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The Material Regimes of Late Soviet Pedagogy: A Socio-Technical Analysis of the Overhead Projector and Slide Projector as Epistemic Actors

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This article offers a socio-technical reconstruction of everyday knowledge practices in late Soviet higher education through an in-depth analysis of two ubiquitous pedagogical technologies: the slide projector (diaprojector) and the overhead projector (kodoskop). Moving beyond traditional historiography focused on grand narratives of Soviet science, we employ an integrated Science and Technology Studies (STS) and media archaeology framework to theorize these devices as constitutive epistemic actors that actively shaped pedagogical temporality, social networks, material economies, and the very conditions of authoritative knowledge transmission. Drawing on a unique corpus of technical standards (GOST), institutional manuals, periodical literature, and evidence of user practices, we reconstruct two distinct socio-technical regimes.

Our analysis reveals a fundamental dichotomy rooted in technological genealogy. The domestically standardized *diaprojector* (GOST 4.459-86) fostered a culture of craft-based, archival knowledge production, embedding pedagogy in personal collections and informal student-lecturer collaborations. Its materiality enforced a discrete, contemplative pedagogical rhythm. Conversely, the imported *overhead projector*, standardized only in 1994 via adapted ISO norms, materialized a hybrid infrastructure of improvisation. Its optimal operation relied on a sophisticated bricolage of East-German hardware, scavenged medical X-ray film, and deficit markers — enacting an economy where technological pragmatics intersected with socialist-era informal networks. Crucially, both technologies were circumscribed by powerful cultural-semiotic boundaries: they were deemed inappropriate for the “sacred” discourse of Marxist-Leninist ideology and the elite, text-centric culture of unofficial humanities, revealing how pedagogical tools accrue symbolic meanings that regulate their deployment.

We argue that the late Soviet lecture hall constituted a key site of socio-technical heterogeneity, where global technological flows (CMEA imports), planned economy constraints, vibrant informal economies, and tacit cultural norms co-produced a distinctive epistemic regime characterized by systemic bricolage. This case study demonstrates how mundane educational technologies serve as critical analytical prisms for understanding the complex materiality of late socialism — a system sustained not only by ideology and planning but equally by everyday acts of adaptation, maintenance, and creative reassembly within materially constrained environments. Our findings contribute to broader STS debates on user agency within constrained systems, the globalization of socialist technologies, and the material cultures of pedagogical authority.

Keywords: Sociology of Science and Technology (STS); Soviet Union; Higher Education; Material Culture; Infrastructure; Media Archaeology; Technology Transfer; Bricolage; Epistemic Practice; Pedagogy; Actor-Network Theory.

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Introduction: Material Traces of an Epistemic Order — Between Grand Narratives and the Grey Zone of Practice

The Soviet pedagogical artifact as a theoretical problem

The history of Soviet science and education has predominantly been narrated through the lens of grand ideological battles, monumental achievements, and systemic structures. From the Lysenko affair to the Sputnik moment, from the organization of “Big Science” to dissident intellectual traditions, scholarship has understandably focused on what was ideologically charged, internationally visible, or politically consequential [Graham, 1993; Kremontsov, 1997; Gerovitch, 2002; Siddiqi, 2010]. This focus, however, has left largely unexplored what we term the “grey zone” of Soviet epistemic practice: the mundane, material, and infrastructural substrata of everyday knowledge production and transmission within academic institutions. How was knowledge routinely *materialized*, *circulated*, and *performed*

in the lecture halls, laboratories, and departments of the late USSR? What can the quotidian artifacts of pedagogy reveal about the operational logic of a socialist system in its mature, increasingly stagnant phase?

This article addresses this gap by turning the analytical lens toward two humble, ubiquitous, yet technologically definitive artifacts of late Soviet higher education: the slide projector (*diaprojector*) and the overhead projector (*kodoskop* or *graphoprojector*). In thousands of auditoriums from the 1970s to the early 1990s, these devices mediated the visual dimension of teaching. Yet, they have escaped serious scholarly attention, dismissed as mere neutral tools or nostalgic relics. We argue, conversely, that these projectors were active, constitutive actors in the socio-technical networks of late Soviet pedagogy. Their specific material properties, their origins and supply chains, the practices they necessitated, and the cultural meanings they accrued fundamentally shaped how knowledge was assembled, validated, and presented.

Theoretical framework: STS, media archaeology, and the “material turn”

Our analysis is grounded in an integrative theoretical framework drawing from two interrelated fields: Science and Technology Studies (STS) and media archaeology. From STS, and particularly Actor-Network Theory (ANT), we adopt the principle of symmetry and relational agency [Latour, 2005; Callon, 1986; Law, 1992]. ANT insists that agency is not a property inherent to humans alone but emerges from associations within heterogeneous networks that include humans, artifacts, texts, and institutions. A slide projector, in this view, is not an inert tool wielded by a lecturer; it is an actant that makes certain actions possible (projecting a pre-made image) and others difficult or impossible (spontaneous annotation), thereby participating in the construction of the pedagogical situation. It enrolls other actors—specific types of film, standardized mounts, darkened rooms, a certain pace of delivery — into a stable network that produces a particular form of visual authority.

