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Joining Forces: The Promotion of Public-Private Partnerships to Bring Computers into West German Schools in the 1980s

Abstract: This chapter focuses on the dynamics and conflicts of interest that have emerged in the process of involving new actors in education policymaking to prepare West German schools for the digital age. In the 1980s, the federal government of West Germany saw the involvement of the private sector as a way to reduce the financial burden on the state in equipping schools with computers. Moreover, it considered the establishment of a public-private partnership under its auspices as a means to strengthen centralized state power within Germany's federal system in order to reduce regional disparities and differences in the efforts to integrate computers into schools. An intermediary actor in the form of the support association "Computers and Education" was brought into play to mediate between the interests of the private and the public sector. However, the association's efforts to reconcile the different vested interests of the involved parties in its mission to kickstart and boost the introduction of computers into public education eventually failed.

Keywords: West Germany; public-private partnership; computer industry; computer education; intermediary actors

The history of how computers entered the classroom is not just about innovative ideas, curricular reforms, and the use of new technologies in teaching and learning. First, it is a history of how tangible objects entered the classroom, that were to be used by teachers and pupils, the hardware that had to be advertised, selected, bought, paid for, installed, and put into use in schools. Such a history allows us, for example, to focus on how the process of equipping schools with computers enabled private actors to become involved in setting the stage for the introduction of com-

puter education into schools. New constellations of actors from education policy, science, and the private sector emerged, each with different interests, demands and ideas. In particular, "intermediary" actors such as support associations, private foundations, and lobby groups increasingly gained influence on education policy programs,[1] for example by providing "expert knowledge" in education policy discourse or by financing and coordinating activities.[2]

In the mid-1980s, a joint effort by the private sector and the public school system was advocated as the allegedly only viable solution to address the financial challenge of equipping German schools with computers and train teachers for their use in the classroom within a short time. On the one hand, this meant that the state openly acknowledged that it could no longer fulfil its task of financing the equipment of schools on its own and had to rely on the private sector to provide the needed material, personnel, and technical support to introduce computers into public schools. On the other hand, it gave manufacturers of hard- and software, as well as commercial providers of computer training privileged access to the promising market of public education to establish potentially long-term sales relationships. In the early 1980s, most federal states and a large majority of schools in West Germany had no consolidated concepts for computer instruction in

1 Stephen J. Ball, *Education plc: Understanding private sector participation in public sector education* (Oxford: Routledge, 2007); Ben Williamson et al., "Education recoded: policy mobilities in the international 'learning to code' agenda," *Journal of Education Policy* 34, no. 5 (2019): 705–725, https://doi.org/10.1080/02680939.2018.1476735; Ben Williamson, "Mediating Education Policy: Making Up the 'Anti-Politics' of Third-Sector Participation in Public Education," *British Journal of Educational Studies* 62, no. 1 (2014): 37–55, https://doi.org/10.1080/00071005.2013.857386; Ben Williamson, "New power networks in educational technology," *Learning, Media and Technology* 44, no. 4 (2019): 395–398, https://doi.org/10.1080/17439884.2019.1672724; Ben Williamson, "Meta-edtech," *Learning, Media and Technology* 46, no. 1 (2021): 1–5, https://doi.org/10.1080/17439884.2021.1876089. On the case of Germany, see Martina Schmerr, "Sponsoring an allgemeinbildenden Schulen – Erfahrungen, Probleme, Handlungsmöglichkeiten," in *Die verkaufte Bildung*, ed. Ingrid Lohmann and Rainer Rilling (Opladen: Leske + Budrich, 2002), 189–206; Annina Förschler, "Das ,Who is who?' der deutschen Bildungs-Digitalisierungsagenda. Eine kritische Politiknetzwerk-Analyse," *Pädagogische Korrespondenz* 58, no. 2 (2018): 31–52, https://doi.org/10.25656/01:21106; Sigrid Hartong and Annina Förschler, "The rising power of business interests through intermediary policy networking: insights into the 'digital agenda' in German schooling," *Working Paper* (2020), https://doi.org/10.13140/RG.2.2.27433.62568.
2 Marcelo Parreira do Amaral, "Neue Akteure der Governance des Bildungssystems – Typen, Einflussmöglichkeiten und Instrumente," in *Handbuch Neue Steuerung im Schulsystem*, ed. Herbert Altrichter and Katharina Maag Merki (Wiesbaden: Springer, 2016), 469.

schools.[3] Thus, as this chapter will demonstrate, this early phase of experimentation opened up a possibility for the computer industry to gain influence over pedagogical practice and the organization of teaching and learning with and about computers, by advertising and selling their products to schools, and by working in cooperation with the Ministers of Education and Cultural Affairs of the federal states. As a result, conflicts flared up in the 1980s over the role of private-sector actors while introducing computer instruction into German schools. An intermediary actor in the form of the support association "Computers and Education" was thus brought into play to mediate between the interests of public education policymakers and school administrators on the one hand, and the computer industry on the other.

This chapter is based on an analysis of historical documents from the German federal archive about the government initiative "Computers and Education" launched in March 1984 and the association of the same name founded shortly thereafter by private actors. From the perspective of the federal ministry of education, the chapter explores to what extent the establishment of public-private partnerships for equipping German schools with computers in the mid-1980s resulted in a shift of competencies and power struggles in public schooling with regard to how computer education was organized and implemented. In what follows, it will be shown that the federal government not only saw the involvement of the private sector as a means of reducing the financial burden on the state in equipping schools with computers, but also considered the establishment of a public-private partnership under its auspices as a possible means of strengthening centralized state power within Germany's federal system in order to reduce regional disparities and differences in the various strategies for integrating computer technology into schools. The case study on West Germany contributes to a better understanding of the dynamics and conflicts of interest that have emerged in the process of involving new actors in education policymaking to prepare schools for the digital age.

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3 Among the first was the federal state of Baden-Württemberg. On 14 March 1984, a concept for "New media and modern technologies in school" was presented, which included the introduction of basic informatics and computer education into upper secondary schools (Ministerium für Kultus und Sport Baden-Württemberg, "Computer- und Informatikunterricht in den Fächern Mathematik und Technik ab Klasse 9," *Kultus und Unterricht Baden-Württemberg* 33, no. 9 [1984]: N 101–N 103).

"Don't Sleep through the Computer Revolution": The Debate on Computers in the Classroom

The development and use of microelectronics in the second half of the 20th century were seen as a means of rationalization, and thus to improve the productivity and competitiveness of businesses and the economy at large.[4] In West Germany, the dominant discourse reflected the fear that if the German economy failed to catch up with this global spread of technology, its already threatened position as a global player and an export nation would deteriorate even further. This seemed especially apparent in comparison with the leading industries of the USA and Japan which had benefitted from massive state support in the research and development of new information technology.[5] Computers had been introduced on a small scale into West German companies already in the 1950s to rationalize and partially automate economic production. The following two decades saw rapid development of data processing technologies and the establishment of a national computer industry, with substantial financial support from the federal government to modernize the German economy by introducing computer systems.[6] At the same time, technological advances enabled the production of smaller and cheaper computers, