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## IMPLEMENTATION OF EDUCATIONAL INNOVATIONS: A SYSTEMATIC LITERATURE REVIEW

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**Abstract:** This research aims to identify the main features of educational innovations in the context of K-12 schools and significant factors that impact the implementation process. Following PRISMA guidelines, we conducted a systematic literature review of 76 English peer-reviewed articles that examined educational innovations between 2010 and 2019. Using the concept of institutional isomorphism, resource dependence theory and the sensemaking perspective, the review found that innovation was not being successfully implemented in schools largely due to “actor-related challenges” including issues related to teachers’ worldviews. The review also identified external environmental pressures outside the schools’ purview that restricted or curtailed the integration of educational innovations. This research contributes to the theoretical understanding of innovation implementation in education from the perspective of implementation science. Illuminating some features of educational innovation implementation and the associated obstacles, this study offers recommendations for research and practice to improve the prospects of sustainable and scalable innovations in educational contexts.

*Keywords:* educational innovation, challenges, implementation

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# TRIỂN KHAI SÁNG KIẾN GIÁO DỤC: NGHIÊN CỨU TỔNG QUAN HỆ THỐNG

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**Tóm tắt:** Nghiên cứu này nhằm xác định các đặc điểm nổi bật của những đổi mới giáo dục trong bối cảnh các trường phổ thông (K-12), cũng như những yếu tố quan trọng tác động đến quá trình triển khai. Sử dụng khung PRISMA, chúng tôi đã tiến hành nghiên cứu tổng quan tài liệu hệ thống trên 76 bài báo tạp chí khoa học bằng tiếng Anh, đã qua bình duyệt, xem xét các đổi mới giáo dục giai đoạn 2010-2019. Dựa trên các khung lý thuyết gồm: đăng cấu thể chế, lý thuyết phụ thuộc nguồn lực và góc nhìn kiến tạo ý nghĩa, nghiên cứu cho thấy nhiều đổi mới chưa được triển khai thành công trong nhà trường chủ yếu do những thách thức liên quan đến tác nhân, đặc biệt là những vấn đề gắn với thể giới quan của giáo viên. Bên cạnh đó, nghiên cứu cũng chỉ ra các áp lực từ môi trường bên ngoài, vượt ngoài phạm vi kiểm soát của nhà trường, có thể hạn chế hoặc làm gián đoạn việc tích hợp các đổi mới giáo dục. Nghiên cứu góp phần mở rộng hiểu biết lý thuyết về triển khai đổi mới trong giáo dục dưới góc nhìn của khoa học triển khai. Thông qua việc làm rõ các đặc điểm của quá trình triển khai và những rào cản liên quan, bài viết đưa ra một số khuyến nghị cho nghiên cứu và thực hành nhằm cải thiện triển vọng thực thi những đổi mới giáo dục theo hướng bền vững và có khả năng nhân rộng.

*Từ khóa:* sáng kiến giáo dục, thách thức, triển khai

## 1. Introduction

Educational innovation in school education has been presented in different forms, and the continual need to innovate learning and teaching was motivated by different forces (Cuban, 2013; Fullan, 1993; Rogers, 2003; Sidorkin & Warford, 2017). Given the recent global health pandemic, innovative technologies have also been increasingly integrated in the learning and teaching activities across contexts to combat learning loss and educational inequities (Tang, 2023). Most innovations in education are introduced and implemented with the aim to transform schools and education systems in a sustainable way. Many educational innovations however seem not to work or fail to scale despite careful conception and considerable support during the implementation. In fact, the expansion of educational innovations has been the focus of educational research since the 1970s, and with the rise of technological advancements, scholars are increasingly studying the constraints and possibilities that influence the scalability of educational innovations (e.g., Klein & Knight, 2005; Nunan, 2003; Serdyukov, 2017; Wilcox & Lawson, 2018). Nevertheless, there needs to be more systematic efforts to better understand the common difficulties as well as affordances of educational innovations across various contexts.

Despite its wide use, the term *innovation* remains notoriously ambiguous due to various

definitions across domains (see e.g., Smirnov, 2017; Taylor, 2017). In education, there is also no consensus over the conceptualization of innovation, but educational innovation can be categorized into three main areas: organizational/managerial (e.g., in organizational structure), instructional (e.g., in pedagogy/ teaching methods), and professional (e.g., in teachers' recruitment) (Ellis, 2017). Serdyukov (2017) quoted Theodore Levitt, a Harvard professor who states that "Creativity is thinking up new things. Innovation is *doing* new things" (p. 8, emphasis added). This author argued that for a new or improved idea to achieve the goal of producing sizable and transformative effect and to become qualified as an *innovation*, it must be implemented on a wide scale. This means that for a new knowledge or practice in education to be considered an innovation, it must be diffused and used by teachers and students across schools to generate a significant difference. The widely adopted Oslo Manual (OECD, 2016) also highlights this crucial aspect by defining innovation as "the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations" (p. 15). As such, this study conceptualized educational innovation as *the implementation of an initiative that is new to its potential users* to address a given educational problem or improve a condition at the school or educational system levels.

This study examines the main actors who implement educational innovations and factors that impact the innovation implementation process, including the hurdles to scaling up innovations in different educational contexts. We believe this study is among the first that attempts to document and categorize constraints to innovation implementation through the lens of organizational theories. Focusing on the implementation of innovation, this research does not attempt to explore the nature of innovation, particularly as related to organizational change or disruptive change that seeks to challenge the status quo. The review draws on a body of published research that examines the implementation of specific interventions - for example, educational policies or programs - and views them as 'innovative' in their contexts; we thereby consider educational innovation as the implementation of an initiative that is new to its potential users to improve a condition at the school or educational system levels.