Complementing this, media archaeology provides a sensitivity to the historical specificity, materiality, and temporalities of media technologies [Kittler, 1999; Ernst, 2013; Parikka, 2012]. It encourages us to examine the “deep time” of media forms and their discursive formations. The slide projector, for instance, belongs to a longer genealogy of optical projection and lantern lectures, carrying with it associations of magic, revelation, and sequenced narrative [Mannoni, 2000]. In the Soviet context, this genealogy intersected with distinct ideological and practical lineages: the agitational train’s film screenings, the push for “visual propaganda” (*nagliadnaia agitatsiia*), and the post-war techno-utopian drive to modernize education. Media archaeology helps us unpack how the material constraints of a technology — the need for a transparent positive, the fragility of glass mounts, the heat of the projection lamp — generate specific cultural practices and user literacies.

This combined framework aligns with the broader “material turn” in the social sciences and humanities, which seeks to re-center the analysis of social life on objects, infrastructures, and embodied practices [Miller, 2005; Hodder, 2012]. In studying state socialist societies, this approach has proven particularly fruitful, revealing how the material scarcities and improvisational practices of everyday life constituted a vital, often counter-intuitive, logic of the system [Verdery, 1996; Crowley, Reid, 2002; Collier, 2011]. Our study contributes to this tradition by applying a rigorous STS-materialist analysis to the specific domain of pedagogical technology.

Methodology and sources: reading standards, manuals, and practices

the empirical innovation of this study lies in its corpus and methodological triangulation. We analyze three layers of evidence as interconnected components of the socio-technical networks under examination.

1. Normative-Prescriptive Texts: State standards (GOST) are treated not as dry technical specifications but as performative scripts that sought to define, control, and idealize technological reality within the planned economy. We conduct a close discursive and structural analysis of GOST 4.459-86 for slide projectors and the belated GOST R ISO 9767-93 for overhead projectors.
2. Institutional-Pedagogical Texts: Methodological manuals from leading technical universities, such as the comprehensive 1980 guide from the Kuybyshev Aviation Institute, are read as documents that codify “best practices,” revealing both the official aspirations for technology use and, often inadvertently, the systemic problems those practices were meant to solve.
3. Critical-Reflective Texts & Evidence of Practice: Articles from pedagogical periodicals of the *perestroika* era (e. g., the 1990 article from Vladimir Polytechnic) provide a layer of practitioner critique, highlighting perceived limitations and failures. Furthermore, we incorporate well-documented, widespread user practices — the use of washed X-ray film, the craft production of slides, the refilling of markers — as recorded in memoirs, interviews, and material culture collections. These practices are understood not as deviations from a norm, but as the actualized form of the technological networks.

By juxtaposing these layers — the ideal norm (GOST), the institutional mediation (manual), and the lived practice / critique — we reconstruct the dynamic and often contradictory field of late Soviet pedagogical technology.

Argument and structure

The core argument of this article is threefold. First, the slide projector and overhead projector enacted two distinct, materially-grounded epistemic regimes within late Soviet pedagogy: one of archival, craft-based preparation and discrete presentation, and another of improvisational, real-time inscription and transparent procedure. Second, the implementation and use of these technologies were characterized by profound hybridity and bricolage, seamlessly blending elements of domestic planning, intra-socialist import, and informal, scavenging economies. Third, the deployment of these visual technologies was culturally regulated; their perceived symbolic associations rendered them illegitimate within the spheres of ideological dogma and elite humanistic performance, demonstrating the inseparability of technical function from cultural semiotics in educational settings.

The article is structured to develop this argument systematically. Section 2 offers a detailed socio-technical biography of the Soviet *diaprojector*, from its normative construction in GOST to its craft-based ecology of use. Section 3 performs a parallel analysis for the imported overhead projector, highlighting its hybrid infrastructure and the sophisticated informal economy it stimulated. Section 4 steps back to analyze the cultural-semiotic boundaries that contained these technologies, examining their exclusion from ideological and elite humanistic discourse. Finally, Section 5 synthesizes these findings to theorize the late Soviet pedagogical space as a key site of socio-technical heterogeneity and adaptive agency, offering conclusions about the material constitution of late socialist systems and methodological contributions to STS.

The Diaprojector Regime: GOST Standards, Craft Production, and the Archive of Knowledge

The totalizing script: GOST 4.459-86 as a socio-technical blueprint

The official status and imagined perfection of the Soviet slide projector are nowhere more clearly encoded than in GOST 4.459-86 [*Gosudarstvennyy komitet SSSR po standartam*, 1986]. This document, titled “System of Product Quality Indicators. Diaprojectors. Nomenclature of Indicators,” transcends mere technical specification. It is a comprehensive exercise in defining a socialist commodity within a planned economy, revealing the system’s ambition for total managerial control over both the object and its qualitative perception.

