

The Effects of Multilingual Teaching Materials on Pupils' Understanding of Geographical Content in the Classroom

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Abstract

The article sounds the potentials of multilingualism as a resource for geography lessons. In detail, it examines the use of multilingual teaching media and their effect on the comprehension of the content. First, the potentials of multilingualism for geography lessons are theoretically developed. After the development and adaption of the material, field research was conducted with a test group of pupils. Based on this, the results of an empirical classroom study are presented. A pretest elicited their prior knowledge, then a multi-perspective analysis on the learning process using screen recording took place. Finally, the data gained was evaluated quantitatively and qualitatively. The central aims of the study are how pupils use teaching media that are offered in different language. In addition, it will be analysed what effect the use of multilingual teaching materials have on pupils' understanding of content. Nearly all pupils used the material in different languages. The multilingual approach had a positive effect on the learning process. The pupils who had the best learning outcome used more non-German media and consumed the same contents repeatedly, but in several translations. Multimedia and digital learning tools are suited well for a multilingual approach and fosters pupils' independence in the learning process and the self-directed acquisition of knowledge.

Keywords: potentials of multilinguality, multimedia, multilingual multimedia media use, multilingual multimedia in geography lessons, multilingual multimedia learning platform

1. Introduction

With regard to the use of multilingualism in the German school curriculum, there is currently still a large gap in research (cf. Hofer & Jessner, 2018, p. 1). In addition, there are hardly any didactic concepts for the integration of different languages of the pupils with the purpose of deepening the acquisition of subject content. This applies in particular to geography lessons, which, due to their content and their global orientation towards all countries, regions and societies, could be particularly suitable for multilingual teaching practice by actively including the multicultural and multilingual background of the pupils (cf. Weissenburg, 2016, pp. 33-49). In contrast to earlier assumptions, multilingualism of pupils is no longer seen as a barrier to successful learning (cf. Haberzettl, 2016, pp. 62-77; Riehl, 2018, p. 19).

Despite a variety of possible applications, the multilingualism (Riehl, 2018, p. 36) of many pupils has hardly been used in German geography lessons (Note 1) so far and German dominates as the language of instruction (cf. Replinger & Budke, 2018, p. 166). Against this background, an explorative study was conducted to investigate how pupils react when they are offered teaching material in eight different languages to deal with geographical topics and where the potentials of this approach lie.

The following central research questions emerged:

- How do pupils use teaching media that are offered in different languages?
- What effect does the use of multilingual teaching materials have on pupils' understanding of content?

After an analysis of the international state of research on multilingual geography teaching, the methodological considerations for this study are presented. Subsequently, the results of a survey and the Screen analysis of working with the multimedia multilingual material on the above questions in an 8th grade class in Germany are presented and

discussed.

2. Theoretical Background

2.1 Multilingualism as Part of Language-aware Geography Teaching

There is currently a heterogeneous field of research with diverse discourses on the topic of multilingualism and its relevance for teaching. In view of the linguistic diversity of German pupils and teachers, multilingualism may offer a serious learning potential for many subjects, especially for geography teaching.

Multilingualism is initially an "umbrella term" due to its heterogeneous content definitions (Androutsopoulos, 2018, p. 199). Oksaar presents a minimal definition: According to this, multilingualism is initially the competence of an individual to be able to switch/switch from one language to the next (cf. Oksaar, 1980, p. 43).

In a "broad" definition, the term includes plurilingualism, translanguaging and bilingualism: plurilingualism ("polylinguaging" or "poly-lingual linguaging") means the use of specific features from different languages, even if not all of them are understood (cf. Jørgensen et al., 2011, p. 33; Jørgensen, 2008, p. 161). Polylinguaging is associated with certain norms: "The (double or multiple) monolingualism norm: 'Persons who command two (or more) languages should at any given time use one and only one language, and they should use each of their languages in a way that does not in principle differ from the way in which monolinguals use that same language'" (Jørgensen et al., 2011, p. 33). According to the concept of "linguaging" (Jørgensen et al., 2011, p.23), multilingualism does not simply exist, but is constantly developed in interactions.

However, ascribing the characteristic "multilingualism" to a person does not yet define how broadly and differentiated these competences are present in the individual (cf. Viebrock, 2019, p. 219). People with multilingual competences usually master their languages to different degrees. The ability to communicate in two or more languages at a mother tongue level of competence (first languages) is rather the exception (cf. Cook & Singleton, 2014, p. 3). Mostly, however, individuals are merely multilingual in different "domains" or "social roles" (Riehl, 2014, p. 14). Moreover, multilingual language use is fluid, dynamic and involves many intermediate expressions (e.g. school, work, family context) (cf. Riehl, 2014, pp. 28-29, Coulmas, 2017, pp. 27-59).

Multilingualism is thus an individual characteristic that encompasses many specific gradations and expressions. Each multilingual individual has a specific language system that differs from that of other multilingual individuals (cf. Hofer & Jessner, 2019, p. 11). Multilingualism could be increasingly used in the classroom, although theoretical conceptualisations are largely lacking so far.

According to Weißenburg (2013, pp. 33-47), linguistic competences, language awareness and the identity-related and geographical education process can be promoted in geography lessons by including multilingualism.

However surveyed pupils teachers with multilingual competences show a "monolingual habitus" (Gogolin, 1997, p. 38): They have unquestioningly accepted German as the dominant language in everyday life and education in the course of their biography. Accordingly, they lack concepts for using their language skills in their later teaching practice (cf. Budke & Maier, 2019, pp. 37-38).

These findings are largely consistent with those of the survey of multilingual teachers (Georgi et al. 2011). The targeted use of multilingual teaching units or methods is accordingly rare, although a large part of German children and young people speak non-German family languages. The languages Turkish, Italian, Arabic and Russian are particularly common.

2.2 Potentials of Multilingualism in the Classroom

It is known that multilingual children are superior to monolingual children in terms of grammatical correctness and in learning other languages (e.g. meta-linguistic competences in recognizing linguistic patterns in words and sentences), which has a positive effect e.g. on reading competences (cf. Riehl, 2006, p. 19). They are more confident in "strategies such as paraphrasing, codeswitching and foreignising (i.e. adapting a word to supposed rules of the target language)" (Riehl, 2006, p. 19).

Recent studies confirm this finding: according to Gabriel et al. (2015, pp. 79-89), there are positive effects on the transfer of language learning competences among German-Chinese and German-Turkish pupils when learning the classical foreign languages French and English at school, e.g. with regard to meta-linguistic skills and phonological awareness. Bilingual children have an advantage, for example, in terms of linguistic flexibility and metalinguistic competences (cf. Baechler, 2015, pp. 124-130).

Furthermore, it is reasonable to assume that multilingual children can also acquire other subject content more easily (cf. Riehl, 2006, p. 19). Advantages for geography teaching through multilingual language skills also lie in the use of a broader range of linguistic terms and formulations and in an increase in communication opportunities on teaching topics. Heuzeroth and Budke (2020) were able to show that multilingual geography teaching is particularly beneficial for the formulation of causal relationships.

Multilingualism provides the pupils with a broader social perspective for everyday life. "They learn other perspectives through the glasses of the other language and are therefore more flexible in their actions" (Riehl, 2006, p. 20; cf. Roth, 2006, pp. 12-13).

Overall, the negative assessment of multilingualism is changing in the last two decades under the impression of globalisation and migration movements. It is no longer the deficits but the resources of multilingualism that are receiving increasing attention. The European Union, for example, advocates that European citizens should have a high level of linguistic competence in at least three languages (cf. European Union, 2020, no page cited). Therefore, we want to empirically and exploratively investigate how multilingualism can be meaningfully integrated into geography lessons.

3. Methodical Approach

The study investigates the usage behaviour of German pupils of a multimedia multilingual learning platform in geography lessons. The following figure (Fig.1) visualises the individual steps of the study.

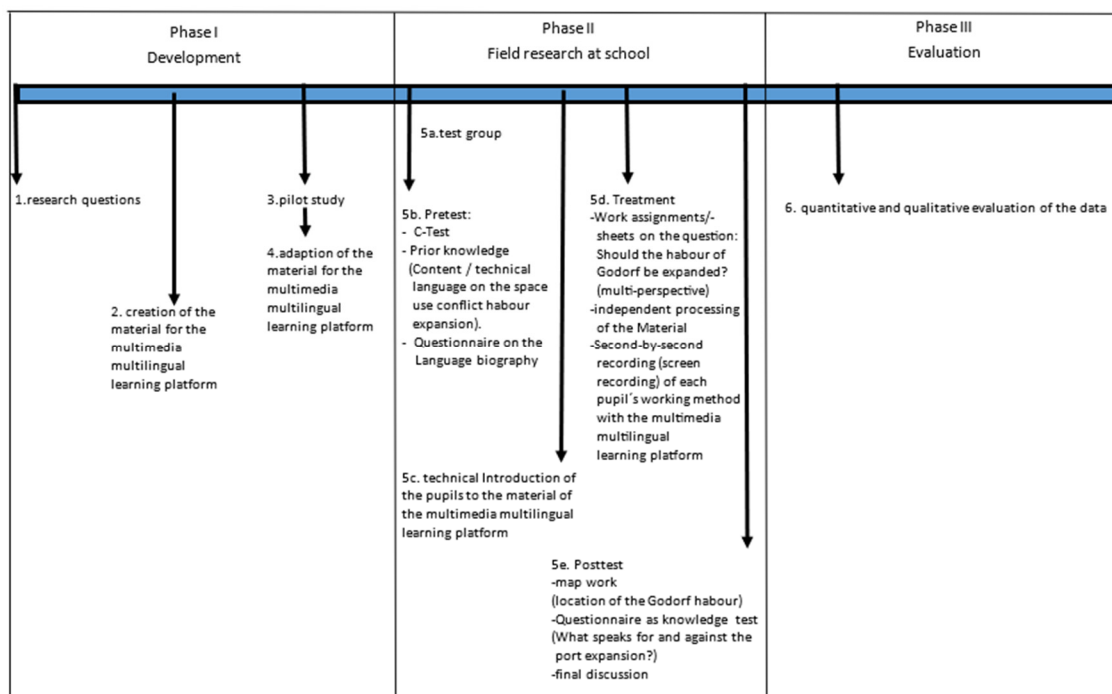


Figure 1. Visualisation of the Individual Steps of the Investigation Source: Own Representation

3.1 Creation of the Material for the Multimedia Multilingual Learning Platform

The material for the multimedia multilingual learning platform called "virtual Rhine excursion" is created by native speakers. The multimedia multilingual learning platform was created in the most spoken languages in North Rhine-Westphalia, namely German, Turkish, Arabic, Polish and Russian (cf. Ministerium für Schule und Weiterbildung des Landes Nordrhein-Westfalen, 2017, p. 173). Native speaker are used for quality assurance.

The openly accessible digital material consists of various media such as texts, audios and videos, all translated into the different languages. The content topic is the expansion of the Godorf harbour in Cologne, which has been controversially discussed for years and therefore represents a typical space use conflict that is usually discussed in

geography lessons. The teaching material is available at the following link: <https://www.multilinguale-rheinexkursion.uni-koeln.de>

3.2 Pilot Study

Before the field study takes place at the school, the multimedia multilingual learning platform is tested in advance with multilingual pupils for comprehension and navigation comfort. The feedback of the multilingual test pupils (15) of an 8th year class of a grammar school is recorded. The native speakers optimise the text and audio files based on the feedback from the test pupils. This results in the final version of the multimedia multilingual learning platform.

3.3 Test Group

The test group on which the final version of the multimedia multilingual learning platform is being tested consists of 25 German pupils in the 8th grade of a grammar school in Cologne (North Rhine-Westphalia), 7 of whom are female and 18 male. The average age is 13 years. All children speak German and learn English as their first foreign language at school. 17 of the 25 pupils come from families of originally non-German origin. The following combinations of family languages occur (number of pupils concerned in brackets): Turkish (13), Turkish / Kurdish (1), Arabic (4), Russian (3), Tamil (1), Persian (1), Serbian (1), French (1), Italian (1). Only one pupil states that he is monolingual in German.

The survey of language skills in the family languages showed that the pupils mostly assess their oral skills much better than their written skills. The C-test (Note 2) on their German language skills showed that all pupils have very good German language skills. In the test group, all but one pupil achieved over 90% of the possible points, nine pupils achieved 100%.

3.4 Test of Subject Knowledge Growth through a Pre- and Post-test Test

Before and after working with the multilingual teaching material, a knowledge test is carried out. The pupils have to draw the location of the Godorf harbour in Cologne on a map and describe it in text, which shows to what extent the pupils have a rough knowledge of the spatial conditions of the lesson example. Furthermore, they are asked to describe their knowledge of the planned expansion of the harbour and the related social discussions. In this way, the pretest ascertains the pupils' prior knowledge of the lesson topic. The results show that not a single pupil knows the location or has any knowledge of the local political discussion about the harbour expansion. At the end of the research, a posttest is conducted in which each test person documents their results on a structured questionnaire with open response categories. The questionnaire contains facts, the views and arguments of the five social groups involved and, finally, the personal reasoned opinion on whether the harbour should be expanded.

3.5 Intervention: Research on the Topic "Should the Harbour of Godorf be expanded?"

After a technical introduction to the functioning of the multimedia multilingual learning platform, all pupils work individually with a tablet on the learning platform. They are to write their own reasoned opinion on the guiding question: "Should the Godorf harbour be expanded?". In the learning platform, five statements of interest groups are presented in addition to basic geographical and socio-economic data. The presentation is made in texts, audio recordings (interviews, statements), videos as well as photos, geographical maps and graphics. All files are available barrier-free in multimedia and multilingual form in eight different languages.

The procedure of each individual test person is recorded by screen recording: The time spent on each page, the sequence of page views, the media format (text, audio, video, graphic, image, map) and the selected language variants are logged to the second. The statistical evaluation is carried out with SPSS.

The data collected provide a profile for each person to answer the questions about the duration and frequency of a language use depending on the media format and reflect the number and the respective context of language changes. The decision as to which languages are used is up to the individual respondent.

For research into the multilingual learning process with language choice decisions, the empirical recording of the use of a multilingual and multimedia learning offer creates a more objective data basis than a pure survey of test persons. In contrast to surveys, their procedure - i.e. in terms of language diversity: their selection procedure - can be recorded automatically. This is done systematically, uninfluenced by the researchers, using the log protocol. Interview answers, which could be influenced by the pressure of expectations in the interview situation, play no role here. Such an analysis of 'inner processes' of the multilingual learning process has remained a desideratum of didactic research due to the fact that multimedia teaching aids have not yet been used.

4 Results

Although the pupils had no experience in using multimedia teaching materials and they could have used the materials only in German, they showed great interest in using the materials in different languages. Basically, it can be said that, with only one exception, all pupils accessed teaching material in different languages (cf. Fig. 2). There were apparently few barriers and the pupils were happy to take advantage of the multilingual offer.

4.1 Media Use

In addition to German, media offerings in Turkish, Arabic, Italian and Russian were used most frequently and for the longest time, which were also the most frequently spoken family languages in the test group. However, pages are also accessed whose language does not belong to any of the test person's language profiles; for example, Chinese media are clicked on several times. However, the shortness of use indicates that these files were probably accessed out of curiosity and not for the sake of gaining information. Furthermore, the frequent use of English-language media is conspicuous because English is learned by all pupils as a foreign language and basic competences are available here. The following figure 3 shows the use of German and other language media when working with the multilingual learning platform for all the pupils studied.

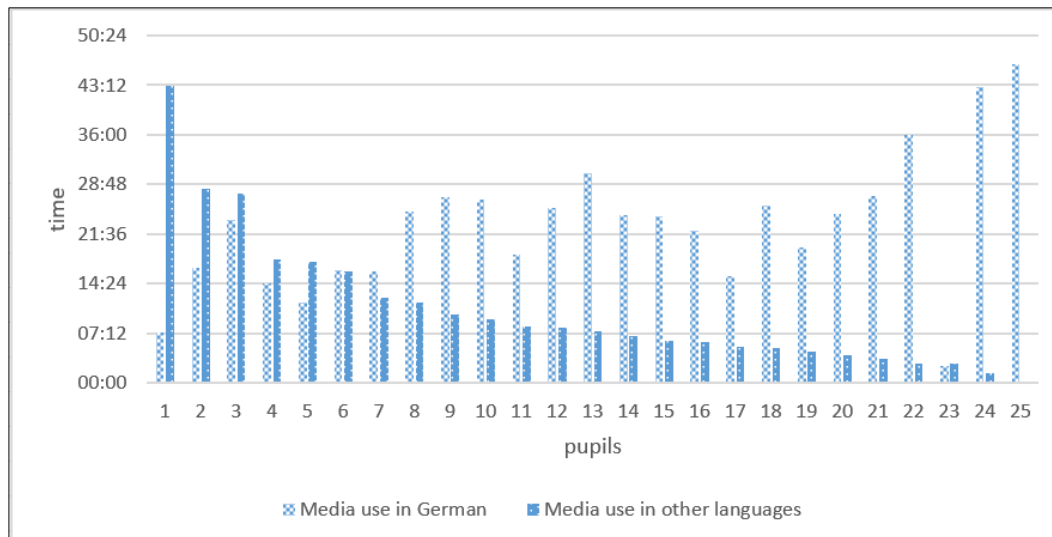


Figure 2. Use of German and Other Language Media When Working on the Learning Platform for all Pupils Studied (N=25, time in minutes and seconds) Source: Own Survey

The blue bars represent the total duration of all German-language media types used in minutes and seconds per person, the light blue show the use of media in other languages than German. It can be seen that almost all pupils use the multilingual learning offer and also use media in other languages. However, the ratio of use between German-language and other-language media varies considerably in the group.

4.2 Learning Success and Language Change

The question now arises whether the way the multimedia material was used influenced the learning effect. Learning success is measured by scoring the results on the post-test questionnaire. According to their results in the posttest, the pupils were classified into three groups (16-18 points in the achievement test [=best group], 12-15 points [=good group] and 6-11 points [=poor group]). The best group has nine pupils and each of the other two groups has eight pupils.

The following graph (Fig.3) shows the analysis of the time spent using the different media formats text, audio file, video and maps in relation to the subject learning gains.

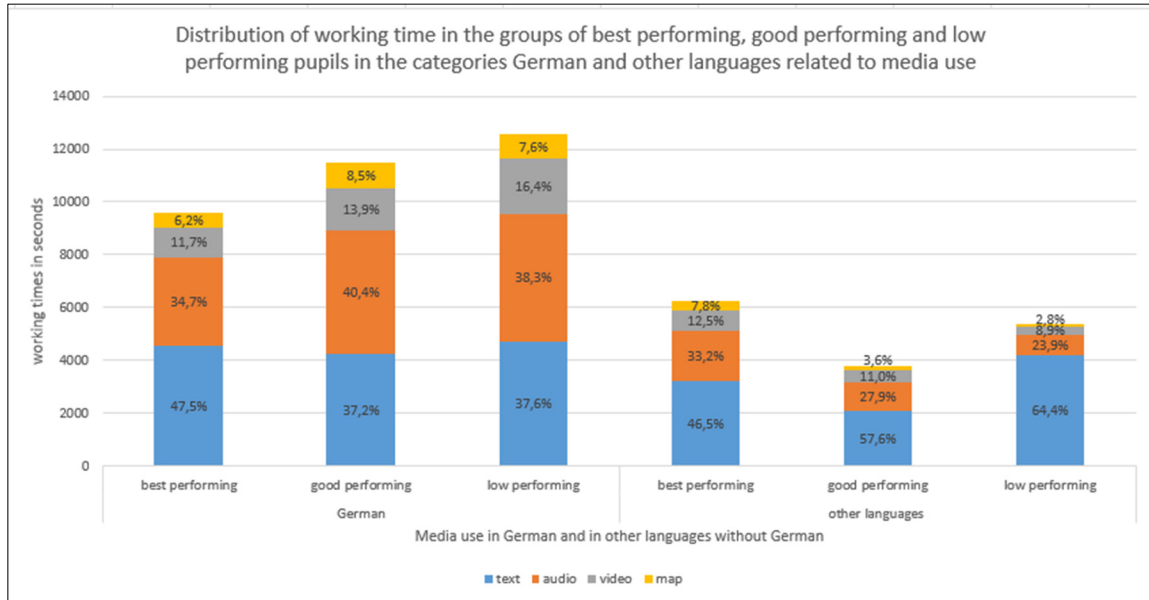


Figure 3. Media Use of the best Performing, Good Performing and Low Performing Pupils. The Bars Indicate the Distribution of the Processing Time of Different Media within the Teaching Material in Percent. On the Left Side the Editing of German Media is Indicated and on the Right Side the Editing of Media in other Languages by the Pupils, e.g. in Turkish. Source: Own survey

It can be seen that the pupils who perform best after the intervention longer audio-, video-based media formats and maps in other language media on the learning platform (more than 6000 seconds, see Fig. 3) than pupils of the other groups (between 3900 and 5200 seconds). This result indicates that multilingual working has a positive impact on learning success. Pupils who learned a lot also spent much more time working on non-German videos, audios and maps than pupils who acquired less knowledge.

The graph below (Fig. 4) shows the cumulative numbers of language changes within the three performance groups together with the mean values of the regressions. The data show that the more often pupils work with media in different languages during the intervention (language changes) and the more often they look at the same media in different languages (regressions), the better they perform in the post-intervention achievement test. This could indicate that simultaneous media use in multiple languages has a positive effect on learning.

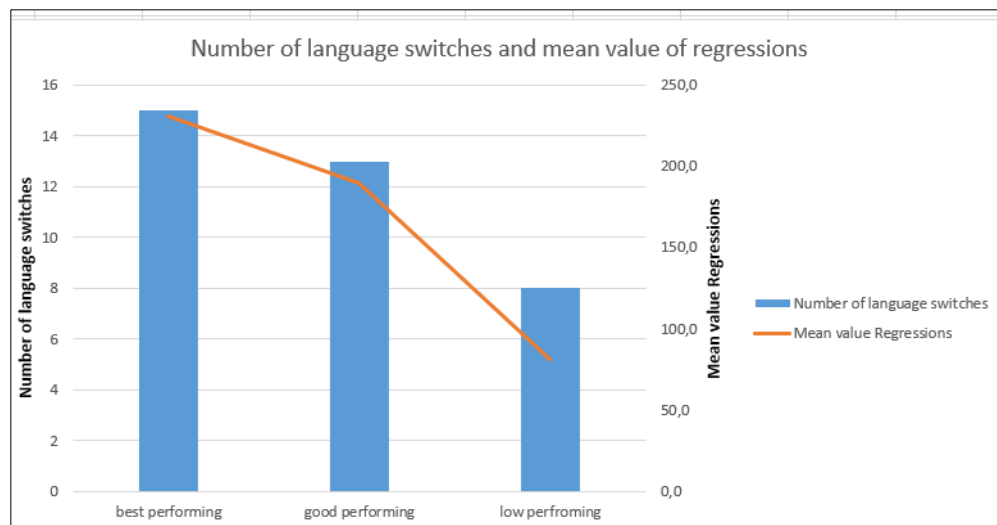


Figure 4. Number of Language Changes and Mean Values of Regressions in the Three Performance Groups, Source: Own Survey

It can be seen that the pupils in the best group in the post-test proceed differently with the language changes than pupils with a lower learning success; they change the languages in which they look at the teaching materials more often (cf. Fig. 4) Characteristic for the best group is the immediate access (= "recourse") to the same medium. For example, they watch a video in Russian and then again in German

5. Discussion of the Results

The offer of a multimedia and multilingual learning platform on a space use conflict is very positively received by pupils. The platform's linguistic diversity is aimed at learning groups consisting of pupils with different family languages. The aim is to use the resources of multilingualism for subject-specific learning. A restriction to only one language of instruction, such as German, is no longer in line with the current state of scientific discussion (cf. Schöber, 2017, Dollmann & Kristen, 2010).

"Multilingualism has become the norm in everyday school life. There are hardly any learners left who grew up in a purely monolingual environment"(Mayr, G. 2020, p. 46). Since multilingualism has an individual character for all pupils (cf. Hofer & Jessner, 2019, p. 11), all forms of multilingualism should be comprehensively taken into account in the classroom; a broad range of languages avoids the disadvantage of individual group members and stimulates the learning ability of all pupils (cf. Weißenburg, 2013, pp. 33-47).

Multimedia, digital learning tools are obviously particularly suitable for preparing material in many languages at the same time. This also ties in with the pupils' habit of using many pages with multilingual information options when researching on the Internet. Multimedia presentation on the Internet is an essential source of multilingualism because "the most diverse forms of multilingualism arise in everyday life simply through the use of new media" (Mayr, G. 2020, p. 46). The freely selectable access to one or more language representations in a subject leaves the pupils with sovereignty in the reception of information, this promotes independence in the entire learning process, including the easier acquisition of subject content (cf. Riehl, 2006, 19). Similar to the study by Heuzeroth and Budke (2020), this explorative study also showed that multilingual teaching has positive effects on subject content learning. Thus, those pupils were particularly successful in acquiring knowledge who, in addition to German media, also spent a lot of time in class with media in their family languages, frequently switched between German and other-language media and used the same media in German and the family language.

6. Conclusion and Outlook

Multimedia and digital learning tools are suited well for the use of multilingual approaches in geography lessons. Therefore, significant advantages can be realized. The research showed that most pupils used the material in different languages and that it supported their comprehension of the content. Especially, they used the same material in several languages. The effect on self-direction of the learning process and its outcome were significantly positive. The most successful pupils also used non-German sources. Also, they switched languages more often when using the material. This shows that receiving the content in several languages can support the understanding of the content and is also conducted by many pupils without an explicit stimulus by the teacher.

In order to realise successful teaching, the different abilities of the pupils should be taken into account in the subject lessons. The study presented here shows this implementation and proves that multilingualism is a valuable treasure.

For the further development of multilingual didactics of geography teaching, the main conclusion based on the results of the study presented here is that multilingual multimedia barrier-free, internally differentiating and thus inclusive teaching materials are particularly suitable for imparting knowledge in a sustainable way. Future research should examine how future teachers and experienced teachers can teach successful multilingual strategies.

This will enable pupils to learn more effectively and sustainably, free from language barriers, and ultimately lead to greater educational success and equity.

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Notes

Note 1. In 2018, around 37 per cent of pupils at general and vocational schools in Germany had a migration background (cf. Mediendienst Integration, 2019, no page cited). In the federal state of NRW, 39.4 per cent of pupils at general and vocational schools will have an immigrant background in the school year 2020/2021. In the group of pupils participating in this study, 68 percent have a migration background. This high migrant background is not untypical for the federal state of NRW, as the examples in the cities of Augustdorf (78.2 per cent) and Wesseling (63.3 per cent) show.

Note 2. The C-Test determines the German language competence of the pupils. The test consists of five short texts in which words or parts of words are omitted or distorted. The test takers have to correct these incorrect passages (cf. Baur / Goggin / Wrede-Jackes 2013). All but one of the pupils in the test group achieved over 90% of the possible points, nine pupils achieved 100%.

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