

RegioDiff: Digitally fostering reading and regional competencies in Grade 4 students

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Introduction

The project RegioDiff (Paleczek, 2020; RegioDiff, 2021) fosters Grade 4 students' reading skills and regional knowledge. It offers topics consisting of differentiated texts and exercises about regional particularities (historical, geographical, etc.), either digitally or in print. The differentiation allows working on a topic while students read according to their reading level. The reading levels are labelled using pictures of regional fruits, which is not related to student achievement but provides an orientation and a form of diversity and inclusion (Table 1). Students' reading abilities are assessed beforehand using the Graz reading comprehension test GraLeV (Paleczek et al., in prep.).

The texts are arranged in paragraphs referring to various subtopics. Each text contains marked glossary words (difficult words, e.g., archduke). Each paragraph is followed by exercises that have been proven to support students in their reading comprehension and learning (cooperative learning, reading strategy and comprehension) (Hattie, 2009; RAND Reading Study Group and Snow, 2002; Spörer, Brunstein and Kieschke, 2009).

Reading level classification	Reading level percentiles	Fruit	Approximate text length
Above average	> 70		750
Average	31-70		575
Lower average	15-30		350
Below average	< 30		250

The Infrastructure

Digitally, the material is implemented in a browser-based learning management system (LMS). Students work on tablets with the material. Teachers set up classes in the LMS, and assign the topic and the appropriate reading level to their students. The LMS offers a wide variety of content presentation and interactive formats. By clicking on glossary words (Fig. 1), students launch a pop-up with written, audio, or (where appropriate) pictorial information.

Besides the text, each level contains comprehension exercises (e.g. true/false, ordering or matching words/sentences/pictures; Fig. 2-3) and cooperative tasks (combined with reading strategy elements) which allow the students to work together in pairs across reading levels (e.g., think-pair-share, summing up or predicting content; non-digital format; Fig. 4). Each text ends with a task to find the letters for a word related to a topic-question. Wrongly chosen letters will make balloons burst. When finding the correct word, the remaining balloons rise into the air (Fig. 5).

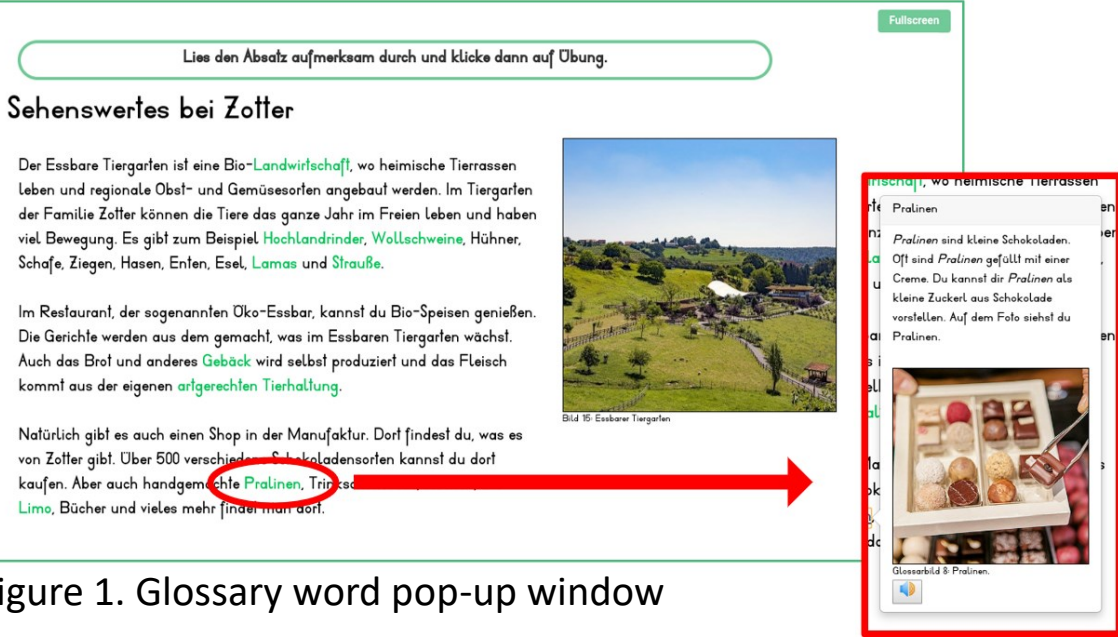


Figure 1. Glossary word pop-up window

The Challenges

Making the best out of users' displays: customization of appearance of the exercises to provide a comfortable reading experience (12" tablet and a 32" computer).