The standard’s structure is revealing. It organizes over forty key indicators into twelve groups, constructing a holistic profile of the ideal apparatus:

- Indicators of Purpose (e. g., light flux, resolution, uniformity of illumination) define its core technical function;

- Reliability Indicators (time between failures, service life) speak to durability under planned conditions;

- Economic Indicators (mass, power consumption, retail and limit prices) tie it to the material and financial calculus of the plan;

- Ergonomic Indicators (control layout, average noise level) address the human-machine interface;

- Aesthetic Indicators are perhaps most telling: “indicator of functional-constructive suitability,” “indicator of stylistic conformity,” and “indicator of thoroughness of coatings and finishing” [*GOST 4.459-86*, p. 3]. The diaprojector was to be not only functional but also stylistically coherent and well-finished — an object of designed consumption;

- Patent-Legal Indicators (“indicator of patent protection,” “indicator of patent purity”) reflect an awareness, however aspirational, of the global market and the need for export viability free of intellectual property disputes.

This GOST performs a totalizing act of socio-technical definition. It prescribes not just how the projector should work, but what it should *be* within the socialist system: a reliable, economical, ergonomic, aesthetically conscious, and legally clean product of Soviet industry. It constructs the diaprojector as a closed, perfectible system, its quality fully measurable and controllable through state standards. This normative vision, however, existed in sharp tension with the realities of the device’s ecosystem, particularly the availability of its essential fuel: the slide itself.

The missing link: the deficit of content and the rise of craft production

The GOST, significantly, has nothing to say about slides. It standardizes the apparatus for showing them but treats the content as an external given. This silence points to a fundamental systemic gap: the near-total absence of a commercial market for pre-produced, thematic slide libraries — the “dia-magazines” common in Western education. While centralized studios like “Diafilm” produced standardized slide-lectures on art, biology, or geography for school use, the specific, advanced, and rapidly updating visual needs of university lecturing could not be met by this slow, generic pipeline [*Karpov, Romanin*, 1972].

This deficit triggered the emergence of a vibrant, decentralized, craft-based micro-economy of visual content production. The slide ceased to be a mass commodity and became a

handcrafted, localized epistemic artifact. The production chain, often informal and collaborative, could involve multiple actors.

1. The Lecturer-Ideologist: Defined the intellectual content and acted as project manager.
2. The Student-Draughtsman: A student with precise draughting skills (often from engineering or architecture) would create a pristine, inked original on paper — a unique master.
3. The Student-Photographer / Technician: A photography enthusiast, often possessing their own camera (a “Zenit”) and access to or knowledge of a darkroom, would photograph the original. This stage involved technical choices: using scarce, high-quality ORWOCHROM color film from the GDR, or more affordable Soviet “Sve-ma” film; experimenting with development to achieve optimal contrast.

This process transformed the university department or faculty into a distributed, collectivized craft workshop. Knowledge was not simply transmitted but materially produced through this collaborative labor. The resulting slide, mounted in a standardized 50 x 50 mm cardboard or plastic frame, became a node in a personal pedagogical archive. Lecturers curated their own boxes of slides, which represented years of accumulated labor, intellectual development, and social capital. This archive was a form of property — often loaned, exchanged, or borrowed within trusted networks, but rarely commodified.

This systemic critique was explicitly articulated by practitioners themselves on the eve of the Soviet Union’s collapse. In a 1990 article, engineers B.A. Sokolov and V.P. Lapteva from the Vladimir Polytechnic Institute succinctly diagnosed the core flaw of standardized audiovisual media: “There exists a direct dependence of the teacher on the structure and content of a film or filmstrip <...> The teacher does not manage the information flow, but, on the contrary, the information manages him” [*Sokolov, Lapteva*, 1990, p. 95]]. This remarkable formulation captures the precise threat that the craft production of slides was designed to mitigate: the loss of the lecturer’s epistemic agency to a pre-packaged, inflexible visual narrative. The diaprojector, within its constrained regime, was a tool for reclaiming that agency, for ensuring that the visual component remained a flexible instrument of the live, authored performance rather than its master.

The materiality of projection: tempo, ritual, and epistemic authority

The material properties of the slide-and-projector ensemble enforced a specific pedagogical temporality and ritual. The dominant Soviet models (“Svetiaz,” “Alfa”) typically used manual, linear magazines holding 36 or 50 slides. Automatic changers or random-access magazines were rare luxuries. This technical fact had profound implications.

The act of projection became a manual, sequential ritual: darkness, the sound of the slide being pushed into the gate, the click of the mechanism, the beam of light, the illuminated image, the lecturer’s commentary, then darkness again for the change. This rhythm created natural pauses for cognitive digestion. It structured the lecture not as a seamless flow of information, but as a series of discrete, contemplative propositions. The lecturer physically controlled the pace, aligning it with the unfolding verbal argument. This tactile control reinforced the lecturer’s authority as the orchestrator of the visual narrative.

Furthermore, the need for a darkened room (to enhance contrast) created a distinct spatial dynamic. The lecturer often stood near the screen, pointer in hand, illuminated by the reflected light of the image, while the projector hummed at the back of the room. This split presence — voice and body near the image, the technological source elsewhere — could

create a quasi-magical effect, with the lecturer acting as interpreter of the luminous truths emanating from the machine. The technology thus participated in the theatricality of pedagogical authority.

The social network of the diaprojector: informal collaborations and embedded knowledge

The diaprojector regime fostered and relied upon a specific social network. Its central node was the lecturer-as-archivist-and-manager. To build and maintain a slide collection, a lecturer needed more than subject expertise; they needed managerial and social competences: the ability to “procure” (*dostat*) quality film, to identify and recruit skilled students, to maintain a darkroom or access to one, and to navigate the informal barter economies of slide exchange with colleagues.

This network extended into the student body, creating informal pedagogical apprenticeships. The student-draughtsman deeply internalized the schematic logic of the diagram they were drawing. The student-photographer learned applied technical chemistry and the discipline of precision. Their reward was not monetary but social and symbolic: inclusion in the lecturer’s trust network, enhanced status, and often favorable treatment in academic assessments. This system created a hidden curriculum of material-scientific literacy alongside the formal curriculum.

In summary, the Soviet diaprojector was not a simple tool for showing pictures. It was the core of a socio-technical regime that: 1) was normatively defined by a totalizing state standard; 2) compensated for content deficit through localized craft production; 3) enforced a discrete, ritualized pedagogical tempo; and 4) fostered social networks based on collaboration, trust, and the exchange of non-monetary capital. It produced a form of knowledge that was individualized, archival, and materially embedded.

The Overhead Projector Regime: Imported Pragmatics, Hybrid Infrastructure, and the Bricolage of Real-Time Knowledge

An exogenous artifact: the belated and derivative GOST R ISO 9767-93

The story of the overhead projector (*kodoskop*) in the USSR begins with its conspicuous absence from the domestic technological imagination and ends with its belated, awkward formalization. This trajectory is crystallized in GOST R ISO 9767-93, “Graphoprojectors. Methods of Measuring and Reporting Performance Characteristics” [*Gosstandart Rossii*, 1993]. The document’s preamble is unequivocal: it is “prepared on the basis of an authentic translation of ISO 9767:1990 with additional requirements reflecting the needs of the national economy.

The contrast with the 1986 diaprojector standard is stark. GOST R ISO 9767-93 is a purely metrological and technical document. It details procedures for measuring light output, illumination uniformity, image distortion, and table heating. It contains no aesthetic, economic, ergonomic, or patent indicators. It does not seek to define a socialist commodity; it provides a protocol for testing an already-existing, externally-defined artifact. Its publication in 1993 (effective July 1994) is itself a telling detail — it occurred *after* the collapse of the USSR and during a period of frantic harmonization with international norms. This standard is a post-hoc rationalization, a bureaucratic attempt to bring a ubiquitous but foreign technology under some semblance of regulatory control. It signals that the overhead projector was not a child of the Soviet planned economy but an adopted import.

The CMEA connection and the hardware of pragmatism

The primary source of these projectors was the German Democratic Republic (GDR), with the “Politlux” brand becoming a genericized name in many institutions. This was not random import but part of the structured technological exchange within the Council for Mutual Economic Assistance (CMEA or Comecon). The USSR supplied energy resources and raw materials; more industrially specialized economies like the GDR and Czechoslovakia supplied manufactured goods, including precision optical and educational equipment [Schiavone, 1981]. The overhead projector thus arrived as part of a socialist technological globalization, embodying a specific form of intra-bloc dependency.

The device’s appeal was its pragmatic immediacy. It promised what the diaprojector could not: the ability to write and draw directly in real-time, to build complex diagrams step-by-step through overlays, to project pages from books, and to correct mistakes instantly. It seemed to be the ultimate tool for dynamic, interactive lecturing. However, this promise was contingent on a suite of consumables that the Soviet system was ill-equipped to supply reliably: large-format transparency film and specialized, non-permanent markers.

The sophisticated bricolage: X-ray film, social networks, and ritual purification

The user response to this deficit was not passive resignation but the development of a remarkably sophisticated and optimized bricolage system [Lévi-Strauss, 1966]. The core innovation was the adoption of used, washed medical X-ray film as the projection medium. This choice was not a primitive fallback but a technologically informed solution. Users discovered that *unexposed* X-ray film had a blue tint that reduced contrast. Only film that had been *fully exposed and chemically developed* in the diagnostic process, and then had its emulsion layer washed off, yielded a perfectly transparent, stable polyester base (*lavsan*).

This material requirement set in motion a chain of socio-technical actions.

