

Open Science and Transfer: Two Concepts for Bridging Gaps in Educational Research

Tamara Diederichs

University of Koblenz, e-mail, <https://orcid.org/0009-0002-5658-8790>

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Abstract

Open Science and Transfer have become central concepts in higher education and educational research. While Transfer emerged from debates on universities' societal and economic responsibilities and is closely associated with the Third Mission, Open Science developed from movements promoting transparency, accessibility, and participation in scientific practice. Despite their distinct historical origins, both concepts increasingly converge through shared commitments to collaboration, societal engagement, and knowledge co-creation.

Against this backdrop, this paper examines the relationship between Open Science and Transfer. Drawing on theoretical perspectives as well as an exploratory analysis of university websites, it explores how both concepts interact, complement one another, and differ in their approaches to knowledge dissemination and societal engagement. The article argues that while open science and knowledge transfer remain institutionally separate in many contexts, their growing convergence offers opportunities for educational research to address both concepts.

Keywords: Transfer, Open Science, Educational Research, Collaboration, Societal engagement, Co-creation

1 Introduction

In today's knowledge-based society, science plays a fundamental role in the generation, dissemination, and application of knowledge. While knowledge has always been a key driver of societal development, contemporary society may be described more precisely as a modern knowledge society, characterized by the widespread influence of scientific advances across nearly all domains of life (Stehr, 2023, p. V). As the importance of knowledge production has increased, the long-standing debate on the role of science in society has regained momentum and is now being examined from multiple perspectives. One manifestation of this shift is the growing openness of research institutions, particularly universities, toward their social and economic environments. Universities are increasingly expected to contribute not only through teaching and research, but also through engagement with societal and industrial partners in order to address pressing global challenges (HRK,

2017).

A prominent concept responding to these societal expectations is knowledge transfer, often framed as the third mission of universities. Beyond teaching and research, universities are increasingly involved in transferring scientific insights into practice through collaboration with industry, policy-making, and civil society. While this shift offers considerable potential, it also brings constraints, including the risk of commercialization, conflicting institutional priorities, and the challenge of integrating transfer activities into traditional academic structures (Compagnucci & Spigarelli, 2020). The importance of the third mission is also reflected in European higher education policy, where the European University Association (EUA) has explicitly positioned knowledge transfer as a core function of universities, equal in status to teaching and research. In its 2006 strategy paper, the EUA emphasizes the importance of fostering industrial and regional partnerships, building networks, and strengthening mutual understanding between academia and external stakeholders (European University Association, 2006).

Parallel to the growing emphasis on transfer, the concept of Open Science has gained traction as another major development shaping the research landscape. Open Science promotes collaborative, transparent, and accessible research practices, emphasizing the early and widespread sharing of knowledge, research findings, and tools (European Commission 2025). Unlike transfer, which is often institutionally driven, Open Science has its roots in diverse movements advocating for scientific openness and participation—whether among researchers, policymakers, or citizens (Fecher & Friesike 2014). Open Science is particularly relevant in the European Union’s research agenda, with strong political support aimed at enhancing innovation, societal impact, and research accessibility.

Both Open Science and Transfer are central to educational research, as they address fundamental challenges in the field. In a rapidly evolving educational landscape, researchers must navigate increasing demands for accessibility, impact, and collaboration. Moreover, key themes in both concepts—such as knowledge co-creation, access, and dissemination—align closely with educational research’s focus on learning, knowledge transmission, and institutional development. Despite their shared goal of bridging research and practice, Open Science and Transfer operate through distinct mechanisms and are underpinned by different theoretical and institutional frameworks. Understanding their differences, overlaps, and potential synergies is crucial for advancing the impact of educational research.