Guided by a framework that integrates Neo-Institutional theory, Resource Dependence theory and Sensemaking theory, we found that both environmental pressures, including coercive, normative, mimetic and resource-dependent elements, and actors' worldviews (e.g., their knowledge, experience, values and belief systems) collectively impede the implementation of educational innovations. These factors have been identified independently in the literature (Ensminger & Surry, 2008; Heck et al., 2001; Mooij & Smeets, 2006; Wilcox & Lawson, 2018). Yet with a comprehensive, integrative review of these factors, our findings highlight that the majority of constraints stem from factors outside schools, including coercive, normative and resource-dependent pressures. This study contributes to existing scholarship on implementation science to suggest a more nuanced approach to investigating innovation implementation in education. It also offers implications that could be helpful for contexts where educational innovations are being considered for scaling up.

Following the Introduction, the next section provides a review of key concepts and theoretical framings that informed the current study. Next, the Methodology section describes the process of the systematic literature review method. This is followed by a discussion of the main findings and implications for research and practice.

## 2. Conceptual Framework

This study is informed by the principles of implementation science and theoretical perspectives within the organizational theories strand. Implementation science (IS) is an expanding area of scholarship that strives to address gaps in translation from discovery to implementation after dissemination (Thomas et al., 2017). The main goal of inquiry in IS is to research and understand how innovations are adopted and maintained (Cook & Odom, 2013). Accordingly, IS distinctively attends to factors in addition to the effectiveness of the innovation itself, to include identifying and addressing barriers and facilitators to the uptake of innovations (Bauer & Kirchner, 2020). As such, we believe that applying the principles of IS will provide new insights to our understanding of which factors affect educational innovation uptake into daily practice.

Given that the context of innovation implementation becomes widely acknowledged as an important influence, there is increasing interest in using theories concerning the organizational level to explain what impacts implementation outcomes (Birken et al., 2017; Nilsen, 2020). Following this vein, this study employs several perspectives within the organizational theory strand, namely institutional isomorphism, resource dependence, and sensemaking perspectives, to help identify complex factors impacting the innovation implementation process occurring at schools as educational organizations. While institutional isomorphism and resource dependence perspectives explain how schools face coercive, normative, mimetic, and resource constraints, they are often applied without specifying the mechanisms through which these pressures shape day-to-day enactment in classrooms. Conversely, sensemaking perspective offers mechanisms for how teachers interpret and respond to change, but is less frequently linked to institutional forces in a way that explains cross-context patterns of implementation success or failure. Accordingly, a key gap in the educational innovation literature is the lack of integrative syntheses that connect environmental pressures to actors' sensemaking processes and trace how this interaction produces different implementation responses. This review addresses this gap by using a framework to synthesize the literature and link pressures, sensemaking, and implementation outcomes. The next paragraphs explain in detail the core concepts of these perspectives and their relevance to the study.

### 2.1. Institutional Isomorphism

Institutional isomorphism, originally developed by DiMaggio and Powell (1983), refers to the tendency of organizations to adopt similar structures and practices while responding to the same set of environmental conditions (Wiseman et al., 2014). Isomorphism results from three types of institutional pressures, namely *coercive*, *normative*, and *mimetic* (DiMaggio & Powell, 1983). Coercive pressures refer to formal and informal rules and regulations that organizations exert and follow (Leeman et al., 2019). Normative pressures primarily stem from professionalization, or "the collective struggle of members of an occupation to define the conditions and methods of their work" (DiMaggio & Powell, 1983, p. 152) that are perceived as legitimate and appropriate according to social expectations and values (March & Olsen, 2011). Mimetic pressures refer to the taken-for-grantedness of social knowledge, such as common frames of reference, attitudes, and stereotypes that force organizations to adopt, especially when effective or efficient practices are unclear (Leeman et al., 2019; Scott, 1995, 2013).

The institutional isomorphism perspective offers critical insight to organizational studies because it emphasizes the constraining power of the environments in limiting organizational changes (Scott, 1991). Hence, isomorphism should be understood as a process

of organizations in an environment resembling one another as a result of constraints from the environment, not the goal. Applying this perspective, this study suggests that attempts to implement innovation in schools might be restricted by internal and external forces, namely coercive (i.e., rules and regulations), normative (e.g., professional goals and rankings), and mimetic pressures (cultural practices).

## **2.2. Resource Dependence**

Despite its useful insights, institutional isomorphism is criticized for its neglect of the importance of material resources (Scott, 2014). To address this critique, this study also employed the Resource Dependence Theory proposed by Pfeffer and Salancik (1978). Essentially, the Resource Dependence (RD) approach emphasizes the dependence of organizations on their environments for resources to operate their activities (Pfeffer & Salancik, 1978). This results in an interdependence between organizations as they compete with one another for resources (Sanz-Menéndez & Cruz-Castro, 2003). Applying the RD approach to this study, it is suggested that implementing innovation at schools requires sufficient resources (e.g., funding, infrastructure, and human resources, etc.), and the lack of such crucial resources may threaten the feasibility and success of the innovation.

The RD approach is similar to the institutional isomorphism perspective in its attention to how organizations are constrained by the environment. Nevertheless, the two perspectives are different in theoretical paradigms with institutional isomorphism taking the sociological view, emphasizing norms, values, and social forces (Birken et al., 2017), while RD is rooted in economics, viewing organizations as rational entities responding to the economic constraints caused by the environments (Kirby-Harris, 2003). Integrating these two perspectives therefore provides a more robust and nuanced explanation regarding the potential constraints that schools may encounter while implementing innovation.

