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Technocentrism and social fields in the Indian EdTech movement: formation, reproduction and resistance

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ABSTRACT

All over the globe, educational technology (EdTech) is being sold to schools as a central mechanism for improving access to quality learning for high poverty populations. There is a growing scholarship that interrogates the institutional drivers of the 'EdTech craze'. Building on this work, this paper examines how technocentrism as a specific strain of neoliberalism is reflected at both the organizational and institutional levels, both by private and public sectors in the case of school education in India. We argue that using institutional theory to explain complex multi-layered reforms means looking in tandem at macro principles defined through interactions in the organizational field and the re-experiencing and transformation of those processes at the micro level.

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Significance and objectives

All over the globe, educational technology (EdTech) is being sold to schools as a central mechanism for improving access to quality learning for high poverty populations. Technocentrism (Papert 1987) in a general sense has been used to describe a worldview that values technology as an inherent good for solving complex social problems. Technocentrists believe that humankind has complete control over nature. They are confident in the use of technology (and in science) to solve complex social problems in ways that are 'time efficient' and avoid public participation, particularly when the process slows down science. In education, technocentrism takes the form of complete faith in the value of technology to solve enduring problems in education including improvement of outcomes with new technologies, supportive government action and a kind of careful economic management of technologies and data. There are number of scholars who have conducted meaningful analyses of the intersection between neoliberalism, capitalism and the push for more technology in education (c.f. Picciano and Spring 2013; Selwyn 2013; Williamson 2016). Some of these authors have examined how the EdTech 'movement' has been informed and pushed by multi-national social media companies, particularly within the United States. This work is useful in informing understanding of how education is being conceived as a commodity in the education technology market, both in terms of something that schools should buy

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and as a product that contributes to cross national flow of money and resources. Following Ball (2006) among others, we see neoliberalism as constructed in and through policy (mandates, grants, sanctions, training and management of organizations, and accountability), and through the actions and activities of people running and working in these institutions and organizations. This makes it imperative to go beyond examination of more macro level dynamics in technocentrist strain of neoliberalism in education. This paper examines how technocentrism as a specific strain of neoliberalism in education is reflected at both the organizational and institutional levels, both by private and public sectors in the case of school education in India.

The paper is also an attempt to embed discussion of the value of K-12 educational technology in its broader institutional context – specifically, the taken for granted stature of neoliberal principles in education and their activation by a social field of industry, government, and not for profit organizations working inside of India on education reform. We argue that concepts from institutional theory such as social fields can help explain complex multi-layered reforms. The concepts of organizational fields and sensemaking enable looking in tandem at macro principles defined through interactions in the organizational field and the reproduction and transformation of those processes at the micro level. Thus, a related aim of the paper is to contribute to a stronger conceptual bridge between macro level theories of new institutionalism (e.g. organizational fields, isomorphism) and more micro theories such as sensemaking. There is a strong evidence that the institution of schooling imposes cognitive constraints on how individuals make sense of education reforms. There is also strong evidence that the reproduction of these cognitive constraints occurs through processes of isomorphism, where organizations look to other organizations for how things are done. Researchers in education have drawn on theories of sensemaking to understand how individual and organizational actors manage these pressures (see, e.g. Coburn 2001; Spillane, Reiser, and Reimer 2002). However, much of the work seems to draw primarily on theories of individual or to some extent, collective cognition and treat the broader institutional context as another input in this processes. With important exceptions (c.f., Krucken 2007; Ramirez, Byrkjeflot, and Pinheiro 2016), the existing work gives secondary consideration to the role of organizational fields in guiding the actions that trigger sensemaking. In this paper we argue that the macro level context is not simply a monolithic, passive construct that influences sensemaking but is part of a dynamic field. Sensemaking in this context is actively constructed in the field.

Our paper is organized as follows. We begin by introducing our case and the contexts and attributes that make it rich for analysis in the project just described. We describe the questions, conceptual frameworks, and methods that guided our work. We map the organizational field of K-12 EdTech movement in India in terms of its prominent discourses from 2009–2016, with specific attention to the role of government, not for profit and industry interactions and the values and beliefs that appeared to be privileged in these interactions, looking first at macro level dynamics before turning to the mirroring and transformation of these dynamics in the actions by a for profit company in its effort to get classroom teachers to use the software, and teachers' sensemaking around these actions. We conclude by considering the theoretical and practical implications of the work.

Bounding the case: educational technology (EdTech) field in India

A growing and significant amount of contemporary literature discusses how the educational discourse, reforms and policies have been influenced by a neoliberal imagination. We bound our case with firstly the larger context of neoliberalism that, as per Shamir (2008), is treated neither as a concrete economic doctrine nor a set of political agendas. Rather neoliberalism is somewhat loosely defined as a

> complex, often incoherent, unstable and even contradictory set of practices that are organized around a certain imagination of the 'market' as a basis for the universalization of market-based social relations, with the corresponding penetration in almost every single aspect of our lives… (3)

In education this has been associated with a certain expertise embodied by the World Bank and the International Monetary Fund that manifested in financial lending to most of the developing world (Hill and Kumar 2012; Kumar 2006; Torres 2008), as well as new types of reforms that are competitive or based on financial imperatives (Carnoy 1999). Rampant privatization (Apple 2006; Ball 2007; Burch 2009; Giroux 2002; Sadgopal 2006), globalized policy networks and hybrid organizations (Ball 2012; Nambissan and Ball 2010), increasing accountability regimes (Apple 2006; Burch 2006; Verger, Fontdevila, and Zacajo 2016), impact on teacher education (Batra 2011), and particularly in developing countries, the rise of low-fee private schools (Nambissan 2010; Srivastava 2007, 2013) have been some other forms in which the manifestations of neoliberal imagination in the education sector have been documented.

With the rise of the accountability regimes worldwide, the idea that measuring quality education and learning is a central dimension of improving social outcomes for underserved children has become globalized. This movement manifest globally as 'Global Learning Metrics' (as articulated by UNICEF) as well as nationally (Kumar 2006), has occurred in tandem with fast paced developments in educational hardware and software and the claims associated with them. Digital instruction – using computers, netbooks, or handheld devices – has been seen as a 'silver bullet' to the problems of education and is rapidly spreading in classrooms and supplemental areas of instruction. Not only do EdTech interventions facilitate learning measurement but promise additional benefits like high quality, personalized learning. Big money is in play: One estimate values the global school market for education software and digital content at nearly $252 billion by 2020 (Market Watch 2016). At all levels from primary to tertiary education, governments are making huge investments in digital education with proponents often touting digital tools as a way to close achievement gaps and improve learning opportunities for economically and academically disadvantaged students.

India is a rich country context for examining the rise of the educational technology movement. Asia, and particularly India, is emerging as the world's EdTech laboratory (Maurer 2015). Despite the paucity of rigorous research on the impact of technology based interventions and its implications for equity, the K-12 space in India has seen a surge in EdTech investments in the last few years (University of Pennsylvania 2016). EdTech is being considered and adopted by the central and state governments to improve elementary education by potentially solving systemic issues like reach, equity, and quality (GoI 2016a, 2013; NCERT 2006). Persisting challenges of extremely low student learning levels (ASER 2015, 2016), teacher shortage (Myers 2015) and lack of teacher motivation (Batra 2005; Ramachandran

2005) creates further interest in the promise of EdTech and specifically blended learning programs, that combine teaching instruction with one-to-one learning using technology.