Against this background, this paper explores how the concepts of Transfer and Open Science interact, complement, and diverge in their approaches to knowledge dissemination and societal engagement. By comparatively analysing these concepts, the paper contributes to a deeper understanding of their respective roles in contemporary higher education and educational research. The paper first develops a theoretical perspective on Transfer and Open Science by outlining their historical roots, central characteristics, and current developments. Building on this conceptual foundation, the study then presents an exploratory empirical analysis of ten European university websites. Particular attention is paid to how universities publicly frame, organize, and communicate the concepts of Transfer and Open Science. As institutional websites represent important interfaces between univer-

sities and society, the analysis provides insights into the practical implementation and strategic positioning of both concepts in contemporary higher education.

2 Theoretical Perspectives on Transfer and Open Science

The following section examines the concepts of “transfer” and “open science” based on key insights from the literature in order to provide an initial theoretical introduction to both concepts and their relationship to one another.

When considering the concept of “transfer” in the context of higher education, it becomes evident that universities do not operate in isolation. In addition to teaching and research as their two traditional core missions, universities are always embedded within broader social, cultural, political, and economic environments. These interconnections include both external functions—such as economic and societal contributions—and services related to teaching, research, and knowledge transfer (Jongbloed et al., 2008). In many countries, including Sweden, Norway, and Germany, universities are now even legally required to generate direct societal benefits (Benneworth, Young, & Normann, 2017; Roessler, 2024). Accordingly, universities are increasingly expected to unlock innovation potential, strengthen regional and international networks, and contribute to the circulation of knowledge between academia and society.

These expectations are increasingly discussed under the concept of the “Third Mission.” Alongside teaching and research, the Third Mission describes a third role of universities: engaging with societal actors and actively contributing to social transformation (Benneworth, Young, & Normann, 2017; German Rectors’ Conference, 2017). Particularly within the European higher education context, the Third Mission has gained considerable significance in recent years (Compagnucci & Spigarelli, 2020, pp. 4–5). The European Commission, for example, closely links its vision of European University Alliances to challenge-oriented and collaborative approaches. Universities are expected to contribute to addressing European and global challenges through cooperation with industry, policymakers, and civil society (Zenkienė & Leišytė, 2024, p. 89).

From a historical perspective, however, universities have always contributed to regional and societal development. What has changed over the past two decades is the intensity and institutionalization of these expectations (Salomaa, 2019). For a long time, the Third Mission was interpreted primarily in economic terms, for example through commercialization, patenting, or collaborations with industry (Berghaeuser & Hoelscher, 2019, p. 59). More recent approaches, however, emphasize that the Third Mission should be understood more broadly and should also encompass social, cultural, and political functions (Compagnucci & Spigarelli, 2020, pp. 1–3).

Within this context, knowledge and technology transfer (KTT) plays a central role. KTT includes activities such as technology transfer organizations (TTOs), patenting, licensing, and academic spin-offs. Traditionally, these activities focused strongly on economic outcomes and commercialization. At the same time, however, there has been a growing movement towards broadening transfer activities to include social innovation and collaborative projects with civil society actors. In this

context, the social sciences and humanities are also increasingly recognized as important transfer actors. They contribute in distinct ways to addressing social and cultural issues—for example through policy advice, the preservation and dissemination of cultural heritage, or participatory research formats such as citizen science (Compagnucci & Spigarelli, 2020).

More recent developments further connect the Third Mission with global agendas and participatory innovation approaches. Concepts such as the Sustainable Development Goals (SDGs), social innovation, and co-creation increasingly shape current understandings of knowledge transfer (Compagnucci & Spigarelli, 2020, pp. 17–18). Similarly, approaches such as the Quadruple Helix—which emphasizes collaboration between academia, industry, government, and civil society—as well as Living Labs, highlight more interactive and participatory forms of knowledge production and exchange (Compagnucci & Spigarelli, 2020, p. 18).

Overall, the concept of knowledge transfer has evolved from a rather narrow and economically oriented understanding into a broader conception of universities' societal responsibility. Today, transfer encompasses not only the commercial exploitation of knowledge, but also social, cultural, and political forms of cooperation and exchange. In this sense, knowledge transfer has become a central component of the expanded understanding of the university in the 21st century, complementing teaching and research while simultaneously responding to growing societal expectations.

