



## **Explanatory Videos in Inclusive Science Classrooms: A Narrative Literature Review**

**Carla BECKMANN <sup>1\*</sup>, Claas WEGNER <sup>2</sup>**

Received: 14 January 2026/ Accepted: 16 March 2026/ Published: 22 April 2026

---

### **Abstract**

*Explanatory videos have significant educational potential, particularly in enhancing subject-specific competencies, improving motivation, and developing metacognitive skills across different age groups and abilities. As part of a narrative literature review, five relevant empirical and conceptual studies published since 2006 were identified that address the key design elements, influencing factors, and research needs associated with video-based learning formats, thereby enabling the development of guidelines for inclusive science teaching. The evaluation specifically focused on didactic design, the potential for inclusive differentiation, and the integration of these videos into cooperative learning processes. Studies show that short, high-quality video lectures featuring a visible teacher contribute to perceived effectiveness and usage frequency. In addition, these videos also allow for individualized access through adaptive features such as pausing and replaying. The application of inclusion-oriented design principles, such as Universal Design for Learning, has been inadequate. The analysed studies, despite not having an inclusive focus, have identified aspects of inclusion sensitivity retrospectively, deriving insights from qualitative analyses during implementation rather than systematically incorporating these aspects into the design of video-based learning environments. Therefore, there is a significant need for research focused on the intentional design, implementation, and evaluation of inclusive learning videos. Such research could further enhance inclusive science lessons and open up new didactic approaches for diverse learning groups.*

**Keywords:** Differentiation; explanatory video; inclusion; SAMR model; Science lessons; Universal Design for Learning

---

**How to cite:** Beckmann, C., & Wegner, C. (2026). Explanatory Videos in Inclusive Science Classrooms: A Narrative Literature Review. *Journal of Innovation in Psychology, Education and Didactics*, 30(1), 37-48. doi:10.29081/JIPED.2026.30.1.03

---

<sup>1</sup> PhD Student, Faculty of Biology, Bielefeld University, Germany, E-mail: [carla.beckmann@uni-bielefeld.de](mailto:carla.beckmann@uni-bielefeld.de)

<sup>2</sup> Prof. PhD, Faculty of Biology, Bielefeld University, Germany, E-mail: [claas.wegner@uni-bielefeld.de](mailto:claas.wegner@uni-bielefeld.de)

\* Corresponding author

## **1. Introduction**

### ***1.1. Inclusive media education as a school educational mission***

The call for inclusive education, as outlined in Article 24 of the UN Convention on the Rights of Persons with Disabilities (UN CRPD), along with the ongoing digitalization of the education system, presents a significant challenge for teachers and schools. They must design learning processes that are both inclusive and supported by digital tools. The field of inclusive media education has recently emerged at the intersection of these two important educational policy goals (Kamin, 2023). Inclusive media education examines how digital media can be effectively designed, implemented, and critically assessed to ensure that educational processes are accessible and participatory for all learners (Bosse, 2019).

Beyond the established compensatory and deficit-oriented uses of digital media, recent reviews focusing on the intersection of digital technology, special education, and science education highlight its potential. Digital tools can help structure, individualize, and reduce various learning barriers, both subject-specific and interdisciplinary. The positive impact of digital media on inclusive learning processes has also been documented in international research (Baumann & Melle, 2018; Huang et al., 2020; Kieserling & Melle, 2020). However, a productive and creative approach to digital media is rarely included in research (Mertens et al., 2022; Quenzer-Alfred et al., 2023). Digital formats not only offer a better understanding of scientific content but also have the potential to broaden access to subjects for learners with varying prerequisites (Fränkel & Schroeder, 2023). Access for learners can be broadened through multisensory presentations, temporal flexibility, or the promotion of self-efficacy (Findeisen et al., 2019).

In an inclusive context, explanatory videos can serve as a promising link between media, pedagogical innovation, and didactic differentiation. These videos can be used passively through adaptive, low-threshold access to complex subject matter or actively in lessons (Fränkel & Schroeder, 2023). For example, students could collaborate in peer groups to create their own explanatory videos (Findeisen et al., 2019). An active approach has the potential to foster collaborative learning, self-expression, and differentiated performance (Bargh & Schul, 1980; Fiorella & Mayer, 2013). However, there has been little empirical or systematic research on how explanatory videos can specifically contribute to the inclusive design of science lessons (Fränkel & Schroeder, 2023). While flipped classroom models have shown positive effects on subject-specific knowledge across various contexts (Habib & Morse, 2022; Kesharwani & Kesharwani, 2022), their impact on inclusion remains largely speculative (Apriani et al., 2021; Doğan et al., 2023). Research on the use of explanatory videos usually emphasizes performance enhancement, motivation, and self-regulation. Yet, factors such as participation, accessibility, and responsiveness to learner diversity through the use of digital media are rarely examined (Mertens et al., 2022; Quenzer-Alfred et al., 2023).