The ascendance of education technology is being fueled by actions of a new national administration with a clear agenda to use technology to encourage more public private partnerships. In this context, venture capital firms and foundations are providing enormous amounts of money to EdTech start-ups, which in turn are designing new products and services that align to the government's agenda of disrupting the existing Indian education system. NGOs, and global foundations such as the Michael and Susan Dell Foundation are highly active players in the Indian education reform movement, using market oriented philanthropic work (e.g. impact investing) to increase supply and demand in the EdTech space.

As Scott and Davis (2007) discuss, the concept of organizational field 'isolates for analysis a system of organizations operating in the same realm as defined by both relational linkages and shared cultural rules and meaning systems' (118). Thus the EdTech field in India has multiple players and actors who participate, shape and contribute to both the discourse and activities of the field. From an organizational perspective, first and foremost these include the *consumers* / purchasers i.e. schools that may be public or private and participate in EdTech activities through various implementations. Second, the field includes businesses investing in the EdTech market in various forms. The investments may be for direct profit-making purposes through Venture Capital, private equity etc. or developmental purposes through Corporate Social Responsibility (CSR), dedicated foundations, philanthropic organizations. Despite their stated purpose the primary role of these businesses is around the economic activities in the field. They decide where investments should be made or which intervention is worth funding. Some of the large players in this segment include local trusts and foundations for instance, Tata Trusts, Azim Premji Foundation, EkStep foundation and international businesses and their foundations, for instance Michael and Susan Dell Foundation (MSDF). Together these organizations have funded large scale EdTech projects through the country. For instance, Tata Trusts in collaboration with MIT has started Connected Learning Initiative (CLIX) covering 1000 schools in four states. MSDF heavily invested in Haryana Quality Improvement Program, a statewide reform in government schools that introduced technology-led curriculum in Science and Maths. EkStep is piloting a technology based literacy and numeracy program for an upcoming implementation at scale. There is also a recent MoU between Bridge Academy and the government of Andhra Pradesh for pre-primary and primary education. Some of these organizations (Central Square Foundation, for instance) also get involved in policy networks and reforms. Thus, these organizations may be seen as *providers* in educational field but may also have overlapping *intermediary* roles.

Independent non-government organizations whether for-profit or not for-profit form the third significant group in the field. These groups act as *providers* (or sometimes *intermediaries* again), primarily bringing in the technical expertise through ground level interventions to the field but in some cases pooling or bearing risks in the field. There are a number of these organizations throughout the country funded largely by the organizations of the previous groups or in some cases consumers or the governments directly. These organizations include existing NGOs and for-profit start-ups that provide a range of services from curriculum development, online content, virtual tutors to skill based assessments. The multilateral organizations such as UNICEF, the World Bank etc. in the field are also present to an extent. Acting as *intermediaries*, these contribute significantly to the field discourse around values of different educational rights and reforms, for instance, the learning outcomes. Finally,

the *governance structures* and policy context in the field represents the government actors. These are critical as they both create the structures for activities by different actors as well as respond to some of the discourses in the field.

As documented by others (Ball 2016; Nambissan and Ball 2010) in different contexts, the multiple actors in the field are networked in complex ways and influence the activities of the field. While we acknowledge their networked presence, our key focus in this paper is to understand the values and beliefs of the field and their movement through various levels. Thus what we aim to do in this paper is map this EdTech field, not in terms of its connections, but in terms of its 'discourses'. We ask, what are the various organizational actors in the field talking about? What values and assumptions undergird these discourses? How do these discursive constructions traverse the path from the overall field to individual teachers implementing EdTech? After mapping these discourses, in order to trace these discursive constructions between macro and micro in EdTech space, we use the case of an EdTech intervention that strategically samples the field. We choose an intervention that represents the coming together of various organizational forms identified in the field – a large business providing funding, a for-profit organization providing technical expertise, key government policies that help us understand how organizations leverage this context and government schools where the implementation materializes with all its underlying logics.

The intervention covered 21 schools (18 government run) in Gujarat, India with over 12,000 students. Started in 2011, and funded by corporate social responsibility (CSR) division of a large Indian corporation, the program includes language and math enrichment through a computer based adaptive learning program developed by a private for-profit company. Each school was equipped with a computer lab (35–40 computers) that ran the learning software. The learning software can be described as a computer program that tries to teach a particular subject or topic by determining the current level and/or specific difficulties of an individual student, adjusting the pace of the instruction to optimally suit the individual student, altering the learning path based on suitability to a particular student, and measuring student learning outcomes through the process. The intervention had three components– (1) students' exposure to software content on Maths and Gujarati language, (2) teacher support in terms of monthly training or visits by employees of the corporation hired to provide technical assistance (or technical partners) and (3) yearly assessment of student learning outcomes.

Research design

We examined the EdTech activity in India at three levels: field level through various discourses, organizational level, and individual teacher levels through the activities of partnering organizations and teachers participating in the intervention under consideration. Analyzing through these levels we trace the underlying values that the field and the implementation represent. Within these levels, we intentionally sample activities across three sectors: government, industry, and non-government organizations, based on the premise that all three kinds of organizational forms were involved centrally in the space, albeit playing different, even though overlapping, roles (e.g. consumers, producers, regulators).

Mapping field level institutional context

This strand of research traced the organizing templates for action in the national and (select) state level policies, in policies and practices of philanthropic organizations working in the EdTech space, and industry level activity. To trace this, we use Foucault's (1972) idea of discourses that not only refer to formal linguistic aspects, but to institutionalized patterns of knowledge that operate by the connection of knowledge and power. Discourse refers to 'the way in which language, or, more broadly, bodies of knowledge… define the terrain and consequently complicate attempts at change' (Bacchi 1999, 40). It is about what can be said and who can speak, when, and with what authority (Ball 1990). Thus, knowledge at this level is inextricably linked with power. This was done through three main data sources – (1) educational and other relevant policy documents available in public domain, (2) marketing and financial information of actors involved in the EdTech field such as venture capitalists, equity firms, foundations and EdTech start-ups, and (3) Interviews with key members (n = 19) from the typology of organizations identified earlier. Researchers point to how the use of assumptive concepts in policy framing may limit a policy's effectiveness and actually re-inscribe the very problem the policy seeks to alleviate (Bacchi 1999). We thus analyzed the national policy documents including National Curriculum Framework (NCERT 2005), key documents published post 1990 – World Conference on Education For All by Ministry of Human Resource Development (GoI 1992, 1993), as well as the current discourse and developments around the 'New Education Policy' under discussion by the current government (GoI 2015a, 2016a), Companies Bill (GoI 2012), and the Digital India campaign (GoI 2015b).

Financial and marketing activities of venture capitalist (VC) firms, education startups and non-government organizations that are instrumental in the current discourse and advocacy were obtained largely through secondary research and contacting organizations directly in some cases. We examined marketing and available financial documents for the large EdTech companies operating in India at the time of the study. This included BYJUs, FlexClass, GreyCampus, Simplilearn, UPGrad, Udacity, Udemy, and Embibe. The research involved tracking the activities of players in the market by analyzing social media on key actors, along with following their internet activity. We also mapped some of the links between the EdTech companies and their investors through agencies such as VCEdge and VCCircle. This also included social media and internet profiles of investors such as Sequoia Capital, Helion Venture Partners, Learn Capital, Kalaari Capital and Investors Capital Partners. Additionally, we looked at the materials of international and domestic philanthropic organizations working in the EdTech space such as the Michael and Susan Dell Foundation, Chan Zuckerberg Initiative, and others.

