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Title “Can you help me?” – Developing and Implementing Support and Tutoring Systems to Individualize Teaching and Learning in Inclusive Classrooms

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Abstract In response to the global demand for implementing inclusive education, the German federal state of Lower Saxony has abolished special schools for students with learning difficulties/disabilities. Hence, all students learn together within diverse learning groups. However, the lack of nationwide standards and insufficient teacher training raise concerns about the effective implementation of inclusive education. Differentiated instruction (DI) is internationally recognized as a key strategy for inclusive teaching. However, its implementation remains scarce in school practice, especially with regard to support and tutoring systems. To address this issue, the project “Can You Help Me?” developed and examined a long-term implementation concept for support and tutoring systems using the design-based research (DBR) methodological framework. The project was implemented in collaboration with four primary school teachers at a school in Lower Saxony to introduce and adapt peer support systems in an authentic school setting. It followed iterative phases of design, im-

plementation, and evaluation. The intervention elements included thematic introduction, coaching, and formative evaluation using voice messages and other qualitative data. Key findings revealed that close support, flexible content delivery, and modular materials facilitated high teacher engagement and effective integration into school routines. Teachers' autonomy and identification with the project were key factors for sustainability. Preliminary results highlight the potential of DBR to bridge the gap between theory and practice in inclusive education. The participatory, context-sensitive approach enabled the development of adaptable, meaningful teaching strategies. Future project phases will assess long-term sustainability and inform material redesign. This study underscores the value of DBR in fostering inclusive, practice-oriented innovation that empowers teachers and learners.

Keywords Design-based research, tutoring systems, peer tutoring, inclusive learning groups, inclusive education, differentiated instruction

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“Can you help me?” – Developing and Implementing Support and Tutoring Systems to Individualize Teaching and Learning in Inclusive Classrooms

Nele Groß, Verena Letzel-Alt

1.0 Introduction

Our society is becoming increasingly shaped by cultural, linguistic, and socioeconomic diversity, an aspect clearly reflected in today’s heterogeneous student populations. This is particularly evident in primary schools, where children with different learning needs and abilities learn together in inclusive classrooms, without prior selection. In Germany, education is the responsibility of the 16 federal states, which leads to variations in the school system because each federal state maintains its own educational organization. Primary education (*Grundschule*) is standardized nationwide for children aged 6–10 (with the exception of, e.g., Berlin, where primary school lasts two years longer). A distinctive feature of the educational system in Lower Saxony (a federal state in Germany) is the complete abolition of special schools for students with learning difficulties and/or disabilities. Consequently, all students with learning difficulties and disabilities attend mainstream primary schools (Niedersächsisches Kultusministerium, 2025), leading to a situation in which all students learn together in one classroom setting, regardless of whether they require specific support measures in terms of learning.

However, the absence of nationwide standards for implementing inclusive education means that many teachers are concerned about their ability to adequately support all students. A study by Forsa (2020), titled “Inclusion in Schools from the Perspective of Teachers in Germany”, found that 21% of respondents believed that it was impossible to provide personalized support for students with and without special educational needs in a shared instructional setting. This highlights the perceived limitations of current school structures and resources. In response to these challenges, differentiated instruction (DI) has been widely proposed as a core practice for inclusive teaching (Loreman, 2017; Tomlinson, 2017). Nationally and internationally recognized as a key strategy, the implementation of DI is considered a shared responsibility of all schools and teachers (Loreman, 2017). DI can be understood as any practice intentionally planned and implemented to address diversity within a learning group (Letzel, Schneider, & Pozas, 2020). Examples of these practices include tiered assignments, adaptive learning materials, flexible grouping, and individualized feedback (Letzel-Alt & Pozas, 2025). Among these strategies, peer

support and tutoring systems have been identified as particularly effective in improving student achievement (Hattie, 2009). These systems provide effective support for learning, especially in diverse learning groups. Learners can assume different roles and contribute their unique strengths. Moreover, they are associated with potential benefits in other student outcome variables, such as social competence, motivation, and a sense of belonging. Despite their proven effectiveness, however, empirical studies have shown that these systems are rarely implemented in day-to-day teaching practices (Letzel, 2021).