### ***1.2. The SAMR Model as an Orientation Framework for Inclusion-sensitive Media Use***

The SAMR model, developed by Rubén Puentedura in 2006, is a useful framework for classifying the educational value of digital media in the classroom. This model divides the use of digital technologies into four stages: substitution, augmentation, modification, and redefinition (Puentedura, 2019; Romrell et al., 2014). The SAMR model helps teachers select appropriate digital media for their lessons. When chosen thoughtfully, digital media can significantly support science lessons and promote skill acquisition (Marci-Boehncke, 2018).

The model distinguishes between the technical and pedagogical integration of digital media and encourages educators to reflect on their potential to strengthen participation and accessibility in inclusive classrooms.

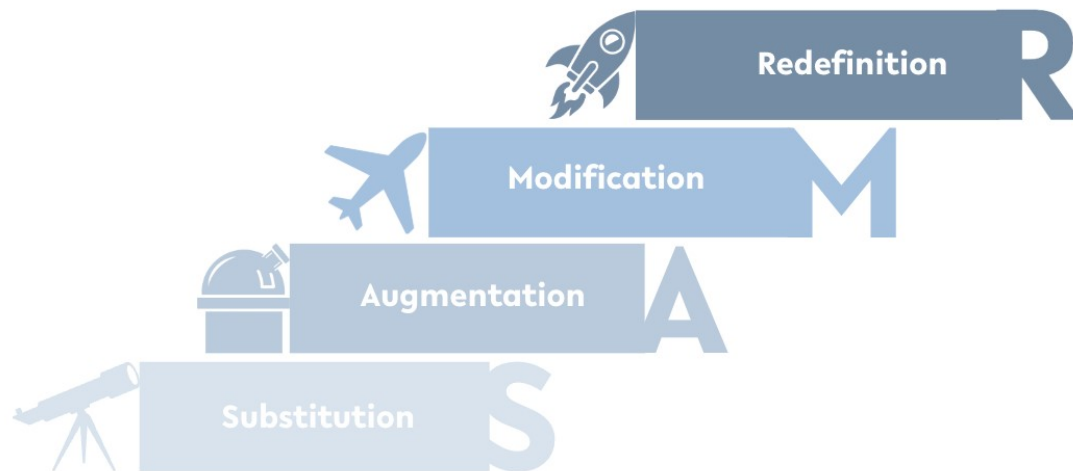


Figure 1. Illustration of the four stages of the SAMR model (based on Puentedura, 2012)

At the substitution level, analog media are replaced with digital alternatives without significantly changing the task or learning process (Puentedura, 2020). Using digital media at the augmentation stage, digital media are enhanced with functional features that increase their instructional value. (Puentedura, 2012). The modification stage entails a fundamental redesign of learning tasks using digital media (Puentedura, 2012). Instruction becomes more active and productive, enabling alternative forms of expression and diverse opportunities for collaboration, self-regulation, and differentiated performance. These characteristics are essential components of inclusive pedagogy (Reich, 2014). At the highest level, the redefinition of learning processes is made possible. This redefinition would not be possible without digital media. Examples for redefining media use include simulation-based learning environments, digital experimentation rooms, and AI-supported, adaptive learning platforms (Kramer et al., 2019; Puentedura, 2020). In science education, such innovations enable individualized access to complex concepts, particularly benefiting students who struggle with abstract thinking or face language barriers (Stinken-Rösner & Abels, 2021). Assessing the level at which a specific form of media use can be situated enables one to evaluate its didactic potential and provides impetus for further development toward greater participation and accessibility in digital lessons (Kerres, 2022; Stinken-Rösner & Abels, 2021).

### ***1.3. Science lessons in the field of tension between inclusion and the media***

One aspect of this discussion that has received little attention is science education. In this context, abstract content, complex processes, and technical language demands come together, creating specific barriers for diverse groups of learners (Stinken-Rösner & Abels, 2021). At the same time, digital media provide unique opportunities for visualization, personalization, and active learning. In a society shaped by both nature and technology, basic scientific literacy is crucial (Fränkel & Schroeder, 2023; Stinken-Rösner et al., 2020). Incorporating digital media into science education should start with an inclusive view of education. This perspective views science education as essential for social participation (Fränkel & Schroeder, 2023), thereby linking inclusion and science education. In an inclusive society, all learners, especially those who have limited access to science- and technology-based educational content, must have barrier-free access to these resources (Lindmeier & Lütje-Klose, 2015).

Stinken-Rösner et al. (2020) identified four primary goals of science instruction: engaging with everyday scientific contexts, acquiring scientific content knowledge, actively constructing

scientific understanding, and exploring science as a socially embedded practice. However, inclusive classrooms often reveal tensions between subject-specific rigor and equitable participation (Abels, 2019). In response to these challenges, science education presents multiple avenues for participation, particularly through phenomenon-based learning and hands-on experimentation (Abels, 2019). Yet, it also has potential barriers, such as abstract modelling, linguistically complex presentations, and standardized working methods (Abels, 2019; Nehring & Walkowiak, 2017). The main challenge lies in developing strategies that communicate technical content in ways responsive to learner diversity (Fränkel & Schroeder, 2023). One promising approach involves focusing on both content and methodological dimensions, for example, emphasizing scientific reasoning pathways or promoting research-based learning (Abels, 2019; Fränkel & Schroeder, 2023). Against this backdrop, digital media are becoming increasingly important as didactic tools in inclusive science education (Stinken-Rösner & Abels, 2021).

