

Zum Nacherfinden. Konzepte und Materialien für Unterricht und Lehre

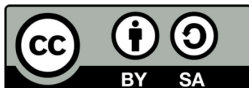
Evaluating Digital Learning Materials for Deeper Reflection on Inclusive Teaching and Learning: The FRoLLM and Its Application in Teacher Training

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Abstract: Digital learning materials play a vital role across diverse teaching and learning contexts. Their design can significantly influence who is included or excluded from achieving success in digital education. To foster more inclusive digital learning environments, (future) teachers must be able to select and, when necessary, adapt learning materials to suit the needs of their students. However, this important topic is often not sufficiently addressed in teacher education. To help close this gap, the Framework for the Reflection on Living Learning Materials (FRoLLM) was developed as part of the international digiLLM project (Digitalization in European Education: Realizing Equity and Inclusion with Living Learning Materials). FRoLLM is designed to support student teachers, in-service teachers, and learners in critically reflecting on the learning materials they use regularly. The framework emphasizes a reflective evaluation of a material's sensitivity to inclusion, grounded in a broad understanding of inclusion and inclusive education. It also acknowledges that different teaching and learning contexts may require different approaches to inclusion. Rather than offering a fixed set of criteria, FRoLLM serves as a flexible tool for fostering deeper reflection on educational materials and their role in shaping inclusive learning experiences. This article presents how FRoLLM was implemented in teacher training programs at Bielefeld University to engage students in critical reflection on digital teaching materials. It also highlights its applications in in-service teacher training and internationalized higher education settings.

Keywords: inclusion; inclusive education; inclusive materials; digital learning materials; digital teaching and learning

1 Learning materials as a reflection on inclusive teaching and learning – introduction

(Digital) Educational materials serve as a crucial bridge between educators and students, playing a pivotal role in the conceptualization, implementation, and lived experience of education. These materials are instrumental in shaping the architecture of teaching and learning environments. Their influence extends through various aspects, including their creation and structure, the ways in which they can be utilized and applied, and their capacity to facilitate personalized learning experiences (Matthes, 2011; Matthes & Schütze, 2017). In the context of inclusive education, the significance of digital materials takes on even greater importance, e.g. in terms of creating personalized learning experiences (Schaumburg, 2021). The choice and nature of resources employed in educational settings can have a profound impact on determining who is included in or potentially excluded from learning opportunities. As

such, educational materials wield considerable power in either fostering inclusivity or inadvertently perpetuating exclusion within digital educational contexts (Pieper, Bierschwale et al., 2023). Herein, the reflection of (international) educational materials is a potential starting point for initiating a reflection process on inclusivity in (school) teaching and learning processes. The topic of inclusive digital educational materials must therefore be addressed in teacher training on both Bachelor's and Master's level in order to guide students in teacher education in this reflective undertaking (Schübler, 2008; von Aufschnaiter et al., 2019).

In this article, the *Framework for the Reflection on Living Learning Materials (FRoLLM)* stemming from the international digiLLM project is being introduced. The FRoLLM is an Open Access reflection tool that guides (future) teachers in thinking more deeply about digital educational materials by evaluating their inclusion sensitivity. Here, a broad understanding of inclusion (Budde & Hummrich, 2015) is applied. The FRoLLM has been used in a variety of ways in different teacher training contexts, one of which is outlined in detail in chapter 2. The tool is part of a broader digital ecosystem on the topic of inclusive digital learning materials, the *digiLLM portal*, whose various applications and features point to even more potential uses for (in-service) teacher trainings that are continuously being explored. Chapter 3 provides access to the presented resources, followed by chapter 4 offering a theoretical categorization with regard to the reflexive conceptualization of FRoLLM and how it relates to the concept of 'Learning to See', before concluding with student voices on the concept in chapter 5.

2 Instructional commentary

In order to demonstrate the application of the FRoLLM in teacher trainings, the genesis and an introduction to the FRoLLM (section 2.1) are discussed below. This is a necessary first step to grasp the application of the course concept more easily. Section 2.2 sketches out an exemplary seminar concept that has been tested at Bielefeld University in summer 2024. Section 2.3 closes with potential uses of the FRoLLM and the digiLLM portal for in-service teachers.