Pop-ups: lower resolution of tablets led to difficult placing and handling (required fine-tuning to avoid information loss, maintain responsiveness, and make sure everything worked smoothly on a touchscreen device)

Crossword Puzzles (Fig. 6): to motivate students but proved to be challenging in development and coding (e.g., umlaut ä, ö, ü; automatic selection of the next empty field after typing a letter; redesigning the pattern vertically and horizontally).

Difference between Android and IOS devices: automatic user interaction did not allow embedded audio to play on IOS; different security overlay in full screen mode on IOS (instructions for the reading text and exercises had to be repositioned). This is clearly an obstacle to widespread classroom use where seamless cross-platform use is a strict requirement.

Weak internet connection: whole class setting requires stable and high bandwidth internet connections; minimizing data amount to increase performance.

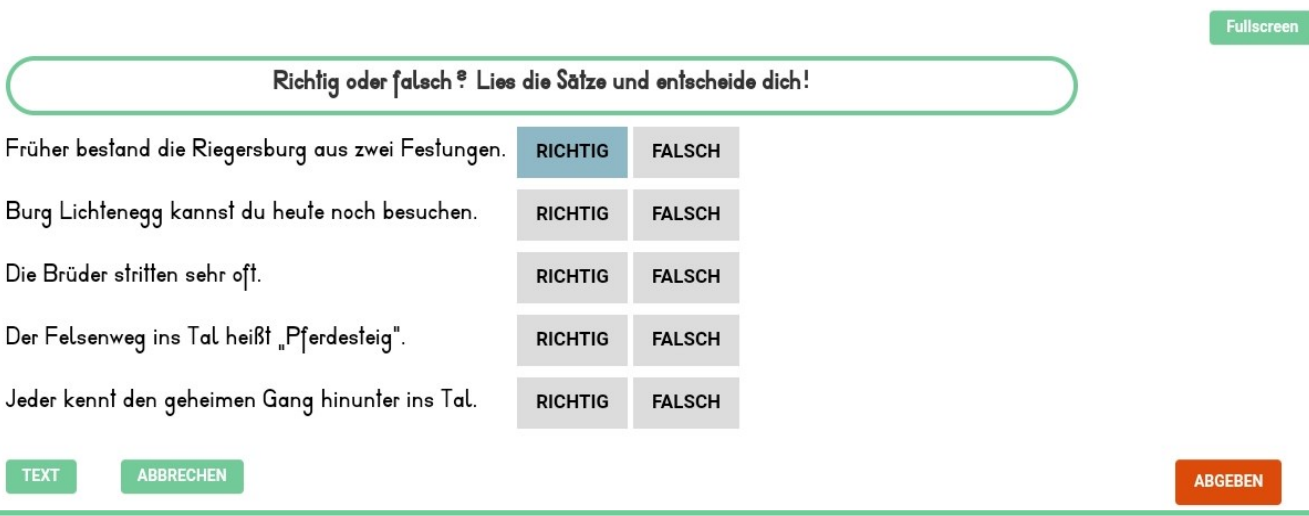


Figure 2. True or False-Quiz.