Among these media, explanatory videos occupy a special position. These videos can facilitate multimodal presentation of scientific content by integrating visual, auditory, and textual elements in a multimedia format (Findeisen et al., 2019; Zander et al., 2020). Explanatory videos offer a high degree of adaptability and differentiation through repeatability, allowing for adjustments to the learning pace, subtitled content, and visualizations (Findeisen et al., 2019). Students can use explanatory videos both receptively and productively, actively engaging with the production and design (Findeisen et al., 2019).

#### ***1.4. Research questions***

Despite the rapid and widespread adoption of digital media in schools following the KMK's resolutions and the Coronavirus Pandemic (KMK, 2012, 2016; Medienberatung NRW, o. J.), the central challenge remains integrating these technologies into teaching practices in a meaningful and inclusive manner. Classrooms today are becoming increasingly diverse, with students varying in their linguistic, cognitive, physical, and social abilities (Sturm, 2016). Therefore, designing inclusive instruction requires creating differentiated, individualized, and barrier-free learning environments (Bohl et al., 2023; Reber & Luginbühl, 2016; Schröder & Wenning, 2004).

Digital media, such as explanatory videos, can be valuable tools for making learning processes more flexible, accessible, and tailored to individual needs, provided they are designed with all learners in mind (Reber & Luginbühl, 2016). However, the potential of explanatory videos to foster inclusion in science education is still being explored in ongoing studies (Andujar & Nadif, 2022; Greitemann & Melle, 2025).

In this context, a narrative literature review is an appropriate methodological approach for reconstructing the current state of research at the intersection of inclusive education, science didactics, and the use of digital media, particularly explanatory videos. Unlike systematic reviews, the narrative format allows for a theory-based, context-sensitive analysis of diverse research contributions (Baumeister & Leary, 1997; Sarkar & Bhatia, 2021). The goal is to systematize the role of explanatory videos in inclusive science education, identify research gaps, and generate theoretically grounded ideas for future empirical studies.

The following research questions have been developed based on the theoretical foundation of this work:

- What potential benefits and challenges related to the use of explanatory videos for promoting subject-specific participation in inclusive science lessons are discussed in the literature?
- Which creative, didactic, and technological features of explanatory videos are identified in the literature as promoting difference-sensitive and low-barrier learning in science lessons?

## **2. Method**

To address the research questions, a theory-driven narrative review was conducted (Baumeister & Leary, 1997) focusing on empirical studies examining the use of digital media in science education through the lens of explanatory videos. Publications from 2006 onward were considered to reflect contemporary educational policy frameworks, particularly considering the adoption of the UN Convention on the Rights of Persons with Disabilities that year. Only empirical studies (qualitative or quantitative) investigating interventions utilizing digital media in school-based science lessons were included in the analysis. The studies had to meet the following criteria:

- a) The study was conducted in a classroom or school setting.
- b) The study included a comparison with a control group, another treatment, or employed a pre-, post-, or follow-up design.
- c) The study focused on primary and/or secondary school pupils, as well as college or university students.

A literature search was conducted across relevant scientific databases, including Google Scholar, Pedocs, ERIC, and Web of Science, using a combination of keywords such as "digital media," "educational video," "explanatory video," along with their German translations and synonyms. Through this search, five studies were identified as the basis for this narrative review. Most of the publications addressing the use of explanatory videos were theoretical reviews or position papers, which were excluded from this review because they lacked an empirical approach.

## **3. Results**

The five studies identified through keyword searches provide a brief examination of the applications, effects, and educational potential of video-based learning formats in both school and higher education contexts. The findings suggest that the type of media used, the study design, and the learning objectives significantly influence the outcomes of digital video integration. Across the analysed studies, both commonalities and context-specific differences can be observed.

Aliyu et al. (2023) conducted a mixed-methods study in a Nigerian senior high school to investigate the impact of a VR-based video learning intervention on critical thinking (CT) skills in the context of climate change. The intervention led to a statistically significant, moderate increase in CT skills in the VR video group compared with a slight improvement in the control group. The structured VR sessions helped learners transition from "less critical" to "critical" thinking. These findings indicate that immersive, video-mediated instruction can support reflective and analytical thinking, particularly when combined with pre- and post-assessments and targeted interventions. Located on the SAMR model, this intervention can correspond to the "Modification" level, indicating a significant redesign of the task through immersive technologies. The retrospectively mentioned inclusive aspects of VR-based videos here emphasize repeatability and personalized learning pace, allowing students to access VR videos and engage in project-based learning (PBL) activities at their own speed (Aliyu et al., 2023).

At the university level, Atkinson et al. (2024) similarly observed increased conceptual understanding in a large-scale randomized controlled trial involving over 550 students. This study focused on student-generated videos in a STEM context. The production of audiovisual content led to not only gains in subject knowledge but also improvements in interdisciplinary competencies such as oral communication and technical proficiency. Students reported heightened motivation and elevated academic performance compared to the control group. This intervention can be associated with the "Modification" stage of the SAMR model, but also approaches "Redefinition" by facilitating learning activities that would not have been possible without digital tools.

Lester (2019) focused on the acquisition of scientific vocabulary by using vodcasts as a supplement to traditional instruction. In this quasi-experimental design involving 5th-grade students in the U.S., the experimental group significantly outperformed the control group, even after controlling for pre-test differences. The intervention's effectiveness may be attributed to its scaffolding function, which provides students with accessible, repeatable video content that complements face-to-face instruction. Lester's approach relies on teacher-produced content, positioning the intervention at the "Substitution" or low-level "Augmentation" stage within the SAMR framework.

Nguyen & Pham (2025) examined the effects of video length and instructor presence on learners' perceived satisfaction and engagement in a primary school setting. Using structural equation modeling (SEM), they found that instructor visibility and video quality notably influenced learners' perceived effectiveness and satisfaction, particularly in short-format videos. Conversely, the impact of instructor presence diminished in longer video formats. The findings underline the importance of video design parameters such as brevity, visual engagement, and the relational dimension of instruction. It can be assigned with the "Substitution" level of the SAMR model, where instructional delivery is enhanced, but the overall task structure remains unchanged.

Finally, Zeidan et al. (2022) conducted a mixed-methods investigation into video-supported, activity-based learning (ABL) for pre-university science students in the UAE. Using interactive video tools like PlayPosit, students reported increased motivation, improved concentration, and improved academic performance. Notably, the self-paced learning features (e.g., rewind functions) appear to be particularly effective in supporting these outcomes.

Quantitative experimental approaches, as illustrated by Lester (2019) and Nguyen & Pham (2025), enable statistically robust conclusions about causal relationships through pre- and post-testing, covariance analyses, and structural equation modeling. The randomized controlled study by Atkinson et al. (2024), which included over 500 participants and mixed methods, provides substantial evidence. Another unifying element is the frequent use of mixed methods designs. For instance, studies by Aliyu et al. (2023) and Zeidan et al. (2022) combined quantitative surveys with qualitative observational data to assess both performance outcomes and subjective learning experiences.

According to the SAMR model, the use of explanatory videos in most of the studies examined can be classified into either the 'Augmentation' or 'Modification' stages. In such cases, the digital medium served either as a direct substitute or as an enhancement of traditional analog materials (Lester, 2019; Nguyen & Pham, 2025; Zeidan et al., 2022). Only one of the reviewed studies modified and slightly redesigned the use of explanatory videos relative to analog materials by actively producing them (Atkinson et al., 2024).

Across the studies, a recurring pattern is the positive influence of video-based learning formats on subject-specific skills, as well documented. For example, Lester (2019) reported significant gains in students' scientific vocabulary acquisition through the integration of podcasts in an eight-week quasi-experimental study. Similarly, Zeidan et al. (2022) found in their mixed-methods study that students who engaged with interactive videos outperformed their peers in physics and chemistry exams compared to those who did not use video materials. These studies particularly emphasize the possibility of individually controlling the learning process, such as by repeating passages, which promotes sustainable skill development. Such affordances provide opportunities for differentiation within science instruction.

Atkinson et al. (2024) found that university students who created their learning videos over a semester demonstrated significantly improved performance. These students benefited not only in terms of content mastery but also developed media literacy and rhetorical communication skills (Atkinson et al., 2024). Aliyu et al. (2023) have shown that interdisciplinary skills, such as communication, creativity, problem-solving, and critical thinking, play a central role.

Additionally, research indicates that VR-based interventions can foster critical thinking skills among younger learners (Aliyu et al., 2023). While the control group exhibited only a minor

improvement, the intervention group achieved a moderate effect size, underscoring the value of interactive and immersive learning formats (Aliyu et al., 2023). Multiple studies confirm that video-based learning can foster learner motivation and engagement across various educational contexts. Nguyen & Pham (2025) found that short, high-quality videos featuring visible instructors increased satisfaction and engagement among primary school learners. However, for longer videos, the instructor's presence had a diminished impact, suggesting reduced learner attention over time. Zeidan et al. (2022) reported similar findings.

#### **4. Discussions**

The studies analysed emphasize the potential of educational and explanatory videos to foster differentiation and provide opportunities for inclusion in educational settings. When purposefully designed and effectively integrated into teaching, these videos can substantially increase subject-specific understanding, motivation, and metacognitive skills across various age groups and educational levels (Nguyen & Pham, 2025; Zeidan et al., 2022).

For example, research shows that short, high-quality video lectures featuring visible instructors increase perceived effectiveness, learner satisfaction, and use frequency among primary school students (Nguyen & Pham, 2025). In this context, different video formats support adaptive instructional design that caters to age-related and attention-related differences. Features like replay and pause functions provide differentiated access for both high-achieving and struggling learners (Zeidan et al., 2022), aligning with the augmentation level of the SAMR model (Kramer et al., 2019; Puentedura, 2012). Lester (2019) demonstrated that incorporating vodcasts into science lessons appears to enhance performance, especially among students with varying levels of prior knowledge. According to the SAMR model, this integration typically represents the substitution and augmentation stages, where a digital explanatory video replaces an analog medium and, potentially, enriches it with additional features (Puentedura, 2012). A key takeaway from the studies is that simply integrating videos into instructional settings does not inherently improve learning outcomes.

Critical factors in this process include the technical quality of the videos and the level of interactivity they offer. For instance, adaptive platforms like PlayPosit, when paired with structured feedback phases, can significantly increase learner engagement and differentiation (Zeidan et al., 2022). Furthermore, embedding videos within cooperative learning processes can constitute a meaningful pedagogical enhancement, aligning with the modification stage of the SAMR model (Puentedura, 2012). Role changes in teaching positions activate metacognitive processes, and authentic application situations strengthen conceptual understanding (Atkinson et al., 2024). Collectively, the analyzed studies verify the substantial educational potential of video-based learning formats in fostering subject-specific, interdisciplinary, and motivational learning objectives. Formats that actively involve learners, such as autonomous video production, problem-oriented application, or assuming a teaching role, demonstrate especially sustainable impact (Aliyu et al., 2023; Atkinson et al., 2024). The benefits of explaining to others within the framework of peer teaching are particularly valuable in inclusive contexts (Büttner et al., 2012), as they can support the productive design and implementation of explanatory videos in educational settings.

The studies indicate positive effects on various aspects of critical thinking skills, scientific vocabulary acquisition, and motivation. However, the inclusive elements of explanatory videos used in science lessons are often deduced retrospectively from qualitative observations or interview findings (Zeidan et al., 2022). Given the potential of explanatory videos in inclusive science education, it is essential to focus on both their creation and reception, aligning with Universal Design for Learning (UDL) principles (Wember & Melle, 2018) or incorporating other aspects of inclusion, sensitivity, and accessibility. According to the SAMR model, these efforts represent at least the modification stage and possibly the redefinition stage. At this level,

explanatory videos facilitate new tasks and instructional methods that might otherwise be unattainable, thereby enhancing inclusive science education (Puentedura, 2012). Moreover, this retrospective, indirect assessment of the importance of explanatory videos overlooks the specific characteristics that make certain videos suitable for sensitive use, thereby affecting the reproducibility of video designs. None of the studies specifically investigated a particular group of students with special educational needs in the intervention. Instead, they focused on a broad student population. This pattern suggests the need for dedicated research on the use of digital media, such as explanatory videos, and their effect on inclusive science teaching.

Further research should explore the conditions under which video-based formats are most effective and identify the target groups that would benefit the most from these approaches in inclusive science education. Special attention should also be given to equity issues in learning environments and the professional development of teachers. Given the adaptability and differentiation potential of video-based learning formats, further investigation is needed to examine their systematic expansion and possible redefinition within inclusive science instruction (Fränkel & Schroeder, 2023), guided by the SAMR model. Future studies should specifically examine the didactic, design-related, and contextual factors that contribute to the development and implementation of low-barrier explanatory videos to enable inclusion, address diverse learning needs, and support both high-performing and struggling students. Additionally, research should focus on the effects of designing accessible, inclusive explanatory videos on students' understanding of scientific concepts. This approach could not only facilitate students' subject knowledge, especially since explaining what they have learned through peer-teaching formats tends to be more effective (Büttner et al., 2012; Fiorella & Mayer, 2013) but also increase awareness among students and teachers about the importance of inclusive science education.

## **Conclusions**

The analysis of the studies helped to formulate conclusions, such as the use of educational and explanatory videos represents a didactic tool with significant potential to support differentiation and further develop inclusion in the educational environment. When intentionally designed and effectively integrated into the teaching process, these resources can improve students' understanding of disciplinary content, increase motivation, and develop students' metacognitive skills.

The simple integration of videos does not automatically guarantee superior educational results. Their effectiveness depends on key factors such as technical quality, interactivity, and the mode of pedagogical integration. In this sense, the use of adaptive platforms and the inclusion of videos in collaborative learning contexts can lead to a deeper educational impact, corresponding to the higher levels of the SAMR model, such as modification or redefinition. Also, the active involvement of students in the learning process, through producing videos, solving problems, or assuming the role of "teacher," has been shown to have lasting effects on conceptual understanding and motivation. Peer-teaching practices are particularly valuable in inclusive contexts, as they facilitate equitable access to learning.