The key organizations identified through this secondary research informed the sample for interviews. These are the members who pretty much define the boundaries and the logics of the field by 'the ways in which arguments are structured and objects and subjects are constituted in language' (Bacchi 1999, 40, 41). We interviewed a total of nineteen people from foundations and philanthropies funding EdTech projects, and heads of key Ed-Tech start-ups in India. The interviews (approximately 60 min each) conducted in 2016–2017 as part of the continuing fieldwork for the project constitute an important data point in the critical analysis of EdTech field.

Analyzing organizational level institutional contexts

At the organizational level, we studied the two participating organizations involved in the EdTech intervention under consideration. One of them was the CSR wing of a large business in India (referred to as the CSR partner) and the other a for-profit organization involved in development and implementation of the EdTech solution (referred to as the technical partner, hereafter). The CSR partner's policy was analyzed for its aims as well as mission and scope of the activity. In order to understand the particular history and motivations behind this intervention, four interviews (approx. 60 min. each) were conducted with the CSR partner team. These included the CSR head as well as three project coordinators.

The technical partner organizational context was studied through observations, interviews and document analysis. The history of the software under consideration was understood by analyzing documents shared by the technical partner. Documents such as the Memorandum of Agreement signed between the CSR partner and the technical partner was analyzed to understand the conditions of agreement. Three people from the software development team were interviewed to better understand the product's ideation and development. Further, we interviewed the head of the intervention project to understand the implementation strategies and the technical partners' ongoing involvement with the project. The three lab coordinators employed by the technical partner for the purpose of this implementation were also interviewed in order to inform the field work with day-to-day implementation conditions and challenges.

To follow field level and organizational level dynamics into more micro processes of implementation, we drew on qualitative research that integrated analysis of student and teacher usage, the data generated from within the software with an in-depth, comprehensive examination of the intervention – teacher practice in different program models and settings, the nature and quality of instruction provided, and program administration – in and across three districts within Gujarat, a state in West India. The study uses a purposive sampling linked to the research questions in order to understand how teachers made sense of the EdTech intervention. We intentionally chose a mature implementation in its fourth year of implementation that had already overcome initial implementation challenges. Teachers' sample ($n = 14$) was based on the teacher usage of software as collected through the software data, feedback from the technical partner and initial observations. This was critical given our research question that aimed to study the values transmitted through the EdTech implementation. This is also based on the assumption that a certain engagement with EdTech is essential for teachers to make sense of it.

The qualitative data that we collected in this study over the school year 2016–2017 include (1) observations of classrooms sessions ($n = 25$, each 45 min) using a semi-structured classroom observation instrument designed to capture key features of instructional settings; (2) interviews with provider administrators ($n = 4$) about the structure of instructional programs, choice of curricula and assessments, challenges in implementation, and choices in staffing; (3) interviews with teaching staff ($n = 14$, of over 22 h) about instructional formats, curriculum, adaptations for special student needs, and staff professional background and training; (4) interviews with site administrators ($n = 4$) involved in program implementation, (5) interviews with program managers/policy influencers in the Indian Edtech space ($n = 19$). The documents analyzed include formal curriculum materials from providers; diagnostic, formative, or final assessments used; and policy documents.

Data was translated,[1] archived, logged and analyzed via software designed for qualitative studies. Our analysis of the data, which was ongoing and iterative, was organized around a case study approach (Merriam 1988). Observations, documentary analysis and in-depth interviews were organized by attribute and theme using advanced qualitative software (NVivo). We used a constant comparative method to develop and refine themes and patterns in the data, looking for convergence and divergence in the values and expectations around the purpose and implementation of education technology in our case.

Conceptual framework

New institutionalism in education

New institutional analyses have figured prominently in discussions of the 'qualitative break' between program goals and practice in education. Much of this work has leveraged institutionalists' concept of loose coupling. In the late 1970s and 1980s, institutional analyses of organizations tended to be built around Parson (1960) ideas about the inevitability of loose coupling between the technical and institutional levels of management in organizations. Parson's idea was that actions taken to align organizations with social norms and values came into conflict with technical activities designed to foster goal attainment. Schools in the US were pointed to as a prime example of loose coupling (Meyer and Rowan 2009; Weick 1976). Operating in a societal sector characterized by fragmentation, multi-layered and pluralistic governance, schools in the United States were seen as striving to conform to different potentially inconsistent rules and regulations in order to gain societal support. But implementation to these norms was thought impossible since it would produce conflict and uncertainty in classrooms.[2]

Then and now, one common criticism of new institutional theory within and outside of education is its' perceived failure to give actors on the ground any agency (DiMaggio and Powell 1983). Norms descend on people and they are helpless in the face of them. A second criticism has been institutional theory's lack of attention to power asymmetries and relationships embedded in institutions and organizations. Scott et al. (2000), Haveman and Rao (1997) and Thornton and Ocasio (1999) among others, launched work that considered organizational agency, specifically how interactions across organizations helped shape operating principles at the industry level, for example in health care. This work helped create a conceptual bridge between the macro, structural perspectives and more micro process approaches by exploring how broader institutional norms (industry wide, sector wide) were encoded in inter-organizational behavior.

Building on this work, we seek to help contribute to frameworks that embed processes of sensemaking in education within broader institutional contexts, and specifically dynamic organizational fields. Organizational fields are part of the institutional context that informs sensemaking, imposing cognitive constraints on individual actors such that content of sensemaking mirrors content of the institution. Following Weick (1995) we view sensemaking as embodying the following properties: identity construction, retrospective of experiences, enactive of sensible environments, social, ongoing and extracted by cues, driven by plausibility rather than accuracy. In Weick's original formulation, individual and organizational actors make sense *with* institutions not outside and despite them. Organizational fields are settings where much of that work happens. An organizational field is the cultural space

where different kinds of organizations co-exist and interact around a kind of shared enterprise, such as online learning for K-12 youth. In organizational fields, cognitive cultural constraints, are encoded and transformed into structures, actions and roles.

Extending this work, and following Weber and Glynn (2006), we argue that individual organizations act as carriers of broader institutional norms. They give form to the both relational linkages and shared cultural rule and meaning systems that make up organizational fields. Organizations operating at multiple levels of the field (e.g. national and regional) mobilize 'ideas or resources' from the broader organizational environment into structures that guide and control organizational behavior. The translation of institutional context into organizational structures is not predetermined. In their social interactions, organizations and the individuals within them can decouple practices from established routines, either by adapting them or resisting them outright. Drawing on multi-leveled (field-level, organizational level, individual level), we next examine the formation, reproduction and resistance of institutional elements in the educational technology space in India.

Technocentric models of school improvement in education technology

As discussed earlier, educational reform both in India and globally is being discussed within and shaped by a neoliberal framework. Education reforms within a neoliberal framework conceptualize teaching and learning as part of market exchange, where education, becomes commodified like any other good or service. From this perspective, quality in education derives when consumers (parents and students) get to choose schooling within a marketplace and producers (institutions and organizations) are afforded maximum degrees of freedom in determining price, design, access, and supply.