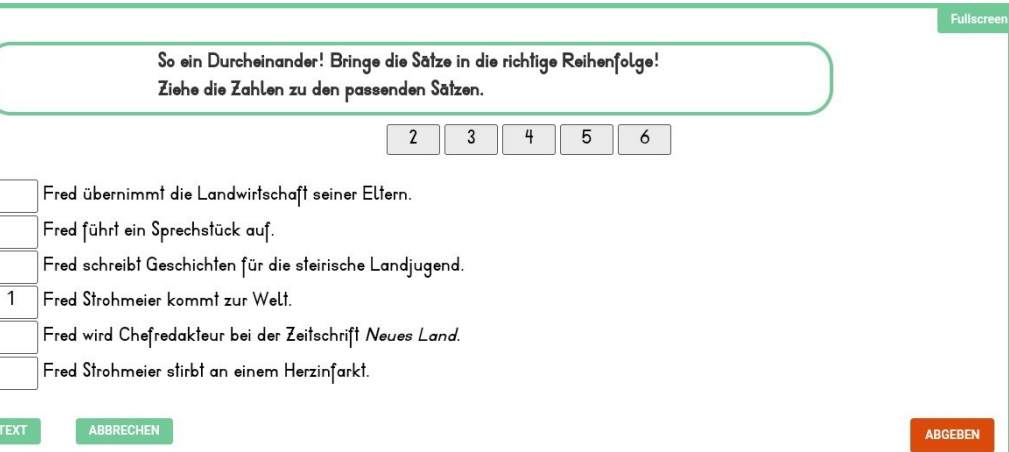


Figure 3. Ordering the sentences.

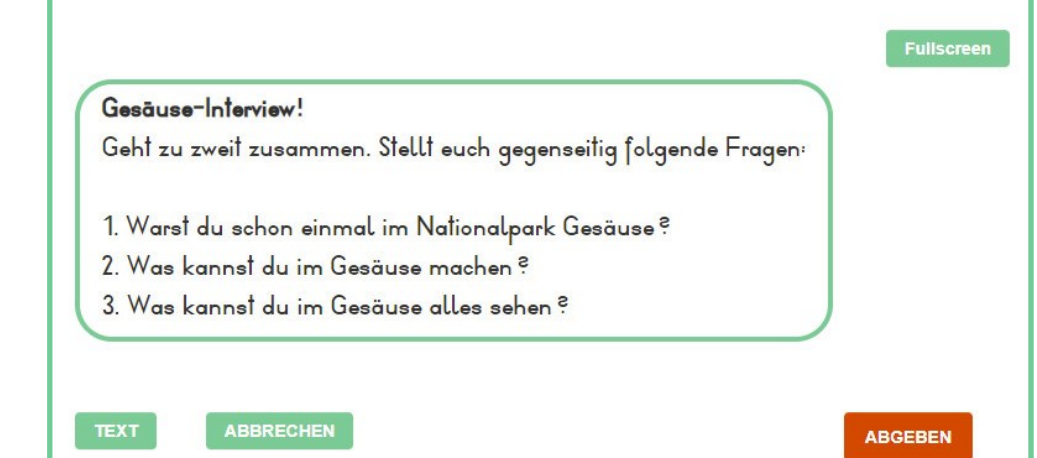


Figure 4. Cooperative learning task: Interview each other.