In contrast, Open Science represents an umbrella term for a variety of movements and practices that are united by the guiding principle of openness within science. Its historical roots can be traced back to the Scientific Revolution of the 17th century, when the norm emerged that scientific findings should be communicated publicly rather than kept secret, as had often been the case in alchemical traditions (David, 2008). The emergence of scientific journals and advances in printing technologies created the foundations for the systematic dissemination and public communication of scientific knowledge.

Although scientific systems in the 20th century were at times characterized by relatively closed structures, the digital revolution since the 1990s has created entirely new possibilities for the accessibility, dissemination, and networking of knowledge (Bartling & Friesike, 2014). Against this background, debates on Open Science gained significant momentum, not least through political initiatives such as the European Union's Horizon 2020 programme (European Commission, 2025) and recommendations by organizations such as the OECD (Paic, 2021), which increasingly emphasize the societal relevance of scientific openness (Vicente-Saez & Martinez-Fuentes, 2018).

A closer examination of the literature reveals that there is no single, universally accepted definition of Open Science, but rather a broad spectrum of understandings and interpretations. Fecher and Friesike (2014) emphasize that the concepts of openness and science constitute the two central pillars of the term. Vicente-Saez and Martinez-Fuentes (2018, p. 434), for example, define Open Science as “transparent and accessible knowledge that is shared and developed through collaborative networks.” UNESCO (2021, p. 7) similarly describes Open Science as an inclusive framework that integrates different movements and practices in order to make scientific knowledge openly accessible, reusable, and collaborative.

Beyond questions of accessibility, more recent conceptualizations increasingly stress the democratic and participatory dimensions of Open Science. Open Science therefore refers not only to the provision of openly accessible outputs such as Open Access publications, Open Data, or Open Source software, but also to the opening of scientific processes themselves to societal actors. This includes participatory research approaches, citizen science initiatives, and the inclusion of marginalized forms of knowledge (Maedche et al., 2024, p. 517).

The concepts and definitions outlined above illustrate that Open Science today extends far beyond technical questions of accessibility and increasingly touches upon the structural organization of scientific knowledge production. This is particularly relevant for universities, as they simultaneously function as sites of knowledge production and as institutions responsible for disseminating and transferring knowledge into society. As emphasized by the League of European Research Universities (LERU), Open Science holds considerable transformative potential for the ways universities generate, store, disseminate, and communicate research and educational outcomes (LERU, 2018, p. 22). At the same time, this openness also has the potential to fundamentally reshape the relationship between universities and society.

In summary, it can be said that: The concept of transfer gained particular significance in the 20th century, as research focused on how scientific findings and technologies could be applied in business, politics, and society. Today, transfer is closely linked to the “third mission” of universities—that is, the task of making research findings usable for social and economic purposes. Open Science, on the other hand, has deeper roots that date back to the scientific revolution of the 17th century. Scientific journals and the ideas of the Enlightenment promoted openness, exchange, and collaboration from an early stage. With the advent of digitization and the internet, Open Science has regained prominence, for example through open access, open data, and collaborative platforms. The goal is to make research more transparent, accessible, and reproducible. The key difference is that “transfer” primarily refers to the application of knowledge outside of academia, whereas “open science” aims to make the scientific process itself more open and transparent. Transfer connects science and society through utilization and application, while open science does so through open access and collaboration.

At first glance, the literature reveals only limited explicit connections between Open Science and knowledge transfer. Nevertheless, closer examination suggests that both approaches share important similarities in their underlying philosophy and are historically more closely connected than often assumed. Wolff and Schlagwein (2021), for example, argue that the historical development of open scientific practices also had considerable influence on European industry, as scientists, inventors, and economic actors frequently collaborated closely and many technological innovations emerged directly from scientific research. Open Science therefore not only affects scientific practices themselves, but also broader economic and technological developments and thus has a transfer component. The concept of transfer is also rooted in openness within science; therefore, the two aspects are interdependent.

Another concept highlighted in the literature that points to the connection between the two is the

concept of open innovation. Beck et al. (2020) emphasize that a variety of parallel discourses currently exist that nevertheless need to be understood in relation to one another. They use the concept of “Open Innovation in Science” (OIS) to describe increasing openness and collaboration within scientific research and point to the considerable overlap between discussions surrounding Open Science, knowledge transfer, public engagement, citizen science, technology transfer, and Third Mission activities.

Taken together, these developments indicate that both Transfer and Open Science seek to redefine the relationship between science and society, albeit from different historical starting points and through different mechanisms. Whereas transfer primarily emphasizes the societal application and utilization of scientific knowledge, Open Science focuses more strongly on transparency, accessibility, participation, and the opening of scientific processes themselves. Nevertheless, both concepts increasingly converge in contemporary higher education and research policy through shared goals such as collaboration, societal engagement, co-creation, and the democratization of knowledge.

While the theoretical literature highlights important conceptual differences and overlaps between Open Science and Transfer, it remains unclear how these concepts are currently interpreted and institutionalized within universities themselves. In particular, the literature provides only limited insight into whether universities understand Open Science and Transfer as connected fields or as largely separate areas of activity.

To explore this question further, the following section moves from the theoretical level to an exploratory empirical perspective. By analyzing the self-presentations of European universities on their institutional websites, it becomes possible to examine how universities define, structure, and prioritize Open Science and Transfer in practice. Website descriptions, strategies, and organizational structures provide valuable insights into institutional understandings of both concepts and reveal how universities position themselves in relation to societal engagement, knowledge dissemination, and collaboration.

The following analysis therefore aims to provide a first impression of how Open Science and Transfer are currently framed within higher education institutions and to identify potential patterns of separation, overlap, or integration between the two concepts.

3 Empirical Exploration: Institutional Framing of Open Science and Transfer on University Websites

Building on the theoretical considerations outlined above, the following section adopts an exploratory empirical perspective in order to examine how universities themselves present and institutionalize the concepts of Open Science and Transfer. While the literature provides important conceptual foundations, institutional self-descriptions offer insight into how these ideas are interpreted, prioritized, and translated into organizational structures and practices within higher education institutions. For the empirical exploration, a qualitative website and document analysis was conducted. Univer-

sity websites, institutional strategy papers, policy documents, and publicly accessible organizational descriptions were analyzed as forms of institutional self-presentation. These materials were selected because they reflect strategic priorities, organizational structures, and official understandings of Open Science and Transfer within higher education institutions. At the same time, such institutional framings can be assumed to shape how researchers and university members engage with these concepts in practice.

The aim of this exploratory analysis was not to generate representative findings, but rather to obtain an initial structured insight into how universities currently frame the relationship between Open Science and Transfer and whether both areas are institutionally connected or treated separately. In this sense, the study follows an exploratory qualitative research design focused on institutional discourse and organizational positioning.

Ten European universities from ten different countries were selected through an AI-supported heuristic sampling procedure. The objective was to identify a heterogeneous sample of universities that publicly communicate both Open Science and Transfer or Third Mission activities. The selection was therefore not statistically representative, but intentionally exploratory and diversity-oriented. The following prompt was used for the selection process: “Can you name 10 random universities in Europe from 10 different countries that have an Open Science website, policy or strategy AND a transfer or third mission strategy, policy or website?” The use of AI-assisted sampling introduces methodological limitations, including potential biases in visibility and searchability, which are acknowledged as part of the exploratory character of the study.