1. Sourcing: It created a dependency on the healthcare system’s waste stream. Lecturers or institute staff had to cultivate social networks with radiologists, lab technicians, or hospital administrators to obtain used film. This was an economy of favors (*blat*), reciprocity, and personal connections — a classic feature of the late Soviet “economy of deals” [Ledeneva, 1998].
2. Transformation: The film underwent a domestic ritual of purification. The grim medical imagery of bones and organs was scrubbed away in bathroom sinks or basins using warm water and soap. This labor transformed a biomedical record, a trace of the interior body, into a blank epistemological slate. The resulting sheet of pristine lavsan was a material metaphor for the system itself: a resilient, repurposed base ready to bear new inscriptions.
3. Inscription and Maintenance: Special overhead projector markers were often deficit goods. Practices of refilling them with ink and alcohol, and using alcohol to clean the films for reuse, were widespread. This fostered a culture of careful maintenance, repair, and resourcefulness.

This hybrid infrastructure — GDR hardware + medical waste + deficit markers + user maintenance skills — was a robust, stable network. It effectively decoupled the advanced functionality of the imported machine from the unreliable Soviet consumer goods sector, anchoring it instead in the more predictable waste flows of the state healthcare system and the resourcefulness of users.

Epistemology of the transparency: fluidity, procedure, and collective editing

The overhead projector regime fostered a distinct epistemology. Knowledge was not pre-packaged in archival slides but performatively constructed in real-time. The lecturer's hand was visible; mistakes could be wiped away; complex ideas could be built incrementally through overlays. This made the process of thinking more transparent. It was particularly suited to technical subjects — solving equations, deriving formulas, constructing schematics — where the procedure was as important as the result.

The technology lent itself to collective editing. During a seminar or problem-solving session, different participants could come up to the projector to amend or annotate the shared transparency. This created a more dialogic, less hierarchical visual space compared to the authoritative, finished image of the slide. The knowledge produced was fluid, editable, and contingent — existing fully only in the moment of its projection and the notes taken by students.

In summary, the overhead projector regime was characterized by: 1) its status as an imported artifact with belated, derivative standardization; 2) its integration into a hybrid infrastructure of CMEA hardware and locally scavenged materials; 3) its stimulation of sophisticated informal economies and social networks; and 4) its production of a fluid, procedural, and interactive form of visual knowledge. It represented a pragmatic, improvisational pole within Soviet pedagogy, complementing the archival, crafted pole of the diaprojector.

Cultural-Semiotic Boundaries: The Taboo on Visualization in Sacred and Elite Discourse

The pervasive use of projectors in scientific and technical education obscures a crucial fact: their deployment was culturally regulated and semantically circumscribed. In two significant domains of late Soviet intellectual life — ideological instruction and elite humanities — these visual technologies were largely rejected. This rejection was not based on technical inadequacy but on the symbolic meanings the technologies carried, revealing how pedagogical tools are embedded in broader economies of cultural value and authority.

The sacred word: ideological instruction and the prohibition of the profane image

Courses in Marxist-Leninist philosophy, history of the CPSU, and scientific communism formed the mandatory ideological core of all higher education. The pedagogy in these courses was paradoxically anti-visual. While diagrams of “base and superstructure” or “the dialectic” seem logically suited to slides, their use was exceedingly rare. The transmission of ideology was construed as a sacred, ritualistic performance [Bourdieu, 1991]. The lecturer served as a guardian and interpreter of canonical texts. The primary medium was the unmediated, spoken Word, occasionally supported by the chalkboard for spontaneous clarification.

To project a pre-made, fixed *image* of a doctrinal concept would have been to reify and profane it. The slide, as a material object, introduces distance, makes the concept static and open to silent, individual scrutiny. It transforms living dogma into a discrete, potentially debatable visual proposition. The chalkboard, in contrast, is ephemeral; it accompanies speech, can be changed instantly, and leaves no permanent, canonical artifact. The preferred “technology” for ideology was thus the most immaterial: the live voice, whose

authority derives from the speaker's institutional position and performative skill, and which leaves only a trace in collective memory. The overhead projector, with its casual, editable markings, was equally unsuitable, as it rendered the exposition of Truth too provisional, too mundane. In this sphere, orality was sacred; visibility was profane.

The elite text: unofficial humanities and the aesthetics of anti-illustration

A different, more nuanced resistance came from the world of elite, unofficial humanities — the semi-dissident circles of philologists, philosophers, and cultural theorists like Yuri Lotman, Sergei Averintsev, Mikhail Gasparov, and others. Their celebrated lectures were verbal-intellectual performances of the highest order. Their disdain for slide-assisted lecturing was multifaceted, rooted in both epistemic and aesthetic values.

First, it reflected a cult of textual and verbal mastery. A lecture was a unique hermeneutic event, a demonstration of the scholar's ability to think complex thoughts *in situ* through sophisticated, often ornate, speech. To rely on a slide to display a quotation or a structural schema would be an admission of intellectual or mnemonic failure — a need for a crutch. True understanding was to be conveyed through language alone, demanding intense cognitive engagement from the listener.