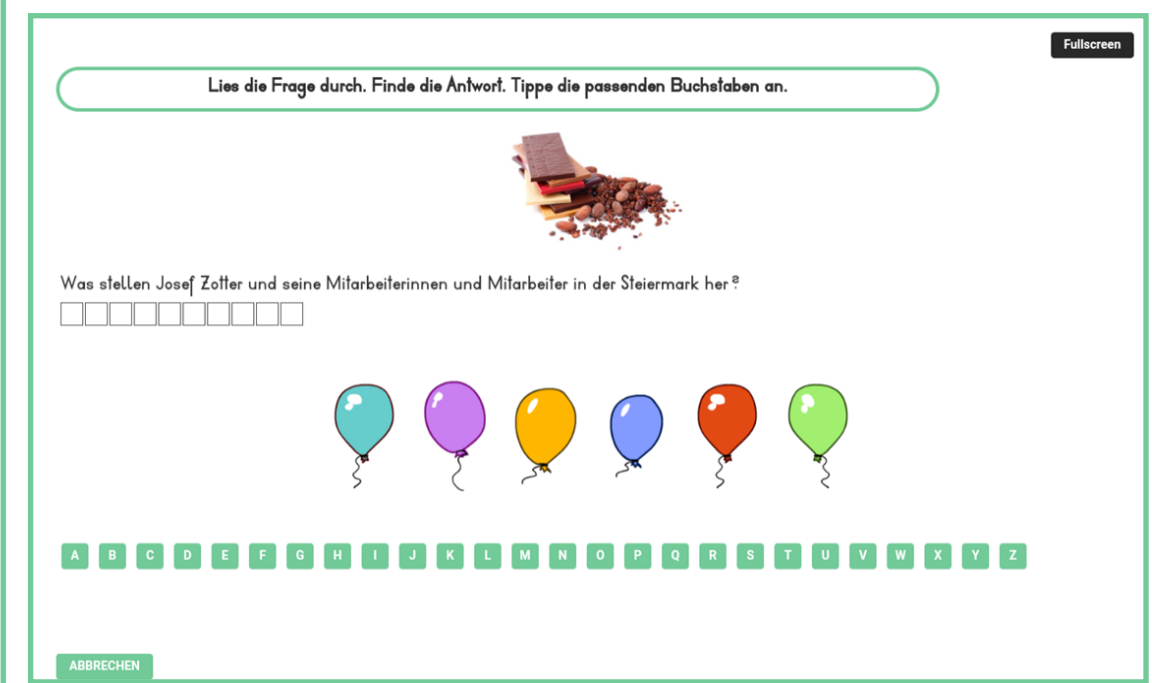


Figure 5. Balloon-Game.

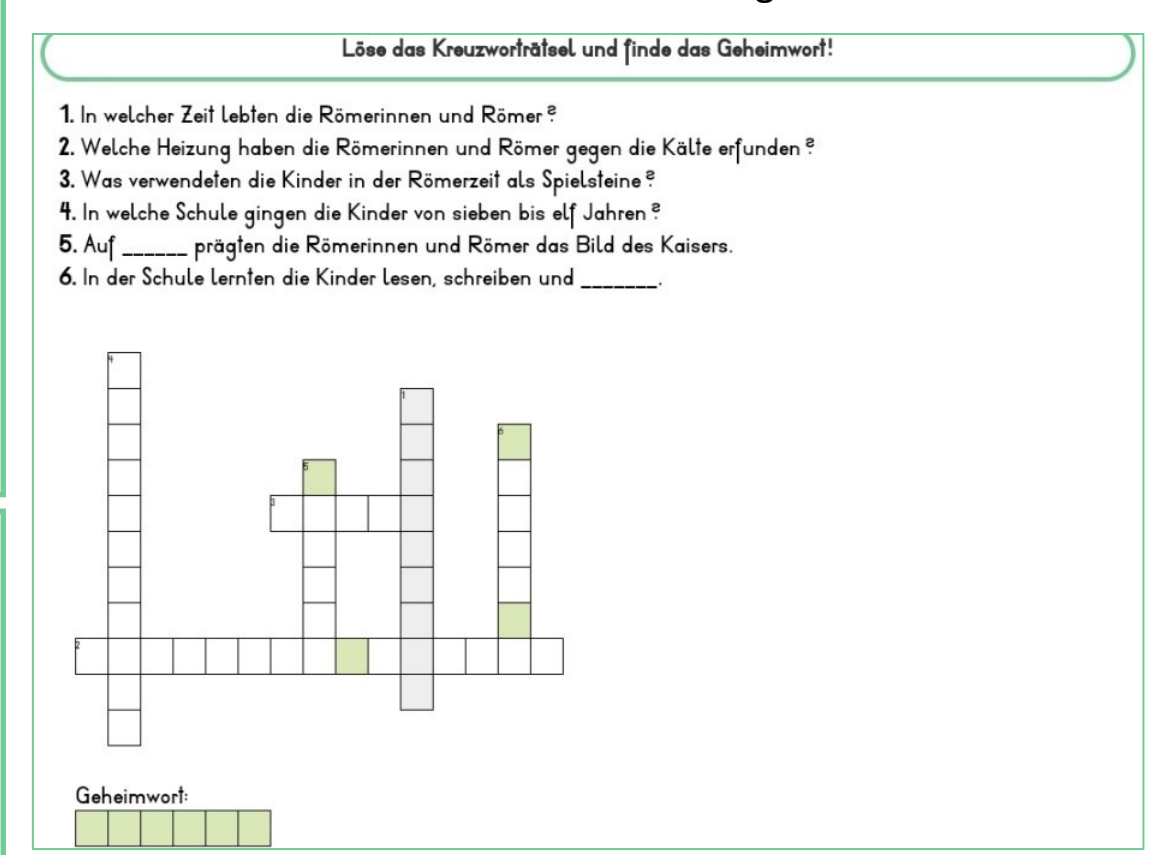


Figure 6. Crossword.