## **2.3. Sensemaking**

Since both institutional isomorphism and resource dependence perspectives focus on how the environment constrains organizations, they share a common critique for underestimating the potential ability of actors in decision making and action (Besharov & Brickson, 2016). As a result, there has been a significant shift toward emphasizing the role of actors in organizational change. This shift has also been observed in the educational research which recognizes that institutions are *not merely passive recipients* of whatever the institutional environment imposes; instead, school leaders, teachers, and other stakeholders who are placed in classrooms can actively reconstruct and reshape institutional forces (Coburn, 2005; also see Weick, 1995; Spillane et al., 2002).

In general, sensemaking is defined as an on-going process (Ganon-Shilon & Schechter, 2017) “through which people work to understand issues or events that are novel, ambiguous, confusing, or in some other way violate expectations” (Maitlis & Christianson, 2014, p. 57). As organizations are constantly stimulated by the ever-changing environment, giving rise to ambiguity and uncertainty, organization members, therefore, seek to clarify by framing the environmental stimuli through an interpretive mental model to make meaning and to gain clarity of the ever-changing environment (Maitlis & Christianson, 2014).

Accordingly, sensemaking perspective is particularly applicable to the question of implementing innovation in schools. The introduction of an innovation, whose meaning is often ambiguous (Sergeeva, 2017), disrupts the practices already in place. When this happens, school actors draw on their existing worldviews to actively interpret and make meaning of said

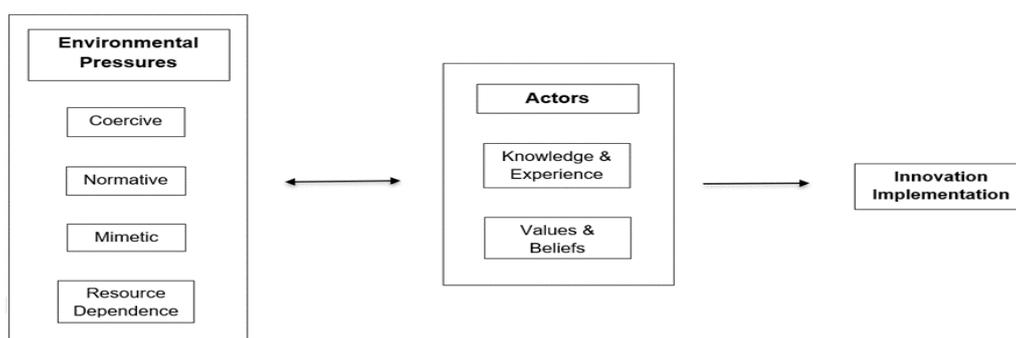
innovation (Coburn, 2005). Hence, the unsuccessful implementation of many educational innovations could be attributed to the ignorance of the school actors' perspectives in the implementation process (Ng & Wilson, 2017), not realizing how these actors' sensemaking can alter both the process and outcome of implementation.

On the other hand, an actor's worldview is not independent from their social context but is rather deeply embedded in it (Coburn, 2001; Spillane et al., 2002). Indeed, the literature suggests that teachers' preexisting beliefs and practices are rooted in and shaped by past encounters with their environment (Coburn, 2004). In this regard, neoinstitutional theory and resource dependence theory complement sensemaking theory in explaining how institutional pressures structure and guide actors' sensemaking process.

In brief, the conceptual framework of this study brought together three perspectives: institutional isomorphism, resource dependence, and sensemaking. The integrative framework helps explain and categorize determinant factors that impact the innovation implementation process into environmental pressures (i.e., coercive, normative, mimetic, and resource dependence) and actor-related factors. The framework and the operationalization of its key concepts are summarized in Figure 1.

**Figure 1**

*Factors Influencing Innovation Implementation*



Using this conceptual framework, the current study aimed to identify the main features of educational innovations in the context of K-12 schools and significant factors that impact the implementation process. As a result, the following three research questions emerged:

1. *Who have been the main actors that implement educational innovations at the school level?*
2. *What educational dimensions (for example, teaching methods, curriculum, school management, or learning experiences etc.) are the foci of innovation across contexts?*
3. *How are the constraining factors of the implementation of educational innovation reflected in the literature?*

### 3. Methods

We conducted a systematic review of the scholarly literature on educational innovation, following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines as articulated by (Moher et al., 2015) to ensure that eligibility criteria, search strategies, and analytical procedures were specified and applied consistently throughout the review process. All five authors of the current study took part in the review process. The review consisted of four steps: (a) defining a set of inclusion/exclusion criteria, (b) screening

and extracting data, (c) assessing the relevance of the reviewed studies, and (d) synthesizing the results. Each of these steps is explained specifically below.

First, our team conducted a brief scoping review to explore the relevant time frames and to identify specific aspects of interest pertaining to educational innovation. The exploratory review of the literature on educational innovation over the past decades suggested that the time period following 2010 experienced rapidly changing circumstances that critically transformed the contexts of innovation implementation. We focused our search using eight major databases for education publications, including ERIC, ProQuest, IBSS, Web of Science, Social Science Premium Collection, Academic Search Complete, JSTOR, and Google Scholar.

A structured search strategy was developed prior to screening, using standard Boolean operators (AND, OR) and truncation (\*) to capture variations of the concepts of innovation and implementation in educational contexts. Search terms combined keywords such as *inno\**, *innovat\**, or *implement\** with an education-related term such as *educat\**, *teach\** or *school*. Search strings were adapted to the syntax of each database. Google Scholar was used as a supplementary source to identify potentially relevant studies, not indexed in the other databases.