Through these dynamics, under certain conditions, neoliberalism can become taken for granted. This makes it imperative to understand whether and how neoliberalism attaches itself or is coopted to expanding education markets, of which education technology is one. The market for education technology globally depends on claims of neoliberalism to justify use of public resources for more technology. Some of these claims, for example, that education technology improves student outcomes, has been challenged by empirical research (c.f. Burch, Heinrich, and Good 2016). Neoliberalism nevertheless is used to explain away suboptimal or inefficient use of resources. This takes the form of arguments such as, 'technology was not ready', 'administrators were not willing or capable to use the technology' and the like. The remainder of the paper seeks to explore how education technology is conceptualized and discussed within a geographically and temporally bounded social field. Specifically, we explore how values of technocentrism tended to dominate the discourse around education reform in India. After exploring the manifestation of technocentrism at the field level, the paper attempts to explore linkages between broader discourse of technocentrism and actions and responses of specific organizations and individuals operating within this discourse. In the following section, the paper identifies three inter-related assumptions: (1) Privileging of Data, Information and Evidence, (2) Technology as a Central Component of Governance (3) Centrality of Technology in Teachers' Work.

Privileging of data, information and evidence

> The Michael & Susan Dell Foundation today announced it has made an equity investment of INR 6 crores ($899,000 USD) in ConveGenius (CG). The investment cements the Michael & Susan Dell Foundation's commitment to expanding its mandate to improve the lives of children living in urban poverty by not only supporting education initiatives in large-scale, school-system transformation but also in outcome-oriented, technology-driven, education innovations. For CG, the investment is expected to further empower its own agenda of taking engaging, impactful education to millions of children by 2020 and nearly 90,000 children by the end of 2016 alone. – Press Release (MSDF 2016)

In the Indian EdTech field, data, information and evidence are central tools. And a central activity is the production of information. There has been an increasing focus on measurement and tracking of learning outcomes in Indian school education in the last few years. At multiple levels, large-scale assessments of student learning outcomes i.e. measurement of subject wise competencies that students have achieved after schooling, is becoming increasingly common. Significant amounts of money are being spent on both national and statewide learning achievement surveys and randomized controlled trials to measure and track absolute levels of, improvements in and impacts of various interventions on student learning outcomes. Several actors involved in Indian education, including non-government organizations like Pratham (ASER 2016), Educational Initiatives (2010), Centre for Civil Society (n.d.), and philanthropic organizations like Michael and Susan Dell Foundation quoted above, Central Square Foundation (2013) have been strongly advocating for the formal inclusion of student learning outcomes as part of various public education reforms that have traditionally focused on providing more inputs such as aids, infrastructure, etc. Philanthropic foundations and multilateral agencies are continuously funding and measuring the impact of their investments in terms of student learning outcomes.

In interviews, criticisms were expressed about the lack of accountability at the government level and the value of learning outcomes in solving that problem.

> The problem with government and the problem in schooling is lack of accountability. Government has invested in raising teacher salaries but it hasn't looked at the issue of teacher quality. Teachers lack the information on how to improve. Student data at the school unit is key to accountability. We can't do anything right without outcome data

was the argument of one not for profit director, echoed across interviews. From this perspective, the problem of learning could be solved by

> putting data in the hands of consumers, so they can make decisions about their futures, whether its preparing for tests, or figuring out what jobs are open to them. The big problem we need to solve is lack of information – good information,

said another leader of an NGO focusing on EdTech.

The influence by various non-government policy actors, coupled with the surge in low-fee private schools across the country (Srivastava 2013), and widely publicized reports – such as National Achievement Survey (NAS) and Annual Status of Education Report (ASER) locally and recently, PISA internationally – highlighting extremely poor student learning outcomes in India – has put national and state governments under immense pressure to make government schools 'perform' better. This has been visible in India's 12th Five-Year Plan as it noted, 'the four main priorities for education policy have been access, equity, quality and governance. The Twelfth Plan will continue to prioritize these four areas, but

will place the greatest emphasis on improving learning outcomes at all levels' (GoI 2013, 49). Official documents, including the aide-memoires of the SSA Joint Review Missions and recommended quality frameworks,[3] show ever increasing government attention and commitment to driving learning achievements (see e.g. Sarva Shiksha Abhiyan n.d.). In a similar vein, the state of Gujarat, in implementing the Right to Education Act, 2009, introduced a significant weightage to learning outcomes for the recognition of existing private schools (GoI 2012). Even after the recent dissolution of Planning Commission in India by the current administration, the focus on learning outcomes is maintained and strengthened. In his 2017 Budget speech, the Finance Minister, Arun Jaitley said the government has 'proposed to introduce a system of measuring annual learning outcomes in schools' (Business Standard 2017). The Centre recently amended the Right of Children to Free and Compulsory Education Act, 2009 and mandated tracking of learning outcomes by all states (The Indian Express 2017a). The National Achievement Survey or NAS, which is being held since 2001, has been tweaked by the National Council of Educational Research and Training (NCERT) to now test a student's competency instead of her knowledge of the school curriculum (The Indian Express 2017b). The decision of 'better' education is thus directly linked to better learning outcomes. Not only do learning outcomes become the end to which all the means should lead but also legitimize any technology that help measure the outcomes directly or indirectly.

Technology as central component of governance

> On the policy front, India is awaiting the release of a draft proposal for a New Education Policy by the Ministry of Human Resources Development (MHRD). As a result, there is interest in understanding how the goal of making 'India a knowledge superpower by equipping its students with the necessary skills and knowledge and eliminating the shortage of manpower in science, technology, academics and industry' is intended to be achieved. The consultative processes undertaken by the MHRD during 2015 had structured inputs on two new themes viz. Promotion of Information and Communication Technology (ICT) systems in school for adult education, new knowledge, pedagogies and varied approaches for teaching of math, science and technology in schools to improve learning outcomes. The manner in which the MHRD delivers on these two themes will be of particular interest to the small yet emerging community of educationists in the country. It is expected that the new policy provisions will commit to leveraging technological affordances for enhancing classroom processes, strengthening the role of the teacher, and creating digital pathways of learning. (Mehendale 2016).

The field that privileges information, data and evidence views technology as a central tool for sharing of information, based on perceived efficiency and its ability to generate large amounts of data. In this view, technology becomes the solution for all education problems. The central role of government becomes making calculated policy choices based on technology. We noted the focus on learning outcomes appearing significantly on the national agenda. Concomitantly, the investments in education technology have also significantly increased since 2014 (Karnik 2016).

Particularly in the last two years, the Bharatiya Janata Party (BJP) led government has started various flagship programs to enable these changes. The new initiatives have been positioned as a 'complete change of the Government's mindset – a shift from issuing authority to a business partner, in keeping with Prime Minister's tenet of "Minimum Government, Maximum Governance"'(GoI n.d.a). For instance, the Digital India Initiative, launched by

Government of India in July 2015, has a vision to 'transform India into a digitally empowered society and knowledge economy' (GoI 2015b), through creation of digital infrastructure for service delivery as well as digital literacy. Similarly, 'Make in India' imagines the country to be a global design and manufacturing hub. Policies announced under Make in India so far show the government as investor friendly, attracting huge FDIs (Foreign Direct Investments) and encouraging entrepreneurship (GoI n.d.b). Declared in the 2016 national budget, start-ups enjoy 100% tax exemption for the first three years on profits (GoI 2016b).