Second, this resistance reflected a sophisticated process of cultural selection and reinterpretation within the unofficial humanities, a process that redefined the very meaning of the avant-garde. These scholars did not reject modernism wholesale; rather, they performed a critical operation of canonical salvage and reinterpretation. Figures like Osip Mandelstam were not celebrated as radical insurgents of the early Soviet cultural project, but were re-configured as “guardians of culture” and martyrs, as last inheritors of a pre-revolutionary Christian-classical (so called Silver Age) tradition filtered through modernist form (Averintsev's readings are exemplary here). Similarly, the formalist legacy of Viktor Shklovsky and Yuri Tynyanov, and the dialogism of Mikhail Bakhtin, were detached from their original revolutionary, defamiliarizing context and absorbed into a hermeneutics of complexity and structural analysis — tools for understanding the deep, enduring structures of culture, not for exploding them. This was an avant-garde stripped of its utopian, transformative social energy and recast as a methodology for preserving cultural memory and deciphering semantic depth. In this re-reading, the avant-garde's formal innovations were valued not as weapons against tradition, but as the most refined means for its preservation and interrogation under hostile conditions.

Consequently, the visual rhetoric of the slide or overhead projector was anathema because it embodied the *other* avant-garde — the one they had explicitly rejected. It was associated with the tradition of direct action, agitation, and social engineering: the montage aesthetics of Sergei Eisenstein and Dziga Vertov, the productivist ethos of *LEF*, the poster art of *ROSTA Windows*. This was the avant-garde of immediate social effect, didactic simplification, and mass mobilization — precisely the lineage that had been successfully co-opted by the Soviet state apparatus to produce socialist realism and “visual agitation” (*nagliadnaia agitatsiia*). The projector, in its function of presenting pre-fabricated, sequential, legible images to a collective audience, was semantically linked to this tradition of pedagogical coercion and rhetorical manipulation. For scholars cultivating a “meditative” aesthetic (aligned with Andrei Tarkovsky's cinema) and a hermeneutics of slow, careful, *difficult* reading [Sandomirskaja, 2013], the projector symbolized the antithesis: a tool for engineering consensus and delivering pre-packaged meaning, antithetical to the nuanced, dialogic, and personally arduous acquisition of knowledge they valorized. The slide's fixed image and the overhead's

didactic transparency were seen as instruments of a flattened, instrumental epistemology, wholly alien to the elite humanistic project of preserving interpretive complexity against the tides of both official ideology and vulgar technocracy.

Thus, for the elite humanities, the rejection of projection technology was a marker of cultural distinction — a way to differentiate their deep, text-based, performer-centered knowledge from the instrumental, visual, and technocratic knowledge of the “official” sciences and pedagogy.

The semiotics of pedagogical technology

These prohibitions demonstrate that the adoption of educational technology is never a simple matter of functional efficiency. Technologies are semiotically charged; they carry meanings about the nature of the knowledge being transmitted, the authority of the transmitter, and the expected mode of reception [Wajcman, 2010]. In late Soviet academia, the slide projector signified technical rationality, prepared craft, and archival stability. The overhead projector signified pragmatic improvisation, procedural transparency, and collective interaction. Both, however, were perceived as illegitimate within discourses that grounded authority in transcendent verbal performance (ideology) or elite textual hermeneutics (humanities).

The material culture of the lecture hall, therefore, was a map of epistemic and cultural territories. The presence of a projector signaled that one was in the realm of science, technology, or applied knowledge — a realm where visual evidence and schematic reasoning were legitimate. Its absence signaled entry into the realms of sacred doctrine or elite cultural interpretation, where different rules of authority and communication applied.

Discussion and Conclusion:

The Late Soviet Lecture Hall as a Site of Socio-Technical Heterogeneity

The technocratic utopia: institutional manuals and the blueprint for total integration

The complex, hybrid reality of projector use, characterized by bricolage and informal economies, existed in stark tension with the official, institutional imagination of how educational technology should function. This idealized vision is perfectly encapsulated in the 1980 methodological manual from the Kuybyshev Aviation Institute, compiled by Yu.N. Maliev and V.G. Trubetskoi [Maliev, Trubetskoi, 1980]. This document serves as a remarkable artifact of late Soviet pedagogical technocracy.

The manual begins by framing the use of Technical Teaching Aids (TCO) as an organic element of the “scientific organization of the educational process,” a direct response to party directives on improving specialist training. It systematically classifies technologies, detailing their didactic functions and proper application. In its sections on static projection, it provides meticulous technical specifications for eight models of Soviet diaprojectors (“Svetiaz,” “Alfa,” “Proton,” “LÉTI-60”), complete with tables on light flux, throw distance, and screen size. It describes the ideal workflow: a lecturer, trained in a special classroom (Aud. 225), selects an apparatus based on audience size and material type, uses pre-loaded cassettes of slides, and operates it via remote control. The manual thus constructs an image of a rational, standardized, and fully managed technological environment.

This vision culminates in a detailed blueprint for a “Type 1” lecture hall — the apotheosis of Soviet pedagogical engineering. The provided floor plan (p. 30–31) depicts a room equipped with:

- two televisions and two screens for slide projection;
- a large cinema screen and a chalkboard;
- two film projectors and two slide projectors;
- a central instructor’s console with integrated control panels;
- sound columns and a radio unit.

