem to have problems with using materials from discontinuous texts. Discontinuous texts differ from continuous texts in that they require independent interpretation by the students, as they are "not self-explanatory" (Wey 2022, p. 30), which means that more effort is required. This higher effort in information retrieval could be a reason for the different frequency of use of the different types of material.

This study shows that the majority of students were able to form their own opinions, express them in writing and give reasons for them. In most cases, the reasoning was relevant to the conflict. The results of the study also show that the students sometimes include counter-arguments to their own opinion in their argumentation. However, this is mostly done through a juxtaposition rather than weighing or invalidating. Riemeier et al. (2012, p. 168f.) came to similar results in their studies. However, in written arguments in particular, the inclusion of counter-arguments is an important component (Feilke & Tophinke 2017, p. 7ff.) and should therefore be practised with the students in class.

Another result of the study is the change in the students' opinion after writing the argumentative text. As suggested by Schüler (2017b, p. 14f.), students were given subtasks to determine intermediate outcomes between the initial reception of the task and the writing process. This revealed that only a few students transferred the opinion they had expressed on the sliding scale in their subtasks into the text. In most cases,



there was a discrepancy between their opinion on the sliding scale and their opinion in the text. This indicates that the students either form their own opinions during the writing process or that the writing/argumentation process leads them to change their opinions formed in the reception phase.

In summary, the students have clear difficulties in writing material-based, multi-perspective argumentations. In addition to the lack of precision in the students' argumentation, this study has shown that many difficulties in written argumentation are due to the fact that students seem to have little knowledge of scientific argumentation, as they do not use this type of structure in their everyday lives, as Riemeier et al. also suggest in their study (2012, p. 169). To further develop argumentation skills, more argumentation tasks should be integrated into geography lessons. Above all, students should be supported in presenting their arguments more precisely in order to be able to present the complexity of the conflict in a broader and deeper way.

The main limitation of this study was that it was conducted with a small number of students (17) and therefore the results cannot be considered representative. It was an exploratory study to test the theory-based approach and to obtain initial results regarding the students' competences.

There are two other factors that may have influenced the survey. First, the survey took place during the Corona pandemic, which confronted the students with special circumstances (Corona tests, wearing masks, returning to regular school after home schooling). Since only home schooling had taken place in the weeks before the survey, it is possible that the students were weaned from prolonged concentrated editing and writing and that this is an explanation for the poor performance. Secondly, the survey took place about two weeks before the start of the summer holidays, which may have had an effect on the low motivation of some of the students. This was reflected in the feedback from some students that the number of materials and the processing time were very high. In addition, some students had to be encouraged to continue working because they wanted or had to stop work early.

The data collected in this study was quantified for analysis, i.e. the qualitative data was converted into numerical data. This process of reducing complexity has the advantage that systematic comparisons can be made in the analysis and thus regularities and peculiarities can be recognised. However, the assignment of qualitative data to quantitative categories is an ambiguous process (Vogl 2017, p. 309) and therefore dependent on the researcher. It is therefore possible that other researchers would have come to different conclusions with the same data. To validate the results, two to three people first analysed the data independently, then discussed it and almost always agreed. In a final step, the author went through the results again and made minor corrections if necessary. We also evaluated the students' texts very favourably and tended to give the student the benefit of the doubt.

#### 6. Conclusion

The aim of this study was to identify the competences and difficulties that students in an 8th grade class have in writing a material-based multi-perspective argumentations. This exploratory study revealed both some competences and some difficulties. First of all, the students found it easy to express their own opinions. They were also able to extract information correctly from the materials provided. However, they only use a small amount of information considering how much information was included in the materials. Students were more likely to process information from continuous texts in their argumentations than from discontinuous texts such as tables, graphs and maps. However, these materials play an important role in geography lessons. Therefore, more emphasis should be placed on supporting students in extracting information from these types of materials. In addition, the students also showed difficulties in considering multiple perspectives on the space use conflict and in dealing with the naming and positioning of all actors involved, especially the complex actors. Again, targeted training on understanding these types of actors would be helpful to support students in understanding the complexity and multi-perspectivity of space use conflicts.

## Acknowledgements

We would like to express our sincere thanks to Prof. Dr. Alexandra Zepter, Dr. Diana Gebele, and Pia Königs from the Institute for German Language and Literature II at the University of Cologne for their excellent cooperation before, during, and after the survey. Further thanks go to our student assistants Lena Romeijn and Pascal Kathrein, and our college Frederik von Reumont for their support in the evaluation. This article was written as part of the project "Spigu", which is funded by the University of Cologne.

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