To structure the analysis, a coding framework was developed and documented in a supplementary codebook (see Supplementary Material A). The analytical categories were derived both deductively from the theoretical discussion and inductively during the exploratory review of the material. Categories included, among others, the terminology used for Open Science and Transfer, thematic priorities, organizational placement on university websites, visibility, degree of institutional integration, and strategic emphasis. For each category, operational definitions and coding criteria were established in order to enhance transparency and comparability across cases.

Particular attention was paid to the degree of institutional integration between Open Science and Transfer. This included examining whether both concepts were presented within shared organizational structures, linked through common strategic frameworks, or communicated independently from one another. Additional categories addressed whether universities emphasized economic, societal, or educational dimensions of these concepts and how prominently they were positioned within institutional communication structures.

The coding framework and category definitions are provided in the supplementary material to ensure methodological transparency and traceability of the analysis.

4 Institutional Framings of Open Science and Transfer: Findings from the Website Analysis

A first analysis of university websites reveals both commonalities and differences in how universities conceptualize and present Open Science and Transfer. Although both concepts are associated with the relationship between science and society, they are framed, prioritized, and institutionalized in distinct ways.

4.1 Institutional Framing of Open Science

Across all universities analyzed, the understanding of Open Science appears relatively consistent. In general, Open Science is described as a set of strategies and practices aimed at making scientific research more accessible, transparent, collaborative, and sustainable through digitalization and openness. Universities emphasize that scientific knowledge should not remain limited to academic communities, but should instead become understandable and accessible to broader publics.

Most universities explicitly use the term “Open Science.” One exception is the University of Southern Denmark, which refers to this field as “Open Science & Research Data,” thereby highlighting the strong role of research data management within its Open Science activities. This suggests that while there is broad agreement regarding the overall concept, institutional priorities and thematic emphases nevertheless differ between universities.

The most frequently mentioned Open Science themes include Open Access, Open Research Data, Open Research Software, Open Educational Resources, Citizen Science, Open Methods, Open Evaluation, and Open Infrastructure. Among these dimensions, Open Access appears to occupy a particularly central position. At some institutions, such as Uppsala University, Open Science activities are coordinated through the university library, underlining the historical connection between Open Science, scholarly communication, and research infrastructure.

Despite this relatively shared understanding, differences emerge regarding the orientation and objectives of Open Science. Some universities primarily frame Open Science as a means of improving scientific quality and research practices. The University of Potsdam, for example, explicitly connects Open Science with principles of good scientific practice. Other universities adopt a broader societal perspective and place stronger emphasis on citizen participation, societal engagement, and collaboration beyond academia. Overall, the findings indicate a relatively coherent conceptual foundation for Open Science, while the degree of societal orientation and practical specification varies between institutions.

4.2 Heterogeneity of Transfer Concepts

In contrast to Open Science, the concept of Transfer appears considerably more heterogeneous. In general, transfer is understood as the sharing, application, and circulation of knowledge through cooperation and innovation for the benefit of society and the economy. Unlike Open Science, how-

ever, there is no universally established terminology or shared institutional framing.

Rather than using the term “Transfer” directly, universities employ a variety of related concepts, including “Knowledge and Technology Transfer,” “Collaboration on Research,” or the “Third Mission.” This terminological diversity reflects the broad spectrum of activities and institutional logics associated with transfer processes.

The transfer-related activities identified in the analysis can be grouped into several recurring categories: Intellectual Property and Commercialization, Entrepreneurship and Start-up Support, Collaboration and Partnerships, Knowledge Dissemination, Innovation Infrastructure, and Education and Societal Engagement. Despite these recurring themes, universities differ considerably in how broadly they define transfer, which forms of participation and collaboration they prioritize, and the extent to which they incorporate accompanying societal dimensions.

The findings further suggest that transfer concepts can be positioned along a continuum. At one end of this continuum, transfer is framed primarily in terms of economic valorization, with a strong focus on patents, commercialization, and start-up activities. In the middle, transfer emphasizes collaborative innovation between universities, industry, and external partners. At the other end, transfer is conceptualized as a broader contribution to societal transformation, including educational, cultural, and democratic goals.