2.1 Framework for the Reflection on Living Learning Materials in the digiLLM project: Introduction and Genesis

The FRoLLM (Framework for Reflection on Living Learning Materials) was developed as part of the digiLLM project, an international Erasmus+ initiative focusing on the inclusion sensitivity of digital educational materials. The international project consortium consists of Bielefeld University (Prof. Dr. Michaela Vogt, Marlene Weymann, formerly Pieper, Stefanie Go), Dalarna University (Prof. Dr. Anette Bagger), Ostrava University (Prof. Dr. Zuzana Sikorova) and University of Luxembourg (Prof. Dr. Katja Andersen). The primary purpose of the FRoLLM as one of the central project outcomes is to raise teachers' and learners' awareness regarding inclusion sensitivity in digital teaching and learning materials.

The FRoLLM consists of six main areas designed to help evaluate and reflect on digital inclusion-sensitive learning materials: (1) Philosophy of a material, (2) learners' needs, (3) learners' environment(s), (4) learning feedback, (5) reflections on learning and (6) learners' agency. The *philosophy* section looks at the intentions and theoretical background of the material. The area on *learners' needs* is about the responsiveness to different learning levels, interests and backgrounds. The aspect of *learners' environment(s)* considers how digital and physical contexts influence inclusivity. *Learning feedback* emphasizes the importance of individual and context-related information on one's specific learning progress. *Reflection on learning*, however, promotes a learner's knowledge of different learning strategies and their application to one's own learning. *Learners' agency* in turn acknowledges learners as active designers of their learning path. Each area is accompanied by key questions guiding the actual analysis and reflection process, helping to immerse oneself in a deeper consideration of the inclusion sensitivity of a material. The FRoLLM also includes examples and indicators relevant to each key question. These examples illustrate how the principles of inclusive education can be applied in practice and, if needed, help users to gain more clarity about a question's purpose and scope.

The FRoLLM was developed as an enhancement of the criteria catalogue for inclusion-sensitive learning materials of the ITM project¹, aiming to transfer

¹ The FRoLLM is based on the criteria catalogue from the ITM project, whose development is being depicted in Vogt et al. (2023). The project "Inklusive Unterrichtsmaterialien im europäischen Vergleich – Kriterien für ihre Entwicklung und Bewertung" (ITM) involves Örebro University, University of Luxembourg,

the idea of evaluating the inclusion sensitivity of learning materials into the digital realm. The development followed a qualitative approach: A process of systematically mapping literature was conducted across partner countries to map challenges in digital inclusive teaching and learning, with a focus on educational materials (cf. Otto et al., 2020; Rasheed et al., 2019). Expert interviews (Bogner et al., 2009) were conducted in each partner country, involving teachers, student teachers, digital learning experts, and representatives from digital educational resource platforms. Additionally, repositories for educational resources were analyzed exploratively with qualitative text analysis (Kuckartz, 2014, 2019) in order to assess their stance on inclusiveness and identify exemplary approaches. This allowed the digiLLM team to identify needs and approaches related to digital educational materials and inclusion. This process was paralleled with a critical examination of existing rubrics and criteria catalogues for evaluating digital learning materials. The first FRoLLM drafts based on these considerations were evaluated with critical friends, in international student and teacher groups and, hence, revised in an iterative process based on PAR (Cornwall & Jewkes, 1995; Reason & Bradbury, 2008). It should be emphasized that the FRoLLM is to be understood as a tool for reflection and thus does not operate with fixed criteria to operationalize inclusion sensitivity.