The study focuses on literature published between 2010 and 2019 to examine educational innovation implementation under relatively stable institutional conditions. The COVID-19 pandemic was seen as a major external disruption that profoundly altered schooling practices, policy constraints, and implementation processes. Innovations introduced during this period were often emergency-driven responses rather than institutionally embedded reforms. Including post-2020 studies would therefore introduce conceptual heterogeneity that is inconsistent with the theoretical framing of this study. Expanding the corpus to include post-2020 studies would require a separate review with different inclusion criteria, analytic categories, and theoretical assumptions, which is beyond the scope of the present study. Furthermore, we noted that from 2020 onwards, the literature around technology applications in education grew quickly, perhaps as the result of the COVID-19 pandemic. This exceptional volume of publications on education innovation stands out from historical trends and requires an in-depth analysis in a full-fledged study. We therefore limited the search results in the current study to the years between 2010 and 2019 to maintain a manageable cohort of 2,524 relevant publications.

Following the PRISMA guidelines (Moher et al., 2015), inclusion criteria were determined prior to screening and limited the review to English-language, peer-reviewed publications focusing on formal/mainstream K-12 education. Studies centred on early childhood education, vocational training, higher education and teacher education were excluded. Applying these criteria resulted in the exclusion of 1,867 items.

The remaining cohort (639 items) was then imported into Zotero for duplicate removal, generating a dataset of 277 unique articles. The final step in screening articles removed 201 additional articles due to (a) irrelevant content, (b) unsuitable publication format (i.e., book chapters, reports, and theses), and (c) inadequate quality (i.e., not peer-reviewed articles). This narrowed our search results to 76 publications for final analysis. The sample size was the outcome of our application of rigorous inclusion and exclusion criteria in systematic review, prioritizing methodological quality and conceptual relevance over volume. Additionally, the aim of this review was not to produce population-level generalizations, but to develop an analytical understanding of how educational innovations are implemented in K-12 contexts. Furthermore, the methodological quality of included studies was appraised using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). The MMAT was selected due to its suitability for reviewing qualitative, quantitative, and mixed-methods research. Each study was

assessed against the relevant MMAT criteria based on its methodological design. However, quality appraisal informed the interpretation of findings but was not used as an exclusion criterion. At this stage, all of the screeners shared consensus on title, abstract, and full-text screening with the inter-rater reliability of Cohen's  $k$  score at 0.687, and all the disagreements were addressed via discussion. This process is summarized in Figure 2.

**Figure 2**

*Process of the Systematic Review*



Data from the selected studies were then extracted onto Microsoft Excel and coded using a coding scheme informed by the literature and the research objectives. Major themes in the coding scheme include *type of publication*, *type of innovation (tech-based or non-tech-based)*, *geography/ies*, *actors implementing innovations*, *educational problems*, *implementation evaluation*, *challenges reported*, etc. All data extraction was cross-checked by a second reviewer to increase reliability (Cohen's  $k = 0.75$ ). The reviewers together went through the information under each category and synthesized the results across the studies. Any disagreements that emerged in the cross-check stage were discussed first among the reviewers and then settled by the group leader. The main aim of this synthesis was to seek common trends related to the characteristics of innovation and challenges of innovation implementation based on the available evidence reported.

## 4. Findings

This section presents the key findings related to the dimensions of innovation implementation, the actors involved, and the factors that constrain the implementation of education innovation across the contexts. Given the methodological heterogeneity of the included studies and the focus on implementation processes rather than comparable outcome measures, meta-analytic or quantitative synthesis techniques were not appropriate. Accordingly, percentages reported in this section indicate the proportion of included studies addressing a given theme and are used descriptively to illustrate patterns across the literature; they do not represent effect sizes, prevalence estimates, or quantitative synthesis.

### 4.1. Main Features of Educational Innovations

The review revealed some discernible characteristics of educational innovations reported between 2010 and 2019, including geographical features and types of innovation. Nearly a third of educational innovations were implemented on a cross-country scale, reflecting the transnational circulation of innovative ideas. In addition, a substantial proportion of studies

focused on innovations in Asian contexts (27.6%) including Indonesia, Hong Kong, China, compared with North America (18.4%). Such uneven distribution in the literature likely reflects epistemic dynamics in global educational research. They could be attributed to unequal research capacity, funding availability, publication access and policy agendas, rather than the absence of innovation activities in under-represented regions.

About 75 percent of the investigated papers focused on specific initiative types that can be categorized as non-tech-based innovations (e.g., combining math and dance concepts) (Helsa & Hartono, 2011) and tech-based innovations (e.g., a 1:1 laptop initiative) (Corn et al., 2012). Tech-based innovations accounted for nearly 40 percent of the sample and were often associated with integrating information and communication technology for improving different aspects of teaching and learning.

#### **4.1.1. The Actors: Implementers of Innovation**

Not surprisingly, teachers and policymakers emerged as the top two key actors in implementing innovations, while school leaders took the role of mediator between the two. Teachers were identified as the primary implementers in 58% of the reviewed studies, underscoring their central role in translating innovation into classroom practice. Across contexts, teachers adopted innovations to enhance students' learning experiences (Chibás-Ortíz et al., 2014; Corn et al., 2012), facilitate teaching practices, design learning materials (Harlow & Leak, 2014), and improve professional learning (Guldberg et al., 2017).

Meanwhile, policymakers featured prominently 36.8% of the studies, typically shaping innovation through (a) integrating social issues, (b) updating pedagogies and assessment, (c) strengthening community involvement (d) facilitating teachers' professional development, and (e) improving educational management (Colbert & Arboleda, 2016; Sokal & Katz, 2015). This distribution highlights a recurrent implementation dynamic in which policy-driven initiatives rely heavily on teachers' capacity and willingness to enact change in practice.