Overall, most universities either primarily emphasize economic objectives or combine economic and societal goals within their transfer strategies. Only one university in the sample explicitly integrated scientific, economic, and societal dimensions equally within its institutional understanding of transfer.

4.3 Degrees of Integration Between Open Science and Transfer

The most striking finding of the analysis concerns the institutional relationship between Open Science and Transfer. In most cases, both areas appear institutionally separated rather than strategically integrated.

Six out of the ten universities analyzed showed no visible integration between Open Science and Transfer. In these cases, the two areas operated independently from one another, were assigned to different organizational units, and lacked explicit conceptual or strategic connections. KU Leuven represents an example of this institutional arrangement.

Three universities demonstrated partial integration. In these cases, Open Science and Transfer were situated within broader research or innovation structures, but without a clearly articulated conceptual linkage or shared strategic framework. Université Paris-Saclay illustrates this type of institutional arrangement.

Only one university in the sample, LUISS University Rome, displayed a stronger form of integration. In this case, Open Science and Transfer were institutionally connected within a shared research framework and explicitly referred to one another within strategic documents and institutional activities.

Taken together, the findings suggest that, despite certain conceptual overlaps, Open Science and Transfer are still largely treated as separate institutional fields within universities. At the same time, the increasingly visible societal orientation of both concepts points toward emerging areas of convergence that may become more relevant in future institutional and strategic developments. In particular, shared themes such as collaboration, participation, accessibility, and societal engagement indicate that both concepts may increasingly intersect within contemporary higher education policy and practice.

5 Conclusion: The Relevance of Open Science and Transfer for Educational Science

This paper has shown that Open Science and Transfer are rarely treated as a unified concept, both in the literature and in institutional practice. The exploratory website analysis demonstrated that universities frequently organize and communicate both concepts separately, even though significant conceptual overlaps can increasingly be identified. At the same time, both concepts have undergone substantial transformations in recent years that gradually bring them closer together.

Within the field of transfer, a shift can be observed from a narrow economic understanding—primarily focused on commercialization, patents, and spin-offs—toward a broader societal perspective emphasizing social innovation, co-creation, participatory research, and societal impact. Transfer is therefore no longer understood solely as the application of scientific knowledge within economic contexts, but increasingly as a reciprocal process between science and society.

A comparable development can also be identified in Open Science. While Open Science initially emerged from technical and scientific concerns such as transparency, reproducibility, and access to scientific publications and research data, it has increasingly adopted a more outward-looking orientation. Contemporary discussions emphasize democratization, inclusion, collaboration, and public participation within research processes. Open Science is therefore no longer directed exclusively toward improving science internally, but also toward strengthening the relationship between science and society more broadly.

The website analysis reflects these broader developments particularly clearly. While some universities continue to frame transfer primarily in terms of commercialization, patents, and innovation management, others increasingly emphasize societal engagement, collaboration, and co-creation. The findings therefore suggest that transfer is gradually expanding beyond a purely economic understanding toward broader societal and educational dimensions.

At the same time, the empirical findings also reveal important institutional tensions. Although universities increasingly connect both concepts through shared themes such as participation, collaboration, accessibility, and societal impact, Open Science and Transfer largely remain embedded within separate organizational structures. In most universities analyzed, both areas appeared institutionally disconnected and linked to different strategic priorities and administrative units. This suggests that conceptual convergence does not automatically result in institutional integration. It is important to

note, particularly with regard to the empirical results, that this is a small-scale study that does not allow for generalizations. For future research, it would certainly be worthwhile to include additional universities in such a study.

For educational science, these developments are however particularly significant. First, Open Science and Transfer can be understood as research practices that shape how educational research is conducted, communicated, and connected to broader publics. Educational research has long been confronted with the challenge of bridging the gap between scientific knowledge and educational practice. In this context, both Open Science and Transfer provide important approaches for strengthening relationships between science and society.