Student and Teacher Reactions

To gain more insight into usability issues (in individual and classroom use), we conducted two studies: one examining the user friendliness and usability of the materials, and a second study examining the program's appropriateness in class level use.

Study 1—the pre-study (02/2021):

Sample & Setting: 18 students (11 girls, one L2 learner, 12 Grade 3 and 6 Grade 4 students) working with the material in *individual settings*

Data: students *think-aloud* and *screencasts*; *observation sheets* while working with the material, the *log-data* and *interview* after working with the materials.

Results: The students particularly liked the balloon exercise and the pictures presented with the texts.

The most challenging tasks according to the students were those that required typing (e.g., the crosswords or finding hidden words in a snake full of letters and writing down the words digitally). They described the tasks as time consuming and tiring. We partly observed them struggling or even becoming frustrated and demotivated (especially in the handling of the crosswords). These tasks were adapted afterwards and combined with analogue structures.

Study 2 (02–03/2021):

Sample & Setting: 3 classroom teachers (51 students; two urban one rural classroom; one with many L2 learners; one mixed inclusive classroom with Grades 3 and 4) in *whole classroom lessons*

Data: *screencasts* and *observations sheets* during the lesson; *interviews* (students: whole-class setting; teachers: individual setting) and *log files* after the lesson.

Results: The interviews showed that both students and teachers enjoyed working in a digital learning environment, and described it as user friendly and intuitive. Teachers also found that it provided useful feedback on student achievement, although its proper use required that teachers first familiarized themselves with the new tool. Students, too, needed more support when working with the materials for the first time, but became more independent and confident the second time. The teachers stated that the offline exercises (cooperative tasks and a combination of digital and analogue) initially led to a certain amount of student insecurity, and that students required more support. However, they were confident that after gaining more experience with the material, both teachers and the students would find it less challenging. After two lessons, students and the teachers expressed how much they enjoyed working with the material and were looking forward to working with further RegioDiff topics.

Expected learning outcomes

In the main study (18 classrooms working with the material for 10 lessons - half of them print/half digitally), we will gather data on (a) students' knowledge concerning two chosen topics before and after reading the texts, and (b) students' reading skills before and after 10 lessons (with a control group). We expect to find that students know significantly more about the topic afterwards and that their reading skills increase. We also expect the cooperative learning elements to positively affect student's social-emotional skills and the classroom climate.

Plans for future development

More differentiated texts have been created and digitized, considering necessary adaptations. We plan on expanding the material with **other topics** (e.g., sustainability) and in different **languages** to implement the material internationally and compare relative effects. Furthermore, we plan on creating a digital **toolbox** (Editor), that enables teachers to build their own topics simply by using copy and paste to fill in text, glossary-word-pop-ups enriched with audio files or pictures, and select exercises from a given list of (empty) exercise templates. The material can then be used as required in an open-source browser-based LMS.

Such new infrastructure is likely to be crucial in large-scale implementation, especially with respect to the targeting of specific topics of regional significance. Such topics are normally outside the interest of standard textbook publishers. The digital creation of a **pool of texts** (written by teachers), offering **free material for all the teachers in German speaking primary schools**, would help reduce the effort required in adaptations and would, therefore, enable schools to create learning spaces that are relevant to their immediate regional environment.

References

- Hattie, J. (2009). Visible Learning: A Synthesis of over 800 Meta-analyses Relating to Achievement. Routledge.
- Paleczek, L. (2020). How to Produce and Acquire Regional Knowledge Digitally and in Print: Conceptualisation of the RegioDiff-Project. Proceedings of the 19th European Conference on e-Learning, pp 611-614.
- Paleczek, L., Seifert, S., Franz, A., Wohlhart, D. and Riedl, S. (in prep.). Grazer Leseverständnistest: GraLeV.
- RAND Reading Study Group and Snow, C. (2002) "Reading for Understanding: Toward an R&D Program in Reading Comprehension", [online], RAND Corporation, www.jstor.org/stable/10.7249/mr1465oeri
- RegioDiff (2021). Overview. <https://regionen-kennenlernen.uni-graz.at/en/overview/>
- Spörer, N., Brunstein, J.C. and Kieschke, U. (2009) "Improving students' reading comprehension skills: Effects of strategy instruction and reciprocal teaching" Learning and Instruction, Vol 19, pp 272–286.

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