There are multiple reasons for this implementation gap. Teachers often perceive the additional planning effort required for DI as a burden (Pozas, Letzel-Alt, & Schwab, 2023). Furthermore, studies have shown that many teachers feel they have not received adequate training on how to apply DI effectively and that they lack the necessary theoretical and practical knowledge (Letzel, 2021; Pozas & Letzel, 2020; Whipple, 2012). Nevertheless, research has demonstrated that teachers generally evaluate DI as meaningful and potentially beneficial. Indeed, implementing structured support and tutoring systems over the long term can reduce teachers' workloads and improve job satisfaction (Pozas et al., 2023; Skaalvik & Skaalvik, 2015).

To explore the long-term and sustainable implementation of DI, we focused on Category III of the DI taxonomy by Letzel et al., (2020), which addresses "long-term established support and tutoring systems." This category served as the conceptual basis for designing a tutoring system that enables teachers to structure and differentiate instruction by systematically incorporating students' individual strengths – spanning academic, social, and organizational competencies. In line with principles of strength-oriented peer assistance (e.g., Carter et al., 2016), the tutoring system introduced in our project aims to draw on a broad spectrum of these strengths rather than primarily on academic performance.

Furthermore, the project can be situated within the framework of Universal Design for Learning (UDL) (Meyer, Rose, & Gordon, 2014). UDL emphasizes providing multiple means of engagement, representation, and expression to support all learners. Peer-tutoring systems can be viewed as a concrete implementation of both DI and UDL because they offer flexible ways to support learning processes and promote participation. The tutoring system used in the project is explicitly based on peer support (student–student), with students helping each other by contributing their individual strengths.

The implementation process was designed, carried out, and evaluated in detail within the project "Can you help me? – Development and Implementation of Support and Tutoring Systems for Individualization in Inclusive Learning Groups." The following research questions guided our work:

1. How can a long-term, guided implementation plan for teachers be designed to introduce support and tutoring systems into the classroom?

2. Which elements of the intervention contribute to this, and how should they be integrated?

The research was conducted in accordance with the methodological framework of design-based research (DBR), as outlined by Reinmann (2020). The aim was to determine how support and tutoring systems should be designed to ensure effective and sustainable integration into everyday classroom practice. In conclusion, our project aims to revise the materials furnished for use in the next redesigned phase.

2.0 Theoretical-methodological orientation of Design-Based Research (DBR)

To address the research questions and design the intervention, we employed DBR, as described by McKenney and Reeves (2018), and supplemented by the methodological perspectives of Euler (2014) and Bakker (2018). This formed the overarching methodological framework (Reinmann, 2020). DBR is a design approach based on research that is particularly well suited to developing innovative, scientifically grounded solutions in teaching, learning, and educational research (Tulodziecki, Grafe, & Herzig, 2013). A defining feature of DBR is the implementation of interventions within authentic learning environments, enabling them to be directly tailored to learners' needs. Another key feature is the close relationship between theory and practice (Feulner, Ohl, & Hörmann, 2015), facilitating the translation of theoretical concepts into practical educational strategies.

According to McKenney and Reeves (2018), the DBR cycle combines the iterative development of interventions with the systematic generation of theoretical insights. The research process consists of three core phases that are closely linked: the initial analysis of the context (exploration), the theory-driven design of an intervention prototype (design), and empirical evaluation (reflection). These phases are dynamically interwoven and connected through feedback loops. Each evaluation serves as the starting point for the next cycle, in which a revised version of the intervention is implemented, analyzed, and reflected upon. Through DBR's iterative structure – comprising development, implementation, analysis, and adaptation in recurring cycles – interventions can be continuously refined and improved in future applications.

Following the exploratory phase, during which we systematically examined the research field and published scientific articles, we found that the long-term implementation of peer support and tutoring systems is currently rare or inadequate. Based on this analysis, we developed a theory-informed design to support the sustainable implementation of such systems. This design formed the basis of the initial prototype.