#### **4.1.2. Aspects of Implementation**

Innovations were implemented in various aspects of education, including teaching/learning methods, curriculum, professional development, school/classroom management, and students' experiences and well-being. Improving teaching/learning methods was the most frequent focus, appearing in approximately 58% of the sampled papers. Examples of improving teaching/learning innovations included using devices and online applications to make learning more personalized and interactive (Sulisworo et al., 2017), helping students with disabilities (Fernández-Batanero et al., 2019), facilitating teachers in giving instructions (Halverson & Smith, 2010), and creating a creative, experience-based and self-directed learning environment (Helsa & Hartono, 2011).

Curriculum-focused innovations appeared in 35.5% of the articles and often emphasized subjects and competencies associated with 21<sup>st</sup>-century learning, such as science, English language, and digital literacy (Curdt-Christiansen & Silver, 2012; Le Cordeur, 2014). Additionally, values such as sustainable development and intercultural competences became vital components in many curricula across contexts (Zhang, 2010). Finally, diversifying and localizing curricula to reflect local contexts and to accommodate diverse learning experiences by involving teachers in curriculum and assessment development were identified as notable innovations in several countries. For example, teachers in Finland are responsible for developing curriculum on the basis of the national standardized frameworks (Le Cordeur, 2014).

## 4.2. Constraining Factors

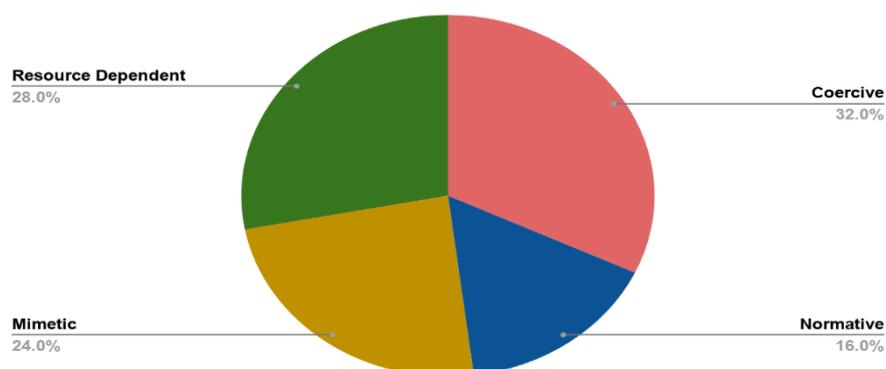
Consistent with the conceptual framework, in this section, we classify constraining factors of innovation implementation as revealed in the data into environmental pressures (coercive, normative, mimetic, and resource dependence elements) and actor-related issues (knowledge and experience; value and belief systems). Overall, environmental pressures were more frequently reported than actor-related constraints, indicating that many barriers to innovation implementation originate beyond individual schools' control.

### 4.2.1. Environmental Pressures

Among environmental pressures, coercive elements were the most frequently reported constraints, appearing in 32% of total papers, followed by resource dependent (28%), mimetic (24%), and normative pressures (16%). (see Figure 3)

**Figure 3**

*Environmental Pressures*



**Coercive pressures** typically include formal and informal rules and regulations (Leeman et al., 2019) such as curriculum mandates (Berkovich, 2014; Paek, 2018; Papadakis, 2016), assessment requirements (Lewin et al., 2018; Le, 2018), and mandatory teacher training (Colbert & Arboleda, 2016; Sokal & Katz, 2015), that conflicted with innovative practices. In many studies, these coercive requirements shaped implementation indirectly by influencing teachers' interpretations of what "counts" as success and what is professionally safe. In particular, exam-oriented and content-driven assessment systems were repeatedly identified as major obstacles to pedagogical and curricular innovation across diverse contexts (Cinganotto, 2016; Jong, 2016; Le, 2018; Pimlott-Wilson et al., 2019; Priestley et al., 2011; Sargent, 2015; Zhan & So, 2017). As mentioned earlier, initial findings indicated that the majority of innovations were implemented in curriculum and teaching/learning methods. This finding concerning constraints in assessment suggests that without equivalent efforts devoted to innovating assessment, the effectiveness of implementing innovation in the areas of curriculum and pedagogy will be minimized, echoing Lee and Krajcik's (2012) assertion that educational innovation must also address assessment requirements.

**Resources dependent pressures** constituted the second most frequently reported category of constraints. In this study, resources refer to infrastructure, time and workload, funding and incentives, and other. Surprisingly, the data revealed that the burden of time and workload were the most frequently reported resource issues constraining innovation implementation (34.8%), followed by infrastructure limitations (30.4%), funding and incentives (21.7%), and other resource constraints (13%). These findings suggest that even when

innovations are conceptually supported, insufficient resourcing can substantially limit implementation capacity.

Teachers' existing teaching, administrative, and professional development workloads frequently constrained innovation implementation (Cinganotto, 2016), especially at larger scales (Lee & Krajcik, 2012), necessitating additional financial and staffing support (Pimlott-Wilson et al., 2019). Meanwhile, insufficient infrastructure, closely linked to inadequate funding and reliance on external resources, also emerged as a major constraint on innovation implementation at the school level (Cinganotto, 2016; Jong, 2016; Papadakis, 2016; Pimlott-Wilson et al., 2019; Tang & Hew, 2017). For example, Tang and Hew (2017) found that the effectiveness of instant message platforms in education was significantly constrained by and found that it is a major concern when a network infrastructure provides low-quality internet connectivity. Similarly, Paek (2018), reported that 63% of teaching artists involved in arts initiatives in Korean schools found that 63 percent of teaching artists were dissatisfied with the facilities provided which limited their instructional capacity.