The genesis in the international context and the focus on the context of digitality implies that the FRoLLM is not bound to a specific understanding of teaching materials or inclusion sensitivity. It therefore has an inherent flexibility that allows open reflexivity as well as broad application to different contexts. The reflexive core of the digiLLM offers provides the basis for this assumption (cf. Weymann & Vogt, forthcoming): It is consistent with Breiwe's (2023) call for reflexive, inclusive media education that critically examines social and educational contexts. This is in line with Häcker and Walm's (2015) view of the increasing importance of reflection in inclusive education. Similarly, Budde and Hummrich's (2014) concept of "reflexive inclusion" aims to recognize differences, reveal inherent disadvantages, and deconstruct implicit norms. While reflection doesn't resolve contradictions, it makes them visible, allowing for a more nuanced approach to inclusive media education that acknowledges the complexities of diversity and digitality in contemporary educational settings. This is also reflected in the name of the

Free University of Bozen-Bolzano, and is coordinated by the University of Bielefeld; it was funded as an Erasmus+ Cooperation Partnership from September 2018 to December 2021.

FRoLLM, as the reflection tool refers to the idea of *Living Learning Materials*: it aims to promote a critical, discursive approach to digital learning materials and, in particular, their sensitivity to inclusion by promoting materials' responsiveness to different needs and contexts (cf. Pieper, Vogt et al., 2023).

2.2 Application of the FRoLLM in Teacher Education

The FRoLLM has been developed to focus on the critical examination of digital teaching and learning materials as core elements of inclusive teaching. As a reflective tool it opens up a wide range of possible applications in teacher training with the reflective process as the key driver for learning at its core (cf. on reflective learning: Schüßler, 2008; von Aufschnaiter et al., 2019). In teacher training seminars at Bachelor's and Master's level, FRoLLM is used to develop sensitivity for inclusion-sensitivity in digital teaching and learning materials as well as in-depth analytical skills. Students are introduced to the tool for analyzing and evaluating educational resources. Depending on the previous experience of the group and the overall design of the seminar, this can be flexibly designed synchronously or asynchronously and can extend over shorter application phases or entire project weeks. Depending on the scope and group design, the work results can be used for assessment (an example of such an application can be found in the contribution by Go and Vogt, pp. 65–77 in this special issue). The reflective application of the FRoLLM has been tested since the summer semester 2024 in various Bachelor's and Master's seminars at Bielefeld University. The FRoLLM and the associated materials were used, for example, in the course 'Living Learning Materials – Digitale Bildungsmaterialien im Check' for Bachelor students in summer 2024. The seminar followed the concept of Problem-Based Learning (Weber, 2007) along the critical evaluation of existing digital learning materials. Problem-Based Learning allows context-orientated learning based on everyday- and work-related 'cases' ("Fälle"), whereby knowledge is developed from active, individual and collaborative construction processes (Weber, 2007). The use of digital educational materials for inclusive education thus represents a context that is worked on collaboratively by evaluating and reflecting on specific 'learning materials' as the given case. The aim is to apply the knowledge acquired in the theoretical part to self-chosen digital resources originating from the students' own (future) contexts and thus to develop an attitude towards a topic of inclusive educational materials and an artefact. This corresponds to the FRoLLM insofar as it does not provide a fixed checklist that decides on the inclusion sensitivity of a material, but rather helps to make context-dependent decisions.

The seminar concept is divided into **three main phases**: an introductory theory phase, followed by a practice-orientated application of FRoLLM, and finally a reflection and presentation of the results.

In the first half of the sessions, a **theoretical focus** is placed on learning materials as a thematic subject, whereby their significance for inclusion and the various aspects of digital materials are discussed. Further in-depth sessions can be followed by an intermediary reflection session in order to reflect on the findings to date and further deepen them. Finally, the FRoLLM will be presented. The focus here is on its purpose and structure in order to enable a broad understanding and effective use of the tool. Within this phase, emphasis is placed on activating methods and small-scale collaborative work and to prepare the more self-directed learning following in the second step.