The evaluation phase is then used to empirically test the developed interventions, providing insights into their effectiveness and contributing to the refinement of the theoretical frameworks. In DBR, theory and practice inform each other, advancing the intervention and deepening scientific understanding. Thus, DBR integrates design and research processes, relying on empirical methods in educational research. Unlike traditional research approaches, the focus here is not on classical criteria, such as sample size or reliability measures, but on “closely observing and understanding the interplay between design and the application context” (Raatz, 2016, p. 54). In DBR, the design process is not regarded merely as an auxiliary tool but as a central component of knowledge generation (Reinmann, 2022). The term *design* can be understood both as a noun – referring to a design concept or a developed product – and as a verb – describing the active process of creating, planning, and testing (Reinmann, 2022). Accordingly, within the DBR framework, design is not limited to the act of shaping or constructing; rather, it encompasses processes that are explicitly aimed at generating knowledge (Reinmann, Herzberg, & Brase, 2024). A defining feature is the integration of exploratory and creative processes that cannot be fully planned in advance but are instead characterized by openness to new ideas, iterative development, and context-sensitive adaptation (Reinmann et al., 2024).

Based on this understanding, we selected DBR as our methodological framework, as this approach is specifically geared toward developing and investigating practice-oriented interventions in complex educational contexts. The iterative integration of analysis, design, and evaluation allowed us to translate theoretically grounded concepts into practical measures and systematically examine their impact under real-world conditions. This process allowed us to generate theory-driven and practice-oriented insights while continuously refining our design.

3.0 Exploration

The DBR process begins with a problem analysis, in which an accurate picture of the initial situation is formed using empirical data, such as interviews, observations, or document analyses as well as theoretical concepts. To ensure comprehensive exploration, we drew on our own experiences and engaged in discussions with experts to reflect on and refine our ideas.

Based on previous research, we have developed and analyzed a taxonomy of DI (Letzel & Otto, 2019; Letzel, Schneider, & Pozas, 2020; Letzel, 2021; Letzel-Alt & Pozas, 2025; Letzel & Pozas, 2022; Pozas & Schneider, 2019; Pozas, Letzel, & Schneider, 2020). Support and tutoring systems are effective practices among a variety of differentiated instructional measures. However, due to their limited implementation in schools, we asked ourselves how we can support their implementa-

tion in practice and what the necessary conditions are. From the outset of our project planning, we recognized the importance of considering all students and their respective strengths in our support and tutoring systems, particularly with regard to inclusive education. Therefore, we deliberately chose not to define strengths in terms of academic performance or grades. Instead, we widened the definition and included soft skills such as orderliness, emotional competence, and organizational talent. This approach would ensure that every child had a role in the support and tutoring system, not just high-achieving students. Thus, this is intended to foster self-concept, self-confidence, and motivation in all students.

During an informal expert interview (Bogner, Littig, & Menz, 2014; Meuser & Nagel, 1991) with a school social pedagogue from the federal state of Rhineland-Palatinate (Germany), we presented our research project and requested her opinion on its implementation. Building on our previous ideas, she strongly endorsed our intended project from her professional experience and point of view. Based on her questions, we realized that it was important to emphasize in the project description that identifying students' strengths is not about differentiating performance but about creating awareness of the value and importance of soft skills. As we could not tell from the feedback whether students were aware of their strengths, we asked the expert's child what his strengths were. After some thought, he responded by naming school subjects in which he considered himself strong. We concluded from the discussion that our project is highly relevant to the implementation of successful inclusion in schools and that suitable materials can help teachers and students alike to recognize their individual strengths concerning academic performance but also, equally relevant, beyond it. The social pedagogue and the child suggested that we could use the characters from the children's TV show Paw Patrol to introduce the topic of "strengths" as well as the idea of implementing support and tutoring systems in class. Paw Patrol, according to the child, is known by every student and therefore can support identification with and interest in the topic.