The manual categorizes auditoriums into three classes based on their level of technological integration, with Type 1 representing the ideal of “complex application” where all modern audiovisual means are simultaneously available and centrally controlled. This blueprint is a fantasy of total pedagogical mediation and environmental control, where technology seamlessly optimizes knowledge transfer, eliminating the “unproductive expenditure of time” on manual illustration.

The profound irony, revealed by our analysis of actual practices, is that this vision of seamless integration existed alongside — and was functionally dependent upon — the very practices of bricolage it implicitly sought to eliminate. The manual’s ideal lecturer, coolly selecting from an array of perfectly maintained, standard-issue technologies, is a stark contrast to the real lecturer managing a network of students to produce slides, scavenging for X-ray film, or refilling markers with alcohol. The document, therefore, is not a description of reality but a normative script and a performance of institutional modernity. It reveals the system’s aspiration for a rational, planned, and hyper-technologized pedagogical space — an aspiration that was systematically undermined by the material deficits and social complexities the same system produced. The Kuybyshev manual thus stands as a testament to the chronic gap between the technocratic imagination of the Soviet state and the adaptive, heterogeneous materiality of its everyday execution.

Synthesizing the regimes: bricolage as a system characteristic

The cultural afterlife of these pedagogical technologies and the practices they engendered is vividly illustrated in post-Soviet popular culture, particularly in narratives of temporal displacement. Films and television series from the 2010s, such as Alexei Pimanov’s *The Sheep Dolly Was Evil and Died Early* (2015) and the series *Guests from the Past* (2020, dir. Vladimir Vinogradov, Maria Kravchenko), deploy a common narrative device: protagonists — either students or a professor — are transported between the late Soviet era and the present day. These works consistently construct a nostalgic dichotomy between pedagogical environments. The late Soviet lecture hall is romanticized as a realm of “genius poverty,” where profound knowledge is produced through pure intellectual effort, embodied by the chalkboard, the notebook, and the lecturer’s charismatic speech. The material constraints and improvisational bricolage we have detailed are either erased or reframed as virtues that fostered ingenuity and deep focus. In stark contrast, the contemporary classroom, saturated with digital screens, *PowerPoint* presentations, and the internet, is portrayed as a space of consumerist superficiality and distracted, passive learning. This nostalgic narrative performs a critical simplification and erasure. It celebrates the Soviet-era ethos of text-based, oral mastery (aligning with the taboo of the elite humanities) while completely effacing the rich, hybrid material reality of Soviet technical pedagogy — the very reality of dia- and overhead projectors, the social networks of slide production, and the grey-zone economies of X-ray film and markers. These cultural texts thus participate in crafting a purified memory of late

Soviet knowledge, one that suppresses its actual socio-technical complexity to serve a contemporary critique of digital media and a longing for imagined pedagogical authenticity.

The detailed examination of the diaprojector and overhead projector regimes allows us to synthesize a broader characterization of the late Soviet pedagogical space. It was not a monolithic, uniformly “Soviet” environment but a site of profound socio-technical heterogeneity and hybridity. Each technology enacted a different but stable network, each a form of bricolage in Claude Lévi-Strauss’s sense: the creation of order from a heterogeneous, pre-existing repertoire of elements [Lévi-Strauss, 1966].

The diaprojector network was a bricolage of *formal industry and informal craft*. It linked the formally standardized, domestically produced machine (envisioned by GOST) with an entirely informal, socially-embedded production chain for slides, relying on personal skills, student labor, and deficit materials like ORWOCHROM film.

The overhead projector network was a bricolage of *global socialist trade and local scavenging*. It linked imported CMEA hardware with the waste product of another state system (healthcare), and deficit consumer goods, held together by user practices of maintenance and social networking.

Both networks were robust and functional, but they functioned according to a logic distinct from both Western market-based systems and the Soviet Union’s own central planning ideals. They were adaptive systems, emerging from the intersection of top-down provision (or import), systemic deficits, and bottom-up user ingenuity.

Agency, infrastructure, and the “grey zone” of socialism

This analysis foregrounds the distributed agency of a wide range of actors within the constrained Soviet system. Lecturers were not just content experts but managers of micro-supply chains and curators of archives. Students participated as co-producers of pedagogical content. Technologies themselves acted, demanding specific materials and practices. This perspective challenges overly rigid models of the Soviet system as purely top-down and oppressive, revealing the spaces for creative, pragmatic action that sustained its everyday operations [Yurchak, 2005].

Our study also contributes to the theorization of infrastructure under socialism. It demonstrates that infrastructure is often not a unified, planned entity but a collage of overlapping, sometimes contradictory systems [Collier, 2011]. The pedagogical infrastructure for visual aids consisted of the official distribution system for projectors, the CMEA import channel, the healthcare system’s waste flow, and the informal networks of *blat* — all operating in tandem. The “infrastructure” was this entire assemblage, not any single part of it.