Among these initiatives, the current government is also in the process of formulating a new education policy (NEP). In 2015, the Ministry of Human Resource and Development (MHRD) created a multi-stakeholder task force and initiated a series of consultations on pre-decided themes. Both learning outcomes and promotion of ICT (Information and Communication Technology) appeared as significant themes in school education (GoI 2015a). Submitted in September, 2016, a committee report for inputs to draft policy calls for a need to accelerate efforts to use ICT for fostering 'quality education' and a 'well-coordinated strategy' to propel wide scale use of technology across all levels and domains of learning (GoI 2016a). Usage of technology is articulated across a range of educational activities such as teacher education curricula and trainings, maintenance of student and administrative records, monitoring teacher and student attendance as well as performance evaluation, management reporting systems, MOOCs for secondary and higher education, and development of different software/ mobile apps by teachers and students to suit local needs (GoI 2016a).

In interviews, technology was uniformly framed as the solution to the problem of 'government accountability'. Commented a senior staff member of a large education philanthropy, 'we see our role as changing public perceptions of technology and using it to build capacity. In working with government, we aim to unlock government money to help teachers access better technology'. The grievances articulated by for-profit and not for profit managers about government were mostly about the need for more technology and more funds to be designated for the use of technology. 'The problem that can be addressed through technology is accountability', concluded one chief executive. Without technology, things would remain unchanged. With it, the problems of educational inequality could be effectively addressed. 'Teachers in government schools are capable, not accountable. Good data can help with that.'

To summarize so far, EdTech field in India is being driven by cross section of actors, including government, philanthropies and industry. The services and products, including learning metric software, being sold to schools derive neither solely from the market nor exclusively from the government fiat. Instead, the pressures emerge from interaction of governmental, industry and not for profit actors. These actors exchange financial and other resources. However, in their interactions, they also create order and meaning in the field. Central to current activity in the EdTech field is a focus on the inherent value of data and the potential for technology to assume more importance in all manner of policy decisions.

Centrality of technology in teachers' work

> Technology has a huge potential to disrupt the education space in all three categories: (i) student's preparation (ii) educator's effectiveness and (iii) administration's efficiency. Personalised tools help students learn and progress at their pace. Such tools, when integrated with the

> classroom, allow teachers to track the learning data of each child and provide individual intervention. (Dhawan and Dalmia 2016)
>
> Personalised learning using adaptive tools and allowing teachers to differentiate instruction to meet varying student interests is the best way to think of the classroom of the future. (Khan and Dhawan 2015)
>
> Companies are getting serious about assessing learning outcomes for anything that attempts to make technology a complementary learning platform. Seasoned founders like Harish Iyer of Flinnt.com are converting this dream into reality. Also, startups like Urros Education are working on creating direct impact on learning outcomes, processes and learning experience for children, and on introducing the essence of skills in secondary education assessment. The chain of engagement is nearing completion with skill assessment-based career path management being already done by a platform called Gradopedia. (Kapal 2017).

Underlying the field's faith in technology is a technocentric model – where individual teachers are expected to use data to order educational priorities and design interventions for high poverty communities. The Michael and Susan Dell Foundation see data as part of a larger necessary 'data revolution' where 'business models that leverage technology for applying data and analytics to improve learner outcomes' play a 'huge role'. Start-up such as Convenginus are identified as leaders in this revolution in developing technology that 'can be used to artificially remodel the teaching of concepts in a classroom and constantly adapt to a child's individual requirements'. The company's product uses data and machine intelligence to provide personalized help to students. Ashish Dhawan of Central Square Foundation, insists that technology can be a big disrupter for teacher effectiveness in terms of allowing them measure learning outcomes and provide individualized attention using technology.

Along with foundations, venture capital firms are investing in products and services aimed at moving the complex work of teaching online. The list included VC firms such as Helion Venture Partners, $605 million dollar firm whose portfolio included Simplilearn and Toppr. The firm invested 10 million dollars into the online test preparation platform Toppr. It also includes Lightbox, based in Mumbai India, a $100 million VC firm investing in Embibe. Non India based VC companies active in the EdTech space also jumped into the Indian market including Learn Capital, investing in EdTech platforms sold in international markets such as EdModo Udemy, Classdojo and Bloomboard.

The EdTech services and platforms produced by start-ups are diverse in many ways. The portfolios target different regions of the country. The technological tools are for use at different grade levels (early education to college) and have different objectives in terms of their place/and role in the classroom. Some are designed for primary use in the classroom to supplant the teacher, while others are supplementary for use after school, as part of broader enrichment strategy (for example, for use alongside of regular curriculum, in conjunction with the teacher). They also are designed for use on different platforms, handhelds, tablets, phones, desktop computers.

Despite these differences, the wide range of EdTech tools now on the Indian education market share a common orientation towards how work in the classroom is to be organized. Several of the new EdTech solutions in the market are silent on the role of teachers. Promotion materials and podcasts characterize the existing system as anachronistic in what and how it teaches children. Improvements in the system center on teachers' and managers' access to data. By this logic, the work of teaching primarily involves accessing data generated online by students' usage of software, which can help teachers see student's course completion or at times improve their own instruction based on the data. Couched in the

language of 'fun' and 'personalized', quality of teaching is defined in direct relationship to digitally based marketplaces that offer students access to a digital library of courses, where students are expected to master new skills by accessing self-paced on demand courses.

These principles seem to reflect a kind of hyper rational, technocentric view of teaching in the emphasis on data, maximizing the exchange of data through technology and reducing teaching to a calculated set of choices based on analysis of individual student preferences. These norms were manifest in the policies established by government, in the products and services placed on the market by start-ups, which were funded by venture capitalists, and in the statements and priorities of advocacy networks and philanthropic organizations.

Similarly, in interviews, respondents identified one of the key solutions to improving teaching as redefining teachers work with respect to technology. From this perspective, improving teaching and outcomes involved getting the right devices into the hands of teachers 'The tablets give teachers access to good content and scripted curriculum.', 'India does not have an infrastructure problem. You just need to make sure that technology can be delivered on lots of different kinds of devices, not a laptop necessarily in a school, but a very simple smartphone.' From this perspective, teaching was viewed primarily a data driven process, focused mainly on technology as the medium for instruction. Reflecting a technocentric view, technology was framed as an inherent good. 'Technology brings the power of good content to the masses,' one for profit manager exclaimed excitedly. 'Most of my generation are visual learners. Technology provides students with the means to master a concept in the least possible time, it is the most efficient way'.

The proponents of this approach to learning claim to be able to help teachers and schools in India more efficiently tailor curriculum and pedagogy to the needs of diverse learners, including the very poor. A continuous theme runs through the policies of new government, advertising materials of start-ups and the foundations that fund them: Technical and policy efficiency has become synonymous with technological efficiency, framed in the language of equity and excellence (universal access to high quality learning). In the next section, we follow the technocentric into the actual work of implementation of EdTech software.

Tracing technocentric logics at organizational and individual level

> It is possible that a student still does not understand subtraction while the teacher may have moved on to division in the class. Our software lets a student be at his/ her own level of learning. While a teacher cannot handle multiple levels within the class, this innovation is possible through technology. The current setting [with automatic topic selection] will help teachers to figure out which students are really lagging behind. (Member, Technical Partner)

To understand what is happening, we have to look not only at mobilities and interactions within the organizational field, but also at the activities of organizations and sensemaking by individuals within that field. To do so, we analyze the work of a technical partner operating within the organizational field and patterns in teachers' responses to the partner, as a means of examining how principles manifested and applied as standards of legitimate practice at the field level were working at the organizational level.