**Mimetic pressures** further shaped innovation conditions. From the institutional isomorphism perspective, mimetic pressures refer to the taken-for-grantedness of social knowledge, such as common frames of reference, attitudes, and stereotypes (Scott, 1995; 2014). In this study, mimetic factors were reflected in school stakeholders' collective attitudes and behaviors toward innovation implementation, particularly: (a) school leaders and colleagues' lack of support for teachers' innovation effort, (b) limited opportunities for professional and collaborative dialogue that facilitates innovation implementation, and (c) minimal teacher involvement in the decision-making process while implementing innovations. These mimetic conditions shaped social sensemaking by signaling whether innovation was normal, valued, and expected. In schools where leaders and colleagues did not actively support innovation or create spaces for professional dialogue, teachers often inferred low legitimacy and low collective commitment, weakening sustained enactment.

Consistent with prior research, teachers' attempts to implement innovation were significantly weakened in the absence of support from school leaders and colleagues, often resembling 'swimming against the tide' (Priestley et al., 2011). Meanwhile, a lack of professional dialogue among teachers and other school stakeholders contributed to strained relationships (Paek, 2018) and/or organisational environments un conducive to innovation (Priestley et al., 2011), particularly in contexts where interdisciplinary, inter-department collaboration were essential (Hanley, 2011). Finally, limited teacher participation in decision-making emerged as a recurrent constraint across contexts. In contrast, studies consistently showed that engaging and empowering teachers was critical for school-wide innovation (Lee & Krajcik, 2012), whether in initiatives adopting the Columbian New School model that promotes teacher autonomy and student-centred pedagogy in Vietnamese schools (Le, 2018) or in efforts to support teachers' use of innovative technologies in European classrooms (Lewin et al., 2018). Such engagement mobilised teacher participation and support, while enabling local adaptation of innovation to specific classroom contexts.

**Normative Pressures** primarily manifested as tensions between school's educational aims and the expectations imposed by external stakeholders at national, societal, and global levels. These pressures took the form of contradictory visions and goals (Bryant, 2016; Paek, 2018; Pimlott-Wilson et al., 2019), divergent public expectations (Priestley et al., 2011; Sargent, 2015), and the overwhelmingly conforming influence of ranking systems and league tables (Berkovich, 2014; Pimlott-Wilson et al., 2019). Such normative pressures often created

competing logics that teachers were required to navigate. When external stakeholders privileged measurable academic performance, teachers' sensemaking tended to frame innovations oriented toward holistic or student-centered goals as misaligned with prevailing expectations, increasing resistance or "reversion" to conventional practices.

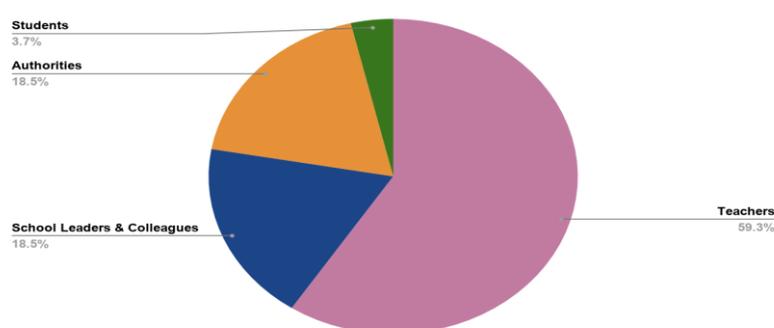
For example, at the national level, Bryant (2016) documented these tensions in Hong Kong's recruitment of native English-speaking teachers as vehicles for internationally borrowed reforms, without adequate consideration of alignment with school-level visions and contexts. This misalignment frequently resulted in unnecessary tensions between the recruited teachers and local school communities. At the societal level, Sargent (2015) found a pronounced mismatch between the expectations of Chinese parents for their children's academic performance (as measured by the college entrance examination) and that of the New Curriculum Reforms. This conflict resulted in stiff resistance from the parents to the reform implementation. At the global level, Berkovich (2014) revealed how rankings and international test results such as PISA and TIMSS caused a major shift in the Israeli Ministry of Education priorities to improve test scores. The Ministry issued a mandatory curriculum redesign for schools, drastically restricting their capacity to implement innovation for different pedagogical purposes.

#### 4.2.2. Actors

In this study, actor-related challenges were categorized into two broad areas (a) knowledge and experiences, and (b) values and belief systems, as outlined in the conceptual framework. Actors involved in innovation implementation included teachers, school leaders and external authorities; however, teacher-related factors accounted for 59.3% of the total papers, followed by a similar proportion of school leaders & colleagues and external authorities (18.5% for each category), and students (3.7%) (see Figure 4). As teachers are the primary implementers of educational innovations, the analysis focuses on teacher-related factors, while recognizing the influence of other actors.

**Figure 4**

*Actor-Related Issues*



**Teachers' Knowledge and Experiences**, mainly teachers' insufficient skills and competencies for innovation implementation (e.g., digital, pedagogical, teamwork, and assessment skills) is a recurring concern across studies in this review. As technology integration has expanded, limited digital proficiency emerged as a salient challenge across both developing and developed contexts, including Turkey (Sulisworo et al., 2017), United States (Jacob et al., 2016), Hong Kong (Jong, 2016), and Europe (Papadakis, 2016).

Beyond technical skills, reviewed studies also highlighted the need for pedagogical

adaptation and collaboration. For example, Corn et al. (2012) showed that in 1:1 device initiatives for students with special needs, students' experiences with the new technology was significantly impacted by the teachers' pedagogical practices, not just the new technology itself. More broadly, successful innovation implementation was consistently linked to teachers' capacity to work collaboratively with colleagues and other stakeholders (Cinganotto, 2016).

**Teachers' Values and Belief Systems**, deeply embedded in educational systems and practices (Meyer, 1980), frequently shaped their responses to innovation. Across studies reported in this review, resistance to innovation commonly stemmed from: (a) the contradiction between their values and beliefs and that underlining innovation, or (b) their perceptions and/or beliefs that underestimate the importance, effectiveness, and legitimacy of a given innovation.