Finally, we have delineated a specific “grey zone” of Soviet epistemic practice: the domain of routine knowledge transmission in higher education. This zone was shaped by material constraints, characterized by adaptive bricolage, and regulated by unspoken cultural codes. It was neither dissident nor fully conformist; it was the pragmatic sphere where the system actually functioned on a day-to-day basis.

Methodological and theoretical contributions

This article makes several contributions to STS and related fields. Methodologically, it demonstrates the value of treating technical standards (GOST) as rich socio-technical documents and of triangulating normative, institutional, and practical sources to reconstruct

historical technological networks. It shows how seemingly mundane artifacts can serve as powerful entry points for analyzing complex social systems.

Theoretically, it extends the geography of STS by providing a detailed, non-Western case study of technology-in-use within a state socialist context. It engages with concepts of bricolage, hybridity, and user agency in a setting defined by scarcity rather than abundance. It also bridges STS with material culture studies and the history of socialism, showing how a focus on artifacts can illuminate systemic logics.

Concluding reflections: the transparency of the washed X-ray film

The cleaned, perfectly transparent sheet of *lavsan*, once a medical X-ray, ready to bear the marks of a lecturer's marker, stands as a powerful metaphor for the late Soviet condition. It represents resilience through repurposing. It symbolizes the erasure of one functional logic (diagnosis) to make way for another (pedagogy), a common survival strategy. Its transparency is hard-won, the result of domestic labor and social negotiation. And while it serves as an excellent medium for projection, it remains haunted by its material history — a faint memory of another body, another system.

The slide projector and the overhead projector, in their contrasting ways, were not merely tools for showing content. They were material condensations of the late Soviet episteme: a system that was at once standardized and informal, globalized and localized, constrained and ingeniously adaptive. By studying their concrete histories and the practices they engendered, we gain not just nostalgia for obsolete media, but a deeper understanding of the intricate, materially-grounded logic of knowledge and power in a vanishing world.

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Материальные режимы позднесоветской педагогики: социотехнический анализ графопроектора и диапроектора как эпистемических акторов

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Настоящая статья предлагает социотехническую реконструкцию повседневных практик знания в позднесоветском высшем образовании посредством углубленного анализа двух вездесущих педагогических технологий: диапроектора (слайд-проектора) и графопроектора (кодоскопа). Выходя за рамки традиционной историографии, сосредоточенной на «больших нарративах» советской науки, мы применяем интегрированную теоретическую рамку исследований науки и технологий (STS) и медиаархеологии, чтобы концептуализировать эти устройства в качестве конститутивных эпистемических акторов, которые активно формировали педагогическую темпоральность, социальные сети, материальные экономики и сами условия передачи авторитетного знания. Опираясь на уникальный корпус технических стандартов (ГОСТ), институциональных руководств, периодической литературы и свидетельств пользовательских практик, мы реконструируем два различных социотехнических режима. Проведенный анализ выявляет фундаментальную дихотомию, коренящуюся в технологической генеалогии. Отечественный стандартизированный диапроектор (ГОСТ 4.459-86) способствовал формированию культуры кустарного, архивного производства знания, укоренения педагогику в личных коллекциях и неформальном сотрудничестве студентов и преподавателей. Его материальность задавала дискретный, созерцательный педагогический ритм. Напротив, импортированный графопроектор, стандартизированный лишь в 1994 г. через адаптированные нормы ISO, материализовал гибридную инфраструктуру импровизации. Его оптимальное функционирование опиралось на изощренный бриколаж из восточногерманского оборудования, добытой по случаю медицинской рентгеновской пленки и дефицитных фломастеров — реализуя экономику, в которой технологический прагматизм пересекался с неформальными сетями социалистической эпохи. Принципиально важно, что обе технологии были ограничены мощными культурно-семиотическими границами: они считались неуместными как для «сакрального» дискурса марксистско-ленинской идеологии, так и для элитарной, текстоцентричной культуры неофициальных гуманитарных наук, что показывает, как педагогические инструменты накапливают символические значения, регулирующие их применение.

Мы утверждаем, что позднесоветская лекционная аудитория представляла собой ключевое пространство социотехнической гетерогенности, где глобальные технологические потоки (импорт из СЭВ), ограничения плановой экономики, живые неформальные экономики и негласные культурные нормы совместно производили отличительный эпистемический режим, характеризующийся системным бриколажем. Этот кейс демонстрирует, как повседневные

образовательные технологии служат критически важными аналитическими призмами для понимания сложной материальности позднего социализма — системы, поддерживавшейся не только идеологией и планированием, но в равной мере повседневными актами адаптации, обслуживания и творческой пересборки в условиях материально ограниченной среды. Наши выводы вносят вклад в более широкие дискуссии в области STS о пользовательской агентности в рамках ограничительных систем, глобализации социалистических технологий и материальных культурах педагогического авторитета.

Ключевые слова: социология науки и технологий (STS), Советский Союз, высшее образование, материальная культура, инфраструктура, медиаархеология, трансфер технологий, бриколаж, эпистемическая практика, педагогика, акторно-сетевая теория.