As discussed earlier, the intervention we study was funded by the CSR[4] wing of a large business. The CSR partner provided all the resources for implementation. Each school was furnished with a computer lab with 35–40 computers shared by the students. A technical partner was hired for the purpose of implementation. Education features as one of the main

components in the CSR policy document for this organization. Within education, some of the key areas needing 'enhancement' include 'contribution to technology incubators' in academic institutions. Facilitation of 'knowledge and innovation' in educational agencies appears as another priority area. While describing the key aims of this intervention the CSR head of the organization mentioned that 'technology can do miracles for poor students'. He described the intervention as a 'cutting-edge, technology solution for the most pressing problems faced by these government schools… problems such as low exposure to the outside world, and teacher readiness'.

The technical partner designed and owned the software and software generated data. The technical partner was also responsible for full scale implementation in the schools, including the software installations, initial as well as ongoing teacher and student trainings on how to use the software, ongoing teacher support as a way of capacity building as well as designing, conducting and reporting on year-on-year student assessments. The technical partner had first developed a version of the EdTech software under consideration in the year 2009. In its early years the software, presented as an 'adaptive-learning program', was sold to private schools primarily in English medium only. Later a vernacular version was developed especially for this intervention with the government schools. In framing the problem currently faced by the Indian education system the head of the technical partner poses a simple question: 'Why is it that as a society, we are able to make better mobiles (phones) every three months, but are unable to significantly improve how our children learn in decades?'. The easy comparison of mobile phones with education system in a country presents fundamentally the technocentric imagination underlying the mission of this organization. The software product in this context is a full-scale 'solution' to various problems at once, 'changes in government schools at infrastructural level, short supply of teachers, and nascent research environment' among other things. Comparison of classrooms with or without the software are made in terms of the number of questions a student would attempt – on an average 1000 per year in a regular class vs. 3000 in a class assisted with the software.

The five-year memorandum of understanding (MoU) signed between the CSR partner and the technical partner stated the aim of the intervention to obtain 'visible and measurable improvement in students' for grades 3 to 8 measured through year-on-year learning outcomes assessment. Clear targets were set for each year and a part of technical partner's fee was dependent on meeting these targets. The technical partner also assigned three lab coordinators for the intervention, who were responsible for addressing ongoing technical issues like those related to computer hardware, software, or the internet. They also acted as the interface between the technical partner and the schools. Monthly trainings for teachers were provided by 'subject experts' from the technical partner. Within each school, one of the teachers was assigned as a school coordinator by the technical partner. School coordinators were chosen on their initiative and comfort with computers. They were supposed to be the first go to point for all the teachers in the school. Apart from lab and school coordinators, the CSR partner had also assigned coordinators (CSR coordinators, hereafter) who would visit schools for both support and monitoring.

Software and expected teacher's role

Conceptualized and designed by the technical partner, the software aimed to provide an 'adaptive learning' experience to its students. Both mathematics and language parts

comprised of units of various topics, as prescribed by the state curriculum. Each topic had a series of finely graded questions (largely multiple choice) arranged by difficulty level. The software algorithm allowed students to move from easier to more difficult questions and the next topics, if students gave correct answers. At the same time if a student was answering questions incorrectly, easier questions were asked, and previous topics were repeated. Thus, in principle, each student would create her own sequence of questions answered through a thirty-minute session. Students would resume their sessions where they left. The design of the software aimed to make students work at their own pace and level, thus creating an individualized learning experience irrespective of the grades they were in. Technically, a grade 3 student could be doing grade 8 content on the software if she displayed competence in topics (by answering the questions correctly) or vice versa if she did not display competence.

The software had high graphical content with ample images and audio-visuals. Hosted on the internet and accessed through a browser, it required a high-speed internet connection to access the software. However, due to internet issues in a few schools, an offline version of the software was made available. The data dump from the offline version was uploaded every day to the server by the lab coordinator in order to ensure student sessions and data were saved and could be accessed later.

The technical partner saw teacher's role as an 'important' part of the implementation. Despite this, the regular classroom teaching time was reduced for each teacher as 2 out 5 assigned periods in a week were assigned as computer lab periods. During this time teachers were supposed to assist students with any doubts and/ or technical glitches. Additionally, teachers were expected to access and analyze the software generated data/ report in order to further improve classroom instruction. Software generated data could be accessed from the teacher interface. This interface gave teachers access to reports aggregated at several levels. These included: (1) comparison charts that showed overall performance of all classes[5] in the school; (2) overall performance reports with each student's name, number of questions attempted, number of questions attempted correctly, time spent on the software, and percentage correct answers; (3) for the selected grade-section topic wise performance reports – with the same metrics as in report # 2; (4) common wrong answers reports that compiled top 10 questions answered incorrectly by maximum number of students; and (5) individual student trail reports in which a teacher could see the entire trail of questions, a student attempted and time spent on each question. Each teacher had access to report #1. Reports #2 through 5 were accessible to teachers for their own class only.

ac, both the design of the software as well as the intervention MoU mirrors the idea that learning outcomes are central to educational process. The data generated through the software is expected make teaching and learning reliable.

Rewards and accountability structures tied to software data

In its fourth year of implementation, during our fieldwork, we noted several practices within and among the intervention schools that tied student/ teachers' involvement with the EdTech intervention to certain rewards. These included monthly rewards distributed in the student assembly for individual students as well as the entire grade-section for achieving highest software usage and highest accuracy. The responsibility of picking students for rewards (at the time of field work) was assigned to teachers who were also the school coordinators. Similarly, teachers from all schools under the intervention were also rewarded

by the CSR and technical partners. While student rewards were tightly coupled to software generated data, the teacher rewards were based on more qualitative indicators such as their feedback from subject trainers (from the technical partner) in addition to their time spent on the software. When asked about the origins of these practices, teachers and coordinators pointed towards two main sources. One from the technical partner, who wanted to encourage software usage in the implementation. The other from the individual initiatives of a particular teacher who, a strong believer in technology, took a leadership role in his school with respect to this intervention.

Within the schools, monthly teacher usage reports were also created using a single metric of time spent on the software through individual teacher logins. Every month, these were printed and displayed on the school notice boards. In some schools, teachers were made to sign next to their name in front of the school principal as an accountability measure. Teachers mentioned that the generation of reports through the software was initiated by the technical partner. However, once again the same teacher who took a leadership role in creating student reports came up with the idea of making teachers sign these reports. The members from technical confirmed this, and added that they were very happy to see a teacher take such initiatives and with the help of nudges from lab coordinators (who were appointed by the technical partners), 'strongly encouraged' such practices in all schools.

Teachers in the sample made sense of rewards and accountability practices, arguably introduced in the process of EdTech implementation, differently from one another. For instance, as described above, some teachers initiated or quickly bought into the ideas. Some felt that these practices acted as 'motivators' for both students and themselves. On the other hand, most others felt the pressure these rewards and accountability practices created. In one school, competition between the teachers and classes to outperform one another for rewards had reached, in a teacher's words, 'unhealthy levels'. She explained:

> It has become a competition in our school – as to which class, and therefore the class teacher, has shown most usage and high accuracy. It is good in a way, but sometimes there are problems, especially if computers don't work in a particular class. Sometimes a class leaves the computer room later than the scheduled time… There is a lot of competition in the school for every minute of student usage. Sometimes we fight for our time on Saturdays. (Laughs). (Teacher D)

Some teachers felt compelled to login to their accounts for the sake of showing some usage. In one school, several teachers had shared their logins with the student monitors who logged into the teachers' accounts, counting towards teachers' usage of data, after they were done with their own session. They would check the comparison report as to which class is doing best and where does their class stand. Some of them also made notes for the teachers from other reports.