The series is about a young boy named Ryder and his team of rescue dogs, each of whom has a specific role in the rescue service. Whenever someone needs help, Ryder sends the right pups to solve problems and save the day. The show emphasizes teamwork, problem-solving competence, and community service, with the pups working together in each episode to tackle everyday emergencies or unexpected challenges. The signature tagline, "No job is too big, no pup is too small", emphasizes the idea that anyone can contribute, regardless of their size or role. To test whether primary school children were familiar with the series, we asked parents in various contexts whether their children knew the characters and their respective strengths. Based on the positive feedback received, we decided to use the Paw Patrol characters as role models for identifying strengths.

Our own research experience in school contexts has made it clear that implementing and monitoring scientific projects in practice is associated with considerable challenges. A central obstacle is the limited time resources generally available to schools and teachers. Teachers and school leaders are increasingly faced with growing administrative, pedagogical, and teaching-related demands, which place considerable strain on their time management and leave little room for additional tasks (Boyland, 2011; Dadaczynski, 2012). In this situation, research projects, especially those requiring more coordination and support, often fall behind or require considerable organizational effort to integrate. It should be kept in mind that schools are already subject to strict time constraints due to the scheduling of class tests, project weeks, and school trips. These dates often vary not only between different schools but also within a single school, from year group to year group. Consequently, time resources can vary considerably, even within a single class. Additionally, there are significant differences in annual school planning between schools and between federal states. Despite careful preparation, problems can arise during project implementation that cause delays, or alternative ways of achieving objectives may emerge that were not originally conceived but that better meet the particularities of different settings. This means that any research conducted in schools should be carried out in the most flexible and unobtrusive way possible for teachers. Due to the differences between and within schools, particularly at the classroom level, researchers must be highly adaptable, flexible, and able to work in short time frames.

4.0 From Concept to Design: Developing an Educational Intervention

The framework conditions for implementation, as well as the characteristics and quality of implementation, can have a significant influence on the results of projects and measures (Schultes, Jöstl, Finsterwald, Schober, & Spiel, 2015). In addition to structural conditions, particular importance must be given to the extent to which school leaders and teachers accept a scientific project, recognizing and appreciating its benefits and added value (Fixsen, Blase, Metz, & Van Dyke, 2015; Hasselhorn, Köller, Maaz, & Zimmer, 2014) and their ability to identify with the project's goals and content. To enable successful collaboration between science and schools, it is essential to clarify the prerequisites and conditions for implementation during the conceptual phase (Metz & Albers, 2014). Based on this, the project timeline should be planned realistically in accordance with these framework conditions to reliably ensure the implementation of measures and accompanying scientific research. Particular focus should be placed on whether those involved have sufficient time and are appropriately trained and prepared for their project-related tasks. Personal interactions, interpersonal relationships, and emotional factors also gain importance in this context, as they significantly influence how teachers and school staff handle additional professional

demands in the context of school-based project work (Kallestad & Olweus, 2003).

Another key aspect of successful implementation is the targeted communication of project-related information to specific audiences. Effective and sustainable dissemination requires that process and outcome goals be clearly defined during the planning phase in order to form the basis for developing suitable communication strategies (Holt & Chambers, 2017; Lezotte, Krishnamurthy, Tulino, & Zion, 2022). Only in this way can it be ensured that scientific findings reach school practice and have a tangible impact.

To ensure a smooth process, we first held an online meeting with the school principal, during which we presented our project idea and explained how tutors and support systems would be introduced and implemented. The principal was enthusiastic about the idea and asked us to compile information that she could share with her teaching staff. During an online meeting with five interested teachers, we presented our initial ideas and answered the teachers' questions. Afterwards, one teacher decided not to participate in the project for private reasons. Further communication enabled us to arrange an in-person "kick-off meeting" with the teachers before the concrete planning of the project began. During this meeting, we introduced ourselves and presented the project idea. We also asked the teachers how they envisaged the implementation process, what time constraints they were facing, which forms of communication they preferred, and where they anticipated potential challenges. Unexpectedly, we had the opportunity to offer financial compensation to the participating teachers. Through funds made available by the Dean's Office of the Faculty of Education at Leuphana University Lüneburg as part of a short-term funding initiative, we were able to remunerate the teachers for their involvement. This served as an additional incentive for active participation and facilitated the continuous integration of school-based practices into the development process.