The second half of the seminar is based on the principle of problem-based learning (cf. Weber, 2007), which requires the practical application and transfer of acquired knowledge, with a particular focus on the taxonomy levels of analysis, evaluation and reflection (cf. Weber, 2007). The FRoLLM is being applied to digital educational materials selected by students according to their subject areas and interests. In view of the wide variety of digital educational materials, students benefit from support in finding and selecting suitable materials. (Here, suitability specifically applies to scope and depth of a material in order to allow for a meaningful analysis and evaluation.) After choosing materials to be evaluated, it is necessary to clarify the understanding of ‘reflection’ in this context (cf. Schüßler, 2008). The processual nature, flexibility and open-endedness of working with the FRoLLM are particularly emphasised. In groups of 3 to 4 students, the following question is being addressed: *To what extent is the material inclusive, and how can its inclusion sensitivity be improved?* Each group member will bring in their own digital material from a field of interest of their choice. Topics and material styles (textbooks, workbooks, material packages etc.) can vary within a group. The goal of this task is to assess the inclusion sensitivity of each material, propose suggestions for improvement and adaptation, and present the findings in a brief presentation.

The **group-based reflection work extends over three sessions**: In the *first session*, a synchronous session, each student groups applies one single area of the FRoLLM assigned by the seminar leader to their materials. This way, the six areas of the FRoLLM are distributed, if possible, evenly among all participating groups. Hence, one group concentrates on the area of the philosophy of a material, the next on learners’ needs and so on. This serves as an

initial familiarization with usage of the tool by applying all guiding questions to the digital resources, entering in first discussions on inclusion sensitivity. The group members then report on their experiences with the FRoLLM area in newly organised groups ('group puzzle' method). In this way, the reflective exchange is supplemented by a peer-learning based familiarization of the other FRoLLM areas. This is followed by a *second, asynchronous session*, during which groups complete the analysis of all materials available in a self-directed manner and develop suggestions for improving their inclusion sensitivity. A further *third session* (synchronous) is used to obtain peer-feedback regarding the comprehensibility and depth of the analysis as well as its presentation.

In the **reflection part** of the seminar, the participants present their finished reflection results in a session designed as a gallery walk. This is being followed by a concluding session in which the most important findings of the course are summarised and reflected upon.

2.3 Opportunities for in-service teacher trainings

As FRoLLM supports the evaluation, selection and application of inclusion-sensitive digital teaching materials and is embedded in a wider digital ecosystem of the digiLLM portal, it also serves as a tool for in-service teacher training. The portal offers free downloads of the FRoLLM framework and introductory FRoLLM training modules in multiple languages. Additionally, the portal offers access to research resources such as an annotated international literature list on the relationship between educational materials and inclusion as well as excerpts from interviews from the project's research work. The integration of the Open Access journal *Digital Inclusive Learning Materials – DILeMa* provides access to further scientific exchange and discourse, in which teachers can actively participate. The core of the portal is the rating function ("LLM ratings"), where reviews of materials can be created and shared publicly. This resource can also be used to select inclusive materials for one's own teaching. The possible uses of the portal cover various areas of application for in-service teachers:

- **Improving Inclusive Teaching Practices:** The FRoLLM framework helps teachers to critically reflect on their current (digital) teaching materials and identify areas for improvement regarding their inclusion-sensitivity. This entails learning about the matter of digital inclusive teaching materials.

- **Evaluating and Selecting Digital Inclusive Materials:** Based on the FRoLLM, the rating function offers the opportunity to consult previously published reviews in order to select suitable materials for their own teaching. It is also possible to share one's own reviews and evaluations with the community.
- **Professional Development:** The portal offers the opportunity to access an introductory training module on working with the FRoLLM and thus expand one's knowledge of inclusion-sensitive digital learning materials. There is also the opportunity to use the extensive literature list on the topic of digitally inclusive teaching and learning for self-study.