The practices of acknowledged competition also showed up in who took the responsibility (and therefore the credit) for a class's good performance. Since the intervention covered Math and Language subjects, initially (in the first years of implementation), subject teachers for each class had the responsibility of students' work in the lab. When students worked on the language content on computers, their language subject teacher accompanied them. However, as the technical partner and subsequently the schools, started rewarding teachers, and there was competition for time spent in the lab, according to a teacher, 'some teachers started giving preference to their own classes,[6] wherever possible'. In other words, a language teacher gave preference (in terms of time and assistance) to the section for which s/he was the class teacher as opposed to others. This led the Principal in one school make

class teachers instead of subject teachers responsible for the lab sessions, even though it meant that sometimes the class teachers were not able to help with a difficult problem that students encountered, since that was not their area of expertise. Thus, we see how school and the principal, as an important context for teachers, provide situated cognition conditions indicating that situation or context is not simply a backdrop for the implementing agent's sensemaking but a constituting element in that process (Spillane, Reiser, and Reimer 2002).

Teaching as rational decision-making?

The software design, as discussed in previous sections, was aimed to be 'adaptive', personalized for each student, allowing them to work at their own pace. The software philosophy was that of making students work at their own levels irrespective of which grade level they were in or what the teacher was teaching at the moment. As one of the team members of the technical partner involved in the design of the software described,

> We need to pitch learning content at the level of the student, by providing them intelligent but limited choice, such that student can learn on his own… thus moving from a teacher-led delivery model to a learner-led experience of education. This is so hard for a teacher to do… individualize content and let students work at their own pace or learning level in a class of 30 or more children. (Member, Technical Partner)

The software's conception of teaching was inherent in the logic of its design. Each question asked to a student was a result of an output generated from the software algorithm with inputs taken from students' prior data. With each correct answer students were rewarded with questions of higher difficulty level, which in turn was determined by student data for that question. As explained by the designers of the software:

> 'The software is designed by utilizing 12 years of data on student learning. This was driven from… assessing the learning levels of lakhs [100,000s] of students annually across private and government schools… Following the assessments, student interviews were conducted on important misconceptions that came out which enabled to understand why students were thinking in a particular way. Through workshops and diagnostic 'Teacher Sheets' this feedback was shared with teachers. This rich educational data provided the foundation to create a product that demonstrated measurable learning improvement.'

Similarly, the conception of teaching was also manifest in the way the intervention was conceived. Teachers were expected to reduce their teaching time with the introduction of the intervention. They neither had a say in the content, flow or design of the software nor on the data or reports generated. Instead, their role had changed to making better teaching decisions using standardized software generated data for students.

This new conception of teaching however was not how teachers perceived their own role. Most teachers struggled with making sense of their own role given the growing use of EdTech. While they acknowledged and appreciated some of the ways in which EdTech had been useful, they were not willing to let go of traditional ideas about teaching. When asked about their own role given the software's capability to make students learn, teachers quickly explained '…but we have to do the real teaching'. They believed that there is no teaching without first explaining concepts in person; an activity that involved gauging visually if students are getting the concepts or not, repeating, if required, asking questions in between, and making sure that students are in fact paying attention and not looking out of the window. Most of them felt that the software was a great 'practice' tool for students

that could scaffold their learning in an interactive way. They also added that questions on the software were interesting and challenging, something that would take up a lot of their own time if they were to make them.

This confusion about their own role was also apparent in how teachers perceived their workload post the EdTech implementation. While some felt that their role had significantly increased as they now had to keep-up with the software content, data and clarify student doubts in different ways. Others saw the software's ability to keep students engaged as a way to have somewhat 'lighter' load during lab sessions.

Teachers' sensemaking of their own role was further complicated by an inherent contradiction in the implementation. While the software conceived learning to be adaptive and self-paced, the nature of rewards and assessments put in place by the implementation was fairly normative. Students were rewarded for faster pace (highest software usage) and accuracy. Even though the content and assessment built into the software was specific to student level (determined by the software), the year-on-year assessments (on which program improvement was measured) were based on the grade appropriate tests for all students. Students working at their level were somehow expected to catch-up to the normative standards of grade appropriate content.

In this light, the software did attempt to track the levels of students every 90 days or so through the built-in content. The reports from this were never disseminated or discussed with teachers. This data was not accessible to the teachers and as a result most teachers were not even aware of this. Almost all teachers in the sample had taken the normative nature of grades more seriously and responded to these contradictions by de-emphasizing personalization and orienting their activities toward managing their classrooms in a way that ensured student progress as defined by the reward structures. Since there were clearer incentives attached to student progress, teachers focused on practices that directly helped them achieve the rewards and made them more competitive. For instance, during lab sessions, in order to increase the overall class usage of software as well as accuracy, teachers sometimes assisted students with the correct answers directly instead of going through the long process of explaining a concept. Ironically, some of them felt that they could explain the concept back in the classroom instead and 'save lab time', defeating the important purpose of personalized learning at students' level of learning. Teachers also assigned student monitors in the lab, who could help other students move on quickly with their responses, as they might get stuck on a question. From the lab observations, none of the student monitors was actually helping a fellow student in understanding a problem. Most of them instead told the students who needed help to click on what the monitors thought was the right answer, or asked them to simply pick any answer option and move on.

Thus, the software's promise of individualized learning experience to the students was essentially reduced to a set of standardized choices to be made either by the student themselves or teachers. The logic of the decision to be made was in turn tied directly to the reward and accountability structures that reflected the student outcomes as the intended end. Most teachers internalized this logic, by routinizing the practices delineated above, however there were exceptions to this. Select teachers' resistance to the accountability and expected standardized norms was particularly visible when they felt that these structures are not really useful. For instance, a teacher felt uncomfortable in signing her software usage numbers in front of the school principal as she felt these numbers did not reflect much. She articulated this frustration as:

> It is important for the principal to know how a teacher teaches or what is going on in the class. But looking at software usage numbers only does not really tell much. I could be logged in, looking at student reports, but may not do much after that. I don't want login for the sake of increasing my [usage] numbers.

Teachers were constrained by as well as co-created the EdTech field

Seeing the micro picture, particularly through the work of teachers in the Indian EdTech field, we argue that teachers did not simply mirror the macro logics. While on the one hand the macro structure did limit their autonomy to some extent, teachers also exercised agency and actively participated in creating meaning and use of EdTech in their day-to-day work.

While framed as an intervention that could empower teachers, in practice, teachers had little control over how the software was used in their classrooms. When the intervention started in 2011, the teachers could control which topics (e.g. division or fractions) to activate in the software. The idea was to use the computer lab time as practice time for topics covered by teachers in the class. Every class-section had five to six math periods per week, out of which two were dedicated to the software. Teachers would activate two to three topics at a time to accommodate the various pace of students attempting questions on the software. Usually teachers would activate a topic as soon as they started teaching that in the class. This gave the some of the 'faster students' an opportunity to practice questions as soon as possible. However, in the third year of its implementation this feature of the software was revoked by the technical partner. Instead the topics were arranged in a sequence as per the state-recommended textbooks. When asked, a member from the technical partner stated that controlling which topics to activate was actually undermining the most innovative feature of the software – its self-adaptive nature. However, most teachers in the sample did not fully understand why the topic-activation feature was discontinued. Automatic topic selection also meant that students who were attempting questions much faster than others could move on to topics that were not yet introduced by teachers in the class. Similarly, teachers could now see questions (attempted correctly or incorrectly by students) on a range of topics some of which they hadn't even taught.