Practices such as Open Access, Open Educational Resources, Open Data, and Citizen Science contribute to making educational research more accessible, collaborative, and participatory. At the same time, they raise fundamental questions concerning whom educational research seeks to address, how knowledge can be communicated beyond academia, and how scientific knowledge can be co-created together with practitioners and societal actors. These approaches create opportunities for more innovative educational contexts and for forms of research that are both socially relevant and practically applicable.

Beyond this, Open Science and Transfer can themselves be understood as educational fields. Transfer processes increasingly require competencies such as scientific literacy, data literacy, and the ability to critically engage with scientific information. If Open Science practices are used to facilitate transfer between science and society, these competencies become essential prerequisites for participation. Enabling participation in open and collaborative research processes can therefore also be understood as an important educational task.

So far, debates surrounding Open Science and Transfer have largely been shaped by economics, law, and technical disciplines. However, as both concepts increasingly emphasize societal openness, participation, collaboration, and co-creation, they also become highly relevant for educational science—not only as research practices, but also as subjects of educational inquiry in their own right.

In this sense, educational science occupies a unique position. It is not only affected by the transformations associated with Open Science and Transfer, but can also actively contribute to shaping how knowledge is shared, understood, and collaboratively produced within society. The growing convergence of Open Science and Transfer therefore represents not only an institutional or scientific development, but also an important educational challenge and opportunity.

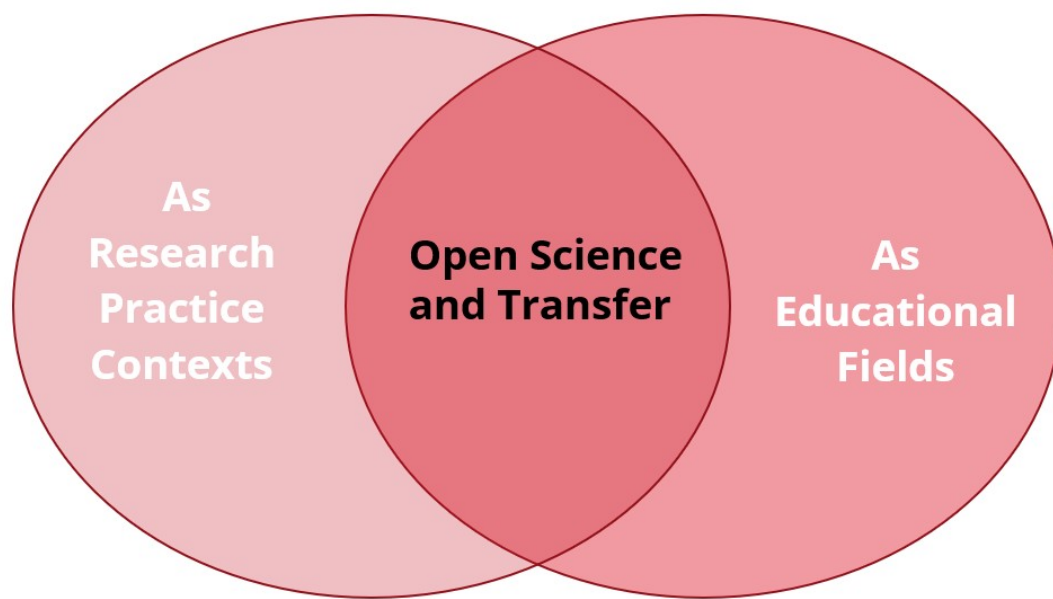


Fig 1: Illustration of open science and knowledge transfer as a research context and field of practice in educational science

Artificial intelligence (AI) was used to support transcription, language editing, and the exploratory identification of universities included in the website analysis. All research decisions, data collection, coding, interpretation, and conclusions remain the sole responsibility of the author.

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