Design Conjectures

Based on the results of the exploration phase and initial discussions, we derived two design domains (Reinmann, Brase, Jänsch, Vohle, & Groß, 2020): (1) implementation and (2) content, and formulated design assumptions as working hypotheses within these domains. These assumptions are intended to serve as the basis for the long-term development of design principles that support successful transfer (Van den Akker, 2013). The design conjectures formulated within the design domains serve as working hypotheses for further development toward the implementation of support and tutoring systems. These can be used in future implementations to develop well-founded design principles (Van den Akker, 2013). Van den Akker (1999) described the structure of design principles as follows:

If you want to design intervention X [for purpose/function Y in context Z], then you are best advised to give that intervention the characteristics C1, C2, ..., Cm [substantive emphasis], and to do that via procedures P1, P2, ..., Pn [procedural emphasis];

because of theoretical arguments T1, T2, ..., Tn; and empirical arguments E1, E2, ..., Eq. (p. 9).

We adopted this principle for the development of the design conjectures – both for the further development of the sustainable implementation of support and tutoring systems and for a later transfer to other schools (Table 1).

Table 1: Overview of the Derived Design Assumptions, according to Van den Akker (1999)

Characteristics and Approach	Theoretical and Empirical Arguments
Design domain Implementation	
C1: Teachers identify with the project to ensure its successful implementation.	TC1.1: Personal identification with project-related processes is essential for the sustainable maintenance of motivation (Ryan & Deci, 2000). TC1.2: The symbolic monetary reward creates a commitment (Mickel & Barron, 2008).
C2: Due to a lack of time resources, the implementation is divided into smaller units.	TC2.1: Time pressure leads to fragmented and reduced depth of implementation (Moir, 2018). EC2.1: In the personal kick-off meeting, the teachers reported time pressure due to report conferences, class trips, and excursions and wished for smaller units for implementation.
C3: Several communication channels (email, messenger) are offered as a multichannel communication strategy for close support of the process.	TC3.1: The combination of several communication channels improves the flow of information and reduces project-related delays (Jean & Amolo, 2025).
C4: To ensure fast and uncomplicated access to all documents, and to avoid unnecessary email correspondence, all materials were stored centrally in the “academic cloud” provided by the university.	TC4.1: Teachers are more likely to accept materials provided digitally (Cohen, Kalimi, & Nachmias, 2013). TC5.1: According to cognitive load theory (Sweller, 1988), reducing the amount of information from a central source improves working memory and reduces cognitive load.
C5: The teachers can decide for themselves in which subject they introduce the helper systems.	EC5.1: In the personal kick-off meeting, the teachers report on their different subjects. Specifying in which subject the implementation should take place would lead to interference in everyday school life.
C6: There is no set timetable for the individual units to minimize the impact on lesson planning.	TC6.1: For implementation, the needs of the field, in this case the teachers, must be considered (Spiel, Schober, & Strohmeier, 2018).
Design Domain Content	
C7: For a common understanding, there is an introductory video on the topic of	TC7.1: To ensure coherence during the project, it is necessary to develop a common understanding