Despite such constraints, most teachers welcomed the presence of functional computers with the internet access in their schools. Over the years many of them had learnt to search for 'interesting videos and images' for their classes. Some of them also referred to the online resources to clarify their own doubts. One teacher went ahead assigned a small science project to her students where they were supposed to look up information over the internet and report back in the class. When asked about the 'project', she felt students in her class should learn how to do google search and be able to make sense of the information presented. While similar instances were noted for some other teachers in terms of using the internet, how they used the software was fairly structured and pre-defined. As discussed in the previous section, teachers' sensemaking of their own role was contradictory to the one imagined by the software or the technical partner. Teachers resisted the idea that their role is that of making the right choices or decisions in the educational process. Instead they asserted that they need to do the 'real teaching', subordinating the presence of technology in their classrooms.

Teachers' resistance to the EdTech implementation was also apparent in low overall usage of the software generated data. While according to the technical partner software data was

Table 1. Software data usage by teachers in academic year 2015–2016.

Academic year: 2015–2016		
	All teachers	Sampled teachers
Number of teachers (*n*)	200	14
Total time accessing student data by all teachers in 2015–2016 (T) in minutes	16804.1	5610.3
Average Time spent per teacher per month =T/($n \times 8$*) in minutes	10.5	50.1

*Based on 8 months usage in the school year.

central to how teaching should take place, this view was not shared by the teachers. As shown in Table 1, only a few teachers across the implementation actually accessed software generated data. Overall low usage of software data by teachers however must be seen in the context of little to none time allocated for them to access this data.

Conclusion

In *A Brief History of Neoliberalism*, Harvey (2005) points towards the hegemony of neoliberalism as a mode of discourse. He observes its 'pervasive effects on ways of thought to the point where it has become incorporated into the common-sense way many of us interpret, live in and understand the world' (3). This discourse around neoliberalism allows for a vast array of research work in different geographic regions and subject areas to be contained within the same analytical frame. At the same time, generalized use of neoliberalism as a shorthand to signal contemporary political-economic context is also problematic. As noted by some others (see, e.g. Gershon 2011) this paper argues that the over generalized framework of neoliberalism could subsume local meanings and categories.

Paying close attention to the particularities of EdTech field in India, we show the contextualized case of EdTech in India at different levels. Our analysis shows that neoliberalism is a contextual ideology that requires up close analysis of the social spaces in which it operates. We learn that rather than descending as is from macro to micro, neoliberalism works itself into school structures through dynamics and interactions of actors at the level of the field, involving industry, government, and non-government organizations.

Field level discourses around K-12 EdTech in India reflected an ethos of technocentrism and hyper rationality in which the complex, multi-layered problem of teaching in high poverty settings is reduced to problem of buying into the right technology and creating structures that standardize and routinize teachers' use of this technology. Privileging largely quantitative data and information, including the focus on learning outcomes in this ethos is at one level an apparently technical issue, but it has serious ontological implications in the sense that what cannot be measured ends up not existing in analytical terms. This not only makes certain forms of information more valuable than others but also facilitates supposedly better justifications and ways of investments by the private capital, the government or their partnerships. Our analysis suggests that this ethos was also manifest in the intentions and actions of a for profit company working with schools to implement its proprietary learning software. The imagination of the software as a potential solution to the historical problems of government schools in India, the largely objective type (multiple choice) questions in the software, negligible involvement of teachers in software design, and expectation of software data usage from teachers, embodies the technocentric values at its core. The data further suggests that the broader national and societal level market

logics of competition, rational decision-making and consumer choice were reproduced in the company's implementation of education software and in teachers' experiences with the software to some extent. However, while teachers' experiences were constrained by and to that extent mirrored this ethos, there were also some differences in the way teachers made sense of EdTech and routinized their practices around EdTech.

Further, we show broad parallels in the internalization of market technocentric approaches at the field level and organizational/ individual level around the principles of data/ information, technology and standardized model of decision-making. However, these parallels drawn between the policy, discourse, economic activities of the field, and the internal workings of an organization or individual sensemaking are neither seamless nor exact replicas. The actors at multiple levels rebuild and reorganize principles of neoliberalism in various ways. Based on the context, actors at times morph principles or make their own meanings to manage pressures and contradictions in the implementation. In this process, the actors co-create the overall field and its logics. This paper shows the dynamics of reproduction and reorganization at the site under investigation. Several school practices like that of rewards and competition mirrored the logics of foregrounding data and accountability in schooling. At the same time, teachers chose not to make software data central to their day-to-day work.

At a theoretical level, this paper seeks to draw attention to the value and importance of understanding the relationships between organizational fields and institutional sensemaking, in order to better understand the evolution of the EdTech market in India. Where prior application of new institutional theory in education studies has focused largely on either the macro phenomenon such as isomorphism or the concept of micro, individual sensemaking, this paper demonstrates the need to see these otherwise disparate strands of research – macro and micro – together. In this effort, we have built both on the work of policy researchers in education using the concept of market logics, as well as the work of organizational sociologists working with concepts of organizational fields to explain market behavior. In this context, we show how the processes of sensemaking, is not something that happens 'at the bottom of the chain' in individual level dynamics. The field dynamics and sense-making mutually constitutive of case of neoliberal ideology in the field of education technology.

From an institutional theory perspective, we argue for increasing theoretical 'bandwidth' with regards to research in education policy. In a political climate where the boundaries between public policy and private action are blurred, we need conceptual tools that give us more purchase for examining organizational dynamics, above and beyond individual level sensemaking. Organizational fields help redirect some attention away from individual sense-maker (micro level processes) and towards the meso level processes that shape agenda setting in the policy process. One reason for this, as Ball (2016) has shown, in India and other contexts, is that increasingly the 'action' in education policy space involves several actors (government, for profit and not for profit) whose influence is in shaping the policy discourse and agenda setting process. In this paper, we analyzed this through examining the EdTech field. As the field is identified and mapped we also note the overlapping roles of the actors in the field, particularly businesses and the non-government organizations who might act as both providers and intermediaries.

Notes

1. Data from interviews and observations was collected in Gujarati and/ or Hindi and was translated into English.
2. The paragraph is excerpted from Spillane and Burch (2006, 88).
3. http://ssa.nic.in/ssa-framework/quality-issues-in-elementary-education
4. As per the Companies Bill (2013) in India, all companies of a certain size are mandated to spend 2% of their three-year average annual profit towards corporate social responsibility (CSR).
5. Each grade-section was considered an individual *class*, since different teachers could be teaching different sections for the same grade. For instance, School 2 had three classes in grade 5: 5A, 5B, 5C.
6. Every class-section in the school has a class teacher assigned. As per the Gujarat state government rules, for grades 1 through 5 the class teachers teach all the subjects. However, for grades 6 and above, subject teachers teach different subjects and one of them is also the class teacher.

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