The conflicts between traditional and innovative values and/or practices can be easily observed in various educational systems and countries. In many Asian education systems, the struggle is between a student-centered, autonomy-promoting, creativity-nurturing innovation versus a social backdrop that espouses hierarchy, obedience, and conformity (Curd-Christiansen & Silver, 2012; Le, 2018; Sargent, 2015). Meanwhile, in the West, the struggle is between holistic, humanistic, and critical perspectives versus a skill-oriented, performance-based approach that emphasizes a narrow set of measurable outcomes (Berkovich, 2014; Pimlott-Wilson et al., 2019; Priestley et al., 2011).

A lack of teacher buy-in further constrained implementation of innovation at the school level (Jong, 2016; Lewin et al., 2018; Paek, 2018; Sulisworo et al., 2017). For example, in Hong Kong, teachers questioned the legitimacy of Virtual Interactive Student-Oriented Learning Environment (VISOLE), a constructivist online game-based teaching, as a legitimate tool to measure learning performance of students, resulting in their reluctance to adopt this innovative measure into their teaching practices (Jong, 2016). Similarly, Lewin et al. (2018), in their study that included more than 500 teachers from 15 European countries, found that in schools where teachers and school leaders did not fully embrace digital pedagogy development as a teaching-related activity, the innovation was not prioritized for implementation.

## 5. Discussions and Implications

The current study has generated findings that highlight the roles of both environmental pressures (i.e., coercive, normative, mimetic, and resource-dependent elements) and relevant actors' worldviews (i.e., knowledge and experiences; values and belief systems) which impact innovation implementation. While these factors have been identified independently in prior research (Ensminger & Surry, 2008; Heck et al., 2001; Hu, 2002; Mooij & Smeets, 2006; Wilcox & Lawson, 2018), our study used integrative conceptual lenses to understand how these complex factors coexist and collectively shape and impact the innovation implementation process. In fact, environmental pressures influenced implementation largely through actors' sensemaking. Across studies, institutional demands and resource conditions shaped the cues teachers attended to (e.g. test requirements, workload), which then informed interpretations of the innovation's legitimacy, feasibility, and fit with professional identity. These interpretations, in turn, were associated with different implementation responses, ranging from deep integration and adaptation to compliance-oriented or symbolic adoption. Knowledge/experience and values/beliefs of teachers appeared to condition how the same external pressures were interpreted, helping explain why similar reforms produced different enactments across contexts. More specifically, the data has revealed that most environmental constraints, especially coercive, normative, and resource-dependent pressures (which account for 76 percent of total

reported environmental issues), generally come from outside of schools. These pressures include policies, regulations, guidelines (coercive), and “best practices” or “standards” (normative) and tend to be accompanied by financial incentives (resource-dependent). As the institutional isomorphism perspective explains, under these pressures, schools are often pressed to adopt similar practices (Puttick, 2017). When these elements are contradictory to the vision of the school or its innovative intentions, the implementation of innovation is predictably restricted.

This finding implies that effective implementation of innovation at the school level may go beyond their capacity, especially when a given innovation conflicts with existing regulations, standards, and resources supporting the school. Hence, although school leaders and teachers are the key change agents in implementing innovation at schools (Ertmer, 2005), merely changing the viewpoints and practices of the actors does not necessarily lead to successful diffusion of innovation. In this regard, our study echoes Karasavvidis and Kollias’ (2017) contention against the common theme in educational innovation that victimizes teachers as the primary cause of failures of educational reform or innovation (Rogers, 2003).

This finding provides another important implication for practice. Innovation implementation is a complex and non-linear process of change that involves multiple sub-processes, interactions, and mutual adaptations (Fullan, 2003). As such, school leaders and teachers, while planning and implementing innovation, should be aware of these pressures and the challenges they may cause in order to develop appropriate measures accordingly. Meanwhile, policymakers and relevant authorities who wish to facilitate schools in their innovative attempts may need to revise the existing systems to remove barriers when necessary. They can align curriculum reforms with corresponding changes in assessment and accountability systems, reducing misalignment that places schools under conflicting demands. For instance, this study has highlighted the considerable attempts to innovate the curriculum and teaching/learning methods across countries (which accounted for 93.5 percent of the total examined papers). However, without equivalent efforts dedicated to revamping testing and assessment, it would be very challenging to sustain the innovation (Jong, 2016; Priestley et al., 2011; Sargent, 2015; Zhan & So, 2017). Policymakers can also support implementation by providing time, targeted funding, and professional learning infrastructures that enable teachers and school leaders to engage meaningfully with innovation. Importantly, policy designs that allow for local adaptation, rather than rigid, one-size-fits-all mandates, may help mitigate resistance and enhance educators’ sensemaking and ownership of innovation efforts.

Having said that, we do not mean to shift the focus away from teachers. Indeed, the significance of this study is in its emphasis on both environment and actors, among whom teachers play a crucial role. As confirmed by the research findings, in making sense of a given innovation, the teachers’ worldviews (i.e., knowledge, experiences, values and beliefs) critically impacts how an innovation is implemented at schools. Nevertheless, it is important to note that sensemaking is generally regarded as a social process, not an isolated individual one. Individuals who make sense on their own are typically embedded in a broader social, professional, and organizational context where their thoughts, emotions, and behaviors are influenced by others and by the environmental structures (Coburn, 2001; 2005). In this respect, this study contributes to the theoretical understanding of implementation science pertaining to educational innovation by proposing a conceptual framework that uses the institutional isomorphism and resource dependence approaches to complement the sensemaking perspective in explaining the contextual structures in which the worldviews of school actors that shape innovation implementation are situated.

Based on this conceptual framework, this study highlights a gap in the literature. None of the research examined in the data addressed educational innovation implementation with reference to the relationship between environmental pressures and the sensemaking process of actors, despite such association being identified and confirmed elsewhere. For example, when examining teachers' various responses regarding the changing ideas of reading instruction in California from 1983 to 1999, Coburn (2004) highlighted the roles of environmental pressures that mediated the teachers' sensemaking process to influence their decision in "handling" these changes. Similarly, Bertels and Lawrance (2016), in investigating how Canadian public schools responded to the emerging emphasis on Aboriginal distinctiveness in education, confirmed that the more teachers found ways to connect new ideas and approaches with their preexisting beliefs and practices, the more likely they were to engage, incorporate, and adopt these ideas. Hence, we believe that future research could fill this gap in the literature by specifically examining the correlation between environmental factors and actors' sensemaking in shaping innovation implementation in educational settings.

Drawing on the integration of the concept of institutional isomorphism, resource dependence theory and sensemaking framework, we propose some empirically testable claims to inform future research. Firstly, implementation is more likely to endure when institutional requirements, such as policy mandates, accountability pressures, and assessment expectations align with an innovation's aims, thereby minimizing competing logics and reducing interpretive uncertainty for school stakeholders. Secondly, teachers' sensemaking, professional identities and pedagogical beliefs shape how external demands are interpreted and enacted locally, helping explain why similar reforms can produce markedly different implementation approaches across schools. Thirdly, when assessment and accountability systems remain disconnected from an innovation's goals, implementation is more likely to become compliance-driven, constraining both the depth and length of change. Finally, policy and leadership arrangements that create adaptive space (e.g. time, resources, legitimacy for local tailoring, iterative learning) are expected to strengthen implementation by enabling ongoing sensemaking and mutual adjustment. Therefore, these propositions collectively translate the study's explanatory framework into empirically examinable expectations for future studies.

Building on the integrative framework, we propose a staged model of school innovation implementation S-A-I-L-S (Signal, Align, Implement, Learn, Sustain). The model emphasizes that implementation unfolds through sequential phases, but transitions between phases are mediated by teachers' sensemaking and constrained or enabled by environmental pressures.

**Table 1**

*The S-A-I-L-S Model of Innovation Implementation in Schools*

Stage	Core purpose	Typical lead actors	Key constraints	Enablers	Outcomes
1. Signal	Define the problem and legitimacy of the innovation	Policymakers, school leaders	Coercive mandates, accountability /test pressures	Clear problem framing, legitimacy narrative, clarify non-negotiables	Shared rationale, initial change logic
2. Align	Build collective sensemaking and local fit	Teachers and school leaders	Teacher beliefs/skills gaps, weak professional	Co-design, professional learning community dialogue, align	Local implementation design, core vs. adaptable elements

			dialogue, low teacher voice	with assessment expectations	
3. Implement	Enact in practice with adaptive space	Teachers and school leaders	Workload/time, infrastructure, funding/incentives, assessment misfit	Time/resources, targeted professional development, technical support, phased rollout	First-cycle enactment, documented adaptations
4. Learn	Use feedback to refine and stabilize practice	Teachers and school leaders	Limited usable feedback, blame culture, unclear success criteria	Simple monitoring, reflection cycles, rapid iteration	Revised design, strengthened supports
5. Sustain	Institutionalize and scale	School leaders, systems/policy actors, teacher leaders	Resource withdrawal, staff turnover, norm reversion, persistent policy misalignment	Embed in routines (timetable /assessment), ongoing resourcing, teacher leadership	Institutionalized practice, scale/sustain plan

## 6. Conclusion

This systematic review contributes a refined, theoretically integrated analytic framework for K-12 innovation implementation by explicitly mapping how neo-institutional pressures and resource dependence conditions shape, and are mediated by teachers' sensemaking. Using a conceptual framework that integrated isomorphism, resource dependence, and sensemaking perspectives, this study extends the scholarship on the implementation science concerning educational innovation and suggests important implications to scale up educational innovations. The novelty of this review rests on identifying factors of educational innovations and giving a theoretically grounded explanation of how these well-documented factors function and interact during implementation. By integrating neo-institutional theory, resource dependence theory and sensemaking, the review moves beyond descriptive accounts of barriers and provides an explanatory framework that clarifies why such factors persist across reforms and contexts.

In light of the study's limitations, we would like to offer some recommendations for next research endeavors. Specifically, this study only included English-language peer-reviewed journal articles, which may introduce publication and language bias by excluding relevant studies published in other languages or in grey literature. This decision was guided by the need to ensure methodological rigor and transparency, as well as the dominance of English as the primary language of international educational research. Future research could therefore focus on gray literature and works published in other languages, including book chapters, reports, and conference papers to capture a broader range of perspectives. Another notable limitation of review studies of this type is their restricted coverage of available insights on the contextual factors. It is commonly acknowledged that social, cultural, and institutional contexts play a significant role and contribute to the successful diffusion of educational innovations (Coburn, 2001; Meyer, 1980). Therefore, an in-depth, situated analysis of contextual conditions could unpack the interplay between agency and structural elements which enable or hinder the sustainable scale-up of innovations. Future research could also conduct empirical or mixed-methods studies to examine the applicability and explanatory power of the integrative review in specific national or regional contexts. Finally, as suggested by our systematic review and explained earlier, the COVID-19 pandemic was viewed as a catalyst for the uptake of many

(technological) educational innovations (Tang, 2023). As educational systems adapt to the 'new normal,' future research can focus on the factors inspiring and influencing the implementation of initiatives that aim to foster inclusive, innovative and environmentally sustainable educational environments.

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