Characteristics and Approach	Theoretical and Empirical Arguments
“Inclusion, internal differentiation and support and tutor systems.”	of key terms and concepts by clarifying uniform definitions and interpretations (Holzer et al., 2024).
C8: Fictional characters from the Paw Patrol series serve as objects of identification to help the students discover their personal strengths beyond their academic achievements.	EC8.1: The expert interview emphasized the educational value of using role models to encourage students to reflect on their personal strengths in a supportive manner.
C9: The appropriate material is made available on the academic cloud for each phase of the project, depending on the requirements.	EC9.1: Our experience of scientific cooperation with schools has shown us that, due to the limited time available in schools, it is necessary to make all materials available.
<i>Realization</i>	
P1: A face-to-face kick-off meeting is organized so that teachers and scientists can get to know each other.	TP1.1: Awad and Alhashemi’s (2012) research indicates a link between personal supportive communication and organizational/team commitment.
P2: Teachers have the opportunity to carry out the intervention and reflection at a time of their choosing. It is possible to watch the screencast several times.	TP2.1: The screencasts make it possible to engage with learning content without any immediate pressure to act (Vohle & Reinmann, 2014).
P3: The screencasts should not significantly exceed a total length of 15 minutes so as not to lose attention to the content.	TP3.1: Learning videos should ideally be 10 to 15 minutes long to avoid cognitive overload and maximize learning performance (e-learning working group (HDA & HRZ, n.d.)).
P4: To be able to respond quickly to queries and comments, feedback via voice message (Messenger) is offered in addition to an email address.	TP4.1: The growing number of respondents using smartphones (Gummer, Höhne, Rettig, Roßmann, Kummerow, 2023) creates new possibilities for social science research. TP4.2: Roghanizad and Bohns (2022) discovered that richer media channels still offer an advantage over text-based ones.

5.0 Implementation and Evaluation

As part of our study, we contacted primary schools in Lower Saxony, primarily around Lüneburg, inviting them to participate. Our aim was to find committed schools willing to contribute to the scientific investigation of introducing support and tutoring systems. Although many schools were interested, we decided to work with one school, due to the time and personnel resources available. The school’s mission statement emphasizes a strong school climate as the foundation for learning together. It emphasizes respectful interaction, acceptance of diversity, and a positive and participatory learning atmosphere. Moreover, the school principal was very enthusiastic and supportive about the project. The principal invited the teachers to

participate on a voluntary basis. Four teachers from the primary school took part in total. We supported the following four teachers in implementing the support and tutoring systems during the project:

Teacher A has over 20 years of teaching experience, including 16 years at her current school. She currently teaches two first-grade classes and one third-grade class in swimming and also serves as a homeroom teacher. She views inclusive education as a shared learning process in which all children are equally involved, regardless of their individual needs. Teacher B completed a state-certified teaching degree with a focus on primary education and worked for ten years at a secondary school. She is the homeroom teacher of a third-grade class of 20 students and teaches German, physical education, general studies, and swimming. For her, inclusive education means meeting each child at their individual level of development. Teacher C is currently completing the practical phase of her teacher training (*Referendariat*) after studying mathematics and religion in the first more theoretical phase. She currently teaches two first-grade classes and one third-grade class. Her understanding of inclusive education emphasizes the importance of ensuring that all students feel comfortable both socially and within their individual learning processes. Teacher D is an experienced educator with an initial degree in cultural studies and a subsequent teaching degree in German and general studies. She has been working at her current school for three years. She is also involved in teacher education at the university level. Currently, she teaches a first-grade class and provides additional support through remedial instruction. She also teaches at the university. She understands inclusion as the principle of providing equal educational opportunities for all students.

Due to various time constraints, the project began in spring 2025 with a kick-off meeting at the start of May and was scheduled to run until the start of the summer vacation period in Lower Saxony in early July of 2025. The plan was to release a new instructional video on the Academic Cloud (provided by Leuphana University of Lüneburg) to which the teachers were given access every two weeks during this period. We implemented the support and tutoring systems in three conceptual phases:

1. Thematic introduction and assessment of individual strengths (“Strengths to roles”)
2. Coaching of the support and tutoring teams (“Administration and Coaching”)
3. Evaluation via voice messages based on guiding questions (“Evaluation”)

Figure 1 illustrates the conceptual phases (1–3) of the intervention and the practical schedule for collaboration between the analyzer and teachers.

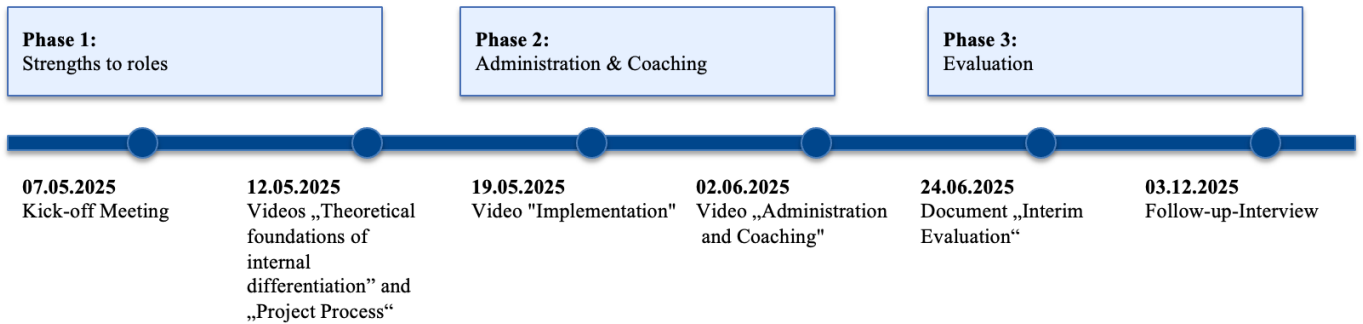


Figure 1: Intervention Timeline: Conceptual Phases & Practical Implementation

As shown in the lower part of the schedule, we provided asynchronous support to teachers. Following the kick-off meeting on May 7, 2025, we provided instructional videos, documents, and reflection tasks at 1–2 week intervals. Teachers worked with the materials at their own pace and provided feedback. An interim evaluation took place in June, followed by a group survey in November 2025.

This qualitative feedback will be used to assess the long-term impact and acceptance of the helper and tutoring systems introduced in everyday school life. To analyze the teachers’ voice messages, an auditory-based method was used that did not require complete transcription. Halcomb and Davidson (2006) advocate systematically listening to the audio material several times in conjunction with field notes and reflexive recordings to save time while preserving the original character of the data. During the listening process, we recorded spontaneous impressions, atmospheric features, and central themes as key points. This process was supplemented by the preparation of analytical memos containing contextual information, interpretive notes, and emotional assessments, which contributed to the comprehensibility of the analysis. A total of 27 voice messages, 17 comprehensive text messages, and 22 photos submitted by teachers were received as a database for further evaluations.

6.0 Results and Discussion

The design of interventions is essential to the course and outcome of DBR projects. McKenney and Reeves (2018) distinguished between alpha, beta, and gamma testing. Since the project is not yet complete, we focus on gamma testing, an advanced evaluation phase carried out after the initial test phases. The goal is to check and improve the functionality and effectiveness of the intervention as an educational design. Since we lack data from the summative evaluation, we are conducting a formative evaluation of the implementation based on the established design assumptions. Below, we present the project’s key results to date.

The meeting between science (theory) and practice was particularly evident at the kick-off meeting. The personal exchange before the start of the project strengthened trust, clarified expectations, and

fostered a cooperative attitude, which positively impacted the project's subsequent progress (compare design assumption TP 1.1).

The intervention was successfully implemented and accepted by the teachers, who actively shaped it. The opportunity to identify with the project proved particularly effective, as evidenced by personal contact, close support, and prompt responses to queries. Although not all participants took full advantage of the low-threshold offer, a fixed group of people participated intensely throughout the project (compare the design assumptions of TC1.1 and TC1.2).

Various communication channels, such as email, messenger, and cloud, facilitated access to support and materials. The central storage of all content on a digital platform simplified the organization and was perceived as helpful by the participants. By using voice messages as a tool to communicate, questions could be addressed quickly, which contributed to the project's continuous progress (compare the design assumptions of TC3.1, TP4.1, and TP4.2). During the process, researchers and teachers realized the importance of formative feedback and the chance to intervene or clarify immediately.

The decision to offer content in a modular and flexible way proved to be crucial for its integration into everyday school life (compare the design assumption of TC2.1). The teachers welcomed the opportunity to decide on the subject and the timing of the content. This flexibility reduced the project's burden and made it more compatible with the teachers' different pedagogical approaches. For example, the idea of incorporating the project into a class trip and identifying students' strengths around a campfire emerged from the discussions – a creative use of time.