The research reviewed highlights some important limitations. In particular, the inclusive dimension of video use is often indirectly inferred, and the lack of studies focused on specific groups of students with special educational needs indicates a significant deficit in the specialized literature. Also, the concrete characteristics of videos that ensure their accessibility and sensitive use in diverse contexts are not sufficiently investigated.

In conclusion, although explanatory videos have a high potential to support inclusive science education, further research is needed on the conditions of effectiveness, target groups, and didactic and design factors involved. Future directions should focus on developing and systematically evaluating accessible video resources adapted to student diversity, as well as on training teachers to use them effectively in inclusive contexts.

## References

1. Abels, S. (2019). Inklusion und Exklusion im naturwissenschaftlichen Unterricht. *Zwischen Persönlichkeitsbildung und Leistungsentwicklung. Fachspezifische Zugänge zu inklusivem Unterricht im interdisziplinären Diskurs*, 129–135.
2. Aliyu, H., Ebikabowei, M., & Kola, A. J. (2023). Problem-Based Learning in Remote Learning Scenario Utilizing Climate Change Virtual Reality Video in Mobile Application to Train Critical Thinking. *International Journal of Essential Competencies in Education*, 2(2), 144–159. <https://doi.org/10.36312/ijece.v2i2.1612>
3. Andujar, A., & Nadif, F. Z. (2022). Evaluating an inclusive blended learning environment in EFL: A flipped approach. *Computer Assisted Language Learning*, 35(5–6), 1138–1167. <https://doi.org/10.1080/09588221.2020.1774613>
4. Apriani, E., Syafryadin, S., Inderawati, R., Arianti, A., Wati, S., Hakim, I. N., & Noermanzah, N. (2021). Implementing E-learning Training toward English Virtual Lecturers: The Process, Perspectives, Challenges and Solutions. *International Journal of Emerging Technologies in Learning (iJET)*, 16(04), 240. <https://doi.org/10.3991/ijet.v16i04.14125>
5. Atkinson, A., Bell, P., De La Rosa, I., DeGeorge, T., Jonassen, L., Kokil, V., Lee, S., Malloy, M., Pinzon, K., Robertson, C., Savage, J. C., Shahbaz, R., Villanueva, O., Wludyga, J., & Morris, J. (2024). Student-created videos in online STEM education: A large, interdisciplinary, randomized control study. *Discover Education*, 3(1), 178. <https://doi.org/10.1007/s44217-024-00283-8>
6. Bargh, J. A., & Schul, Y. (1980). On the cognitive benefits of teaching. *Journal of Educational Psychology*, 72(5), 593–604. <https://doi.org/10.1037/0022-0663.72.5.593>
7. Baumann, T., & Melle, I. (2018). Evaluation multimedialer Lernumgebungen im inklusiven Chemieunterricht. *Naturwissenschaftliche Bildung als Grundlage für berufliche und gesellschaftliche Teilhabe. Gesellschaft für Didaktik der Chemie und Physik, Jahrestagung in Kiel*. [https://gdcp-ev.de/wp-content/tb2019/TB2019\\_117\\_Baumann.pdf](https://gdcp-ev.de/wp-content/tb2019/TB2019_117_Baumann.pdf)
8. Baumeister, R. F., & Leary, M. R. (1997). Writing Narrative Literature Reviews. *Review of General Psychology*, 1(3), 311–320. <https://doi.org/10.1037/1089-2680.1.3.311>
9. Bohl, T. (2017). Umgang mit Heterogenität in Schule und Unterricht Grundagentheoretische Beiträge, empirische Befunde und didaktische Reflexionen. In T. Bohl, J. Budde, & M. Rieger-Ladich (Hrsg.), *Umgang mit Heterogenität in Schule und Unterricht: Forschungsbefunde und didaktische Implikationen*. Verlag Julius Klinkhardt.
10. Bosse, I. (2019). Schulische Teilhabe durch Medien und assistive Technologien. In G. Quenzel & K. Hurrelmann (Hrsg.), *Handbuch Bildungsarmut* (S. 827–852). Springer Fachmedien Wiesbaden. [https://doi.org/10.1007/978-3-658-19573-1\\_33](https://doi.org/10.1007/978-3-658-19573-1_33)
11. Büttner, G., Warwas, J., & Adl-Amini, K. (2012). Kooperatives lernen und peer tutoring im inklusiven unterricht. *Zeitschrift für Inklusion*, (1–2). <https://doi.org/10.25656/01:5877>
12. Doğan, Y., Batdı, V., & Yaşar, M. D. (2023). Effectiveness of flipped classroom practices in teaching of science: A mixed research synthesis. *Research in Science & Technological Education*, 41(1), 393–421. <https://doi.org/10.1080/02635143.2021.1909553>
13. Findeisen, S., Horn, S., & Seifried, J. (2019). Lernen durch Videos – Empirische Befunde zur Gestaltung von Erklärvideos. *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung*, 16–36. <https://doi.org/10.21240/mpaed/00/2019.10.01.X>
14. Fiorella, L., & Mayer, R. E. (2013). The relative benefits of learning by teaching and teaching expectancy. *Contemporary Educational Psychology*, 38(4), 281–288. <https://doi.org/10.1016/j.cedpsych.2013.06.001>

15. Fränkel, S., & Schroeder, R. (2023). Digitale Medien im inklusiven naturwissenschaftlichen Unterricht. Ergebnisse eines systematischen Literaturreviews. In *Inklusion digital! Chancen und Herausforderungen inklusiver Bildung im Kontext von Digitalisierung* (S. 51–65). Verlag Julius Klinkhardt: Bad Heilbrunn. <https://doi.org/10.25656/01:26302>
16. Greitemann, L., & Melle, I. (2025). *Netzwerk Digitalisierter Chemieunterricht: Sammelband NeDiChe-Treff 2023*. <https://doi.org/10.25926/BUW/0-761>
17. Habib, A., & Morse, T. E. (2022). An Examination of the Flipped Classroom Paradigm for Diverse Student Populations. *International Society for Technology, Education, and Science*. <https://eric.ed.gov/?id=ED626675>
18. Huang, K.-T., Ball, C., Cotten, S. R., & O’Neal, L. (2020). Effective Experiences: A Social Cognitive Analysis of Young Students’ Technology Self-Efficacy and STEM Attitudes. *Social Inclusion*, 8(2), 213–221. <https://doi.org/10.17645/si.v8i2.2612>
19. Kamin, A.-M. (2023). *Inklusions-und digitalisierungsbezogene Kompetenzen im Lehramtsstudium erwerben. Konzeption, Erprobung und Evaluation der Lehr-/Lernumgebung inklud. NRW*. <https://doi.org/doi.org/10.35468/5990-17>
20. Kerres, M. (2022). Mediendidaktik. In U. Sander, F. Von Gross, & K.-U. Hugger (Hrsg.), *Handbuch Medienpädagogik* (S. 105–114). Springer Fachmedien Wiesbaden. [https://doi.org/10.1007/978-3-658-23578-9\\_12](https://doi.org/10.1007/978-3-658-23578-9_12)
21. Kesharwani, R., & Kesharwani, R. (2022). Effectiveness of Flipped Learning versus Traditional Learning in a Middle-School Chemistry Classroom. *International Society for Technology, Education, and Science*. <https://eric.ed.gov/?id=ED626680>
22. Kieserling, M., & Melle, I. (2020). Tablet-gestütztes Experimentieren und Lernen im Chemieunterricht. In S. Habig (Hrsg.), *Naturwissenschaftliche Kompetenzen in der Gesellschaft von morgen. Gesellschaft für Didaktik der Chemie und Physik, Jahrestagung in Wien 2019. Universität Duisburg-Essen* (Bd. 214). [https://gdcp-ev.de/wp-content/tb2020/TB2020\\_214\\_Kieserling.pdf](https://gdcp-ev.de/wp-content/tb2020/TB2020_214_Kieserling.pdf)
23. KMK. (2012). *Medienbildung in der Schule*.
24. KMK. (2016). *Bildung in der digitalen Welt*.
25. Kramer, M., Förtsch, C., Aufleger, M., & Neuhaus, B. J. (2019). Der Einsatz digitaler Medien im gymnasialen Biologieunterricht: Eine deskriptive Auswertung einer quantitativen Videostudie. *Zeitschrift für Didaktik der Naturwissenschaften*, 25(1), 131–160. <https://doi.org/10.1007/s40573-019-00096-5>
26. Lester, D. B. (2019). *Science Vocabulary Acquisition: A Nonequivalent Control-Group Examination of Vodcasts and Fifth Grade Students*. <https://digitalcommons.liberty.edu/doctoral/2092/>
27. Lindmeier, C., & Lütje-Klose, B. (2015). Inklusion als Querschnittsaufgabe in der Erziehungswissenschaft. *Erziehungswissenschaft*, 26(2), 7–16. <https://doi.org/10.3224/ezw.v26i2.21065>
28. Marci-Boehncke, G. (2018). *Von der integrierten zur inklusiven Medienbildung. Eigereicht für: Hug, Theo (Hg.): Medienpädagogik - Herausforderungen für Lernen und Bildung im Medienzeitalter. Innsbruck University Press*. <https://doi.org/10.13140/RG.2.2.32062.59207>
29. Medienberatung NRW. (o. J.). *Medienkompetenzrahmen NRW*.
30. Mertens, C., Quenzer-Alfred, C., Kamin, A.-M., Homrighausen, T., Niermeier, T., & Mays, D. (2022). Empirischer Forschungsstand zu digitalen Medien im Schulunterricht in inklusiven und sonderpädagogischen Kontexten. Eine systematische Übersichtsarbeit. *Empirische Sonderpädagogik*, 14(1), 26–46. <https://doi.org/10.25656/01:25529>
31. Nehring, A., & Walkowiak, M. (2017). Eine inklusive Lernumgebung ist nicht genug: Fachspezifik, Theoretisierung und inklusive Unterrichtsentwicklung in den

- Naturwissenschaftsdidaktiken. *Zeitschrift für Inklusion*. <https://www.neu.inklusion-online.net/index.php/inklusion-online/article/view/450>
32. Nguyen, T. P. N., & Pham, T. H. (2025). Exploring Video Lecture Effectiveness for Elementary STEM Education: Instructor Presence, Video Quality, and Student Perceptions. *TEM Journal*, 759–767. <https://doi.org/10.18421/TEM141-67>
  33. Puentedura, R. (2012). SAMR: Thoughts for design. Retrieved October 3rd. [https://hippasus.com/rrpweblog/archives/2012/09/03/SAMR\\_ThoughtsForDesign.pdf](https://hippasus.com/rrpweblog/archives/2012/09/03/SAMR_ThoughtsForDesign.pdf)
  34. Puentedura, R. (2020). *An Intro to the SAMR Method: The Two-Pass Ladder*. [http://hippasus.com/rrpweblog/archives/2019/12/IntroSAMRMethod\\_TheTwoPassLadder.pdf](http://hippasus.com/rrpweblog/archives/2019/12/IntroSAMRMethod_TheTwoPassLadder.pdf)
  35. Quenzer-Alfred, C., Mertens, C., Homrighausen, T., Kamin, A.-M., & Mays, D. (2023). Systematisches Review des empirischen Forschungsstands zu digitalen Medien für SchülerInnen mit einem zusätzlichen oder einem sonderpädagogischen Förderbedarf unter Berücksichtigung inklusiver, integrativer und exkludierender Unterrichtsszenarien. In K. Scheiter & I. Gogolin (Hrsg.), *Bildung für eine digitale Zukunft* (Bd. 15, S. 125–158). Springer Fachmedien Wiesbaden. [https://doi.org/10.1007/978-3-658-37895-0\\_6](https://doi.org/10.1007/978-3-658-37895-0_6)
  36. Reber, C., & Luginbühl, M. (2016). *Inklusion ohne digitale Medien ist nicht mehr denkbar*. (Jg. 22, 4 /).
  37. Reich, K. (2014). *Inklusive Didaktik: Bausteine für eine inklusive Schule*. Beltz.
  38. Romrell, D., Kidder, L. C., & Wood, E. (2014). The SAMR Model as a Framework for Evaluating mLearning. *Online Learning*, 18(2). <https://doi.org/10.24059/olj.v18i2.435>
  39. Sarkar, S., & Bhatia, G. (2021). Writing and appraising narrative reviews. *Journal of Clinical and Scientific Research*, 10(3), 169–172. [https://doi.org/10.4103/jcsr.jcsr\\_1\\_21](https://doi.org/10.4103/jcsr.jcsr_1_21)
  40. Schröder, J., & Wenning, N. (2004). „Barrierefreiheit“ und Heterogenität-eine erweiterte Perspektive auf Zugänglichkeit und Nutzung Neuer Medien. *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung*, 1–22.
  41. Stinken-Rösner, L., & Abels, S. (2021). Digitale Medien als Mittler im Spannungsfeld zwischen naturwissenschaftlichem Unterricht und inklusiver Pädagogik. *Naturwissenschaftsdidaktik und Inklusion*, 4, 161–175. <https://doi.org/10.3262/SZB2101161>
  42. Stinken-Rösner, L., Rott, L., Hoffmann, T., Menthe, J., Abels, S., Baumann, T., Hundertmark, S., & Nehring, A. (2020). *Thinking Inclusive Science Education from two Perspectives: Inclusive Pedagogy and Science Education*. 3, 30–45.
  43. Sturm, T. (2016). *Lehrbuch Heterogenität in der Schule*. UTB.
  44. Wember, F. B., & Melle, I. (2018). Adaptive Lernsituationen im inklusiven Unterricht: Planung und Analyse von Unterricht auf Basis des Universal Design for Learning. *DoProfIL–Das Dortmunder Profil für inklusionsorientierte Lehrerinnen-und Lehrerbildung*, 57–72.
  45. Zander, S., Behrens, A., & Mehlhorn, S. (2020). Erklärvideos als Format des E-Learnings. In H. Niegemann & A. Weinberger (Hrsg.), *Handbuch Bildungstechnologie* (S. 247–258). Springer Berlin Heidelberg. [https://doi.org/10.1007/978-3-662-54368-9\\_21](https://doi.org/10.1007/978-3-662-54368-9_21)

46. Zeidan, M., Huang, X., Xiao, L., & Zhao, R. (2022). Improving student engagement using a video-enabled activity-based learning: An exploratory study to STEM preparatory education in UAE. *Journal of Learning Development in Higher Education*, (24). <https://doi.org/10.47408/jldhe.vi24.888>