3 Material

The digiLLM portal provides access to the Framework for the Reflection on Living Learning Materials (FRoLLM):

FRoLLM Framework for the Reflection of Living Learning Materials	framework for reflecting on educational materials to enhance inclusion sensitivity in English, German, Czech, Swedish and French; online access and downloads available	https://digi-europe.org/frollm/
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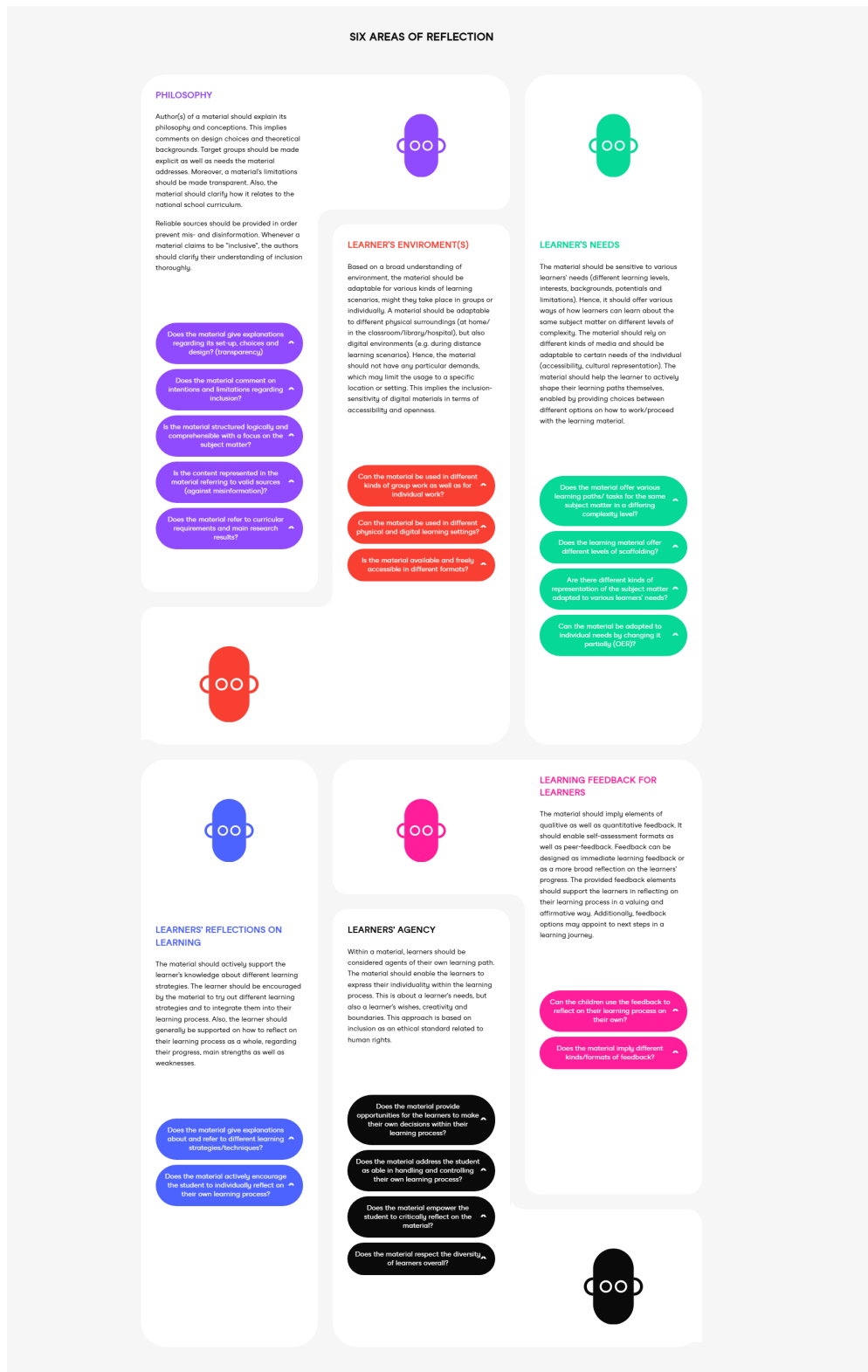


Figure 1: Screenshot from FROLLM website

4 “Learning to See” through working with the FRoLLM – theoretical foundations

The FRoLLM as well as the digiLLM portal encourage a critical and reflective perspective on inclusive education. As both were developed as part of an international project consortium and were used from the outset by persons from all partner countries, the work is thus aligned with the concept of *Learning to See* (Vogt et al., 2024a, 2024b) as internationalized learning experiences in Higher Education. In this case, *Learning to See* is embedded in a process of transformative learning according to Mezirow (1997), when the transformation of “frames of reference” (Mezirow, 1997), for example standardized ideas of school inclusion, is made possible through problem-based learning when working with artifacts and perspectives from varying educational backgrounds. In the following, this perspective will be fleshed out by illustrating possible applications of digiLLM products in the sense of internationalized tertiary teaching and learning. The internationalization of university teaching, through the concept of *Learning to See*, allows student teachers to reflect on inclusion and address the diversification of educational contexts. Viewing educational materials as artifacts of teaching and learning helps educators contextualize their assumptions, identify differences, and discuss implications for inclusion.

In **teacher training seminars**, evaluations can be extended to resources from other languages and/or education systems. Digital platforms for educational resources facilitate access to learning materials from other educational contexts and other languages. By viewing materials as representative artefacts of an education system, they serve as an anchor point for thinking about (inclusive) school teaching and learning in the respective country. Depending on the didactic focus, the aim of this can be to challenge one’s own normative assumptions or to reflect on inclusive education in other education systems.

In **seminars on qualitative research methods**, there could be a stronger focus on the international comparison of learning materials or reviews of such materials, for example, when reviews of an English language material that has been reviewed many times and from an international perspective are viewed and analysed under an internationally comparative research question.

It is also worth mentioning the use of the FRoLLM in decidedly **international teaching and learning settings**, such as a blended intensive programme as

the one organised by the Universities of Bielefeld, Örebro and Ostrava in 2023 and 2024. The FRoLLM and the comparative analyses of teaching and learning materials in international small groups were the subject of both BIPs and their thematic focus on inclusive education in international comparison. This demonstrates that the FRoLLM and the features of the digiLLM portal, with its open access, flexible and multilingual offerings, can also be the lynchpin of internationalised teaching formats.

5 Experiences and perspectives: student voices on the FRoLLM as a teaching concept

There are many different learning experiences that can be made possible by working with the FRoLLM. First, however, the impact of this tool should be referred to so that its use for the various conceivable teaching and learning scenarios can be assessed.

The impact of the FRoLLM was – among other instances – evaluated in the abovementioned course “Living Learning Materials. Digitale Bildungsmaterialien im Check” for Bachelor students, using a questionnaire ($n = 24$). 87.5 percent of respondents confirmed that the learning activity designed with the FRoLLM had broadened their own perspective on the topic of inclusive digital learning materials. This is also confirmed by the selection of qualitative feedback (translated from German):

I think it's great that the material makes it clear what possibilities there are for designing inclusive learning materials.

A lot of perspectives that are often forgotten have been taken into account. This is very good for improving the worksheets in particular.

I find the FRoLLM concept very useful. Precisely because it is sometimes difficult to recognize inclusion in materials and to develop an understanding of it at all, this is a very helpful approach. Also to get a good overview and it provides a basis for comparison.

As a limitation, it must be noted that the positive feedback was preceded by an intensive examination of the materiality of education and a dedicated examination of the inclusion sensitivity of educational materials.

Special potentials of working with the FRoLLM and the resulting learning movements relate to the steps after reflection: it is conceivable that the analyzed materials can be understood not only as food for thought and stimulus for discussion, but also as a basis for further active work. For example, the

materials can be adapted and adjusted based on the observations with regard to inclusion sensitivity. This is an opportunity to put the learnings drawn from reflective approaches into action. These further steps ensure that the reflections made are transferred to the participants' own educational practice or learning.

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Information on the article

Quotation:

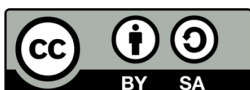
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Online-Supplements:

- 1) Framework for the Reflection on Living Learning Materials (FRoLLM) – English Version
- 2) Framework for the Reflection on Living Learning Materials (FRoLLM) – Deutsche Version

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