Our design assumptions also revealed some misconceptions. Although the children could identify with the "Paw Patrol" characters, the teachers were initially reluctant to engage because they were unfamiliar with them. In a redesign, we would therefore provide the teachers with an explanatory handout introducing the characters and content of the program. Moreover, we assumed that each student would be sorted into one support and tutoring team. However, we realized that all teachers decided to sort the students into different groups, letting them take over different supportive roles, which turned out to be more beneficial.

The chosen period from May to July posed an additional challenge. In addition to curricular obligations and half-yearly changes, conferences, class trips, and project weeks often occur during this time. To give teachers more time and flexibility to implement the support and tutoring systems, a different project period would be advisable.

In response to the research questions, the findings offer guidance on designing a long-term, guided implementation plan for teachers (RQ1) and on which intervention elements contribute to successful implementation and how to integrate them (RQ2). A relational start phase, such as a kick-off meeting, should be included in the intervention to build trust, clarify expectations, and foster teacher engagement. Then, content should be provided in modular, adaptable

units on an asynchronous schedule, allowing teachers to integrate the materials flexibly into their classroom routines. Multichannel communication, rapid feedback loops, and continuous formative reflection are essential for monitoring progress and providing timely support. The plan should also include options for context-sensitive adaptation, enabling teachers to adjust the intervention to local classroom conditions, schedules, and student needs.

This study has several notable strengths. The iterative, collaborative nature of the DBR approach allowed continuous adaptation of the intervention to the specific conditions of the participating school. Its modular and flexible design enabled teachers to integrate the materials into their everyday classroom routines at their own pace. Genuine teacher participation fostered ownership and acceptance of the intervention, while low-threshold communication channels, such as cloud-based platforms, messaging, and voice notes, facilitated rapid access to materials and immediate feedback. Furthermore, the intervention proved to be context-sensitive, allowing adjustments such as flexible student role assignments and the incorporation of school activities like class trips. At the same time, several limitations should be noted. The study was conducted with a relatively small sample of teachers and schools, limiting generalizability. Only formative evaluation data are currently available, with summative evaluation planned for fall 2025. Not all participants engaged fully with the materials, so some findings reflect the experiences of a subset of teachers. The chosen implementation period (May to July) coincided with other school activities, such as conferences, project weeks, and class trips, which constrained flexibility. Finally, dissemination strategies have been limited so far, and broader adoption and sustainability remain to be explored.

Specific intervention elements that enable flexibility, accessibility, trust, and iterative adjustment are particularly influential. These elements should be embedded structurally in the implementation plan through the relational start phase, the modular, adaptable materials, the multichannel communication with rapid feedback, the formative reflection loops, and the context-sensitive redesign options. Together, these components support the dynamic and collaborative nature of DBR, facilitate integration into heterogeneous and inclusive classrooms with limited resources, and create conditions that enable teachers to adopt, adapt, and meaningfully implement support and tutoring systems in the long term.

7.0 Conclusion

The feedback and high implementation rate demonstrate that the iterative, collaborative nature of DBR was essential for integrating support and tutoring systems into classroom practice. The close integration of planning, implementation, and formative feedback enabled continuous testing and refinement of design assumptions in response to real classroom conditions. The findings also show that specific design features, such as the relational kick-off meeting, modular asynchronous materials, and multichannel communication,

created the flexibility and accessibility that teachers needed to meaningfully implement the intervention. These mechanisms were particularly important in inclusive settings, where heterogeneity, limited resources, and structural tensions often complicate innovation.

However, the preliminary nature of the study and structural constraints, such as limited time and variable participation, highlight the need for continued refinement and broader dissemination strategies. A follow-up study in fall 2025 will examine whether the support and tutoring systems have become sustainably established in classroom routines. Overall, the study shows that DBR is well suited to developing sustainable concepts that help all students build on their strengths – the core ambition of inclusive education – with its application-oriented, flexible, and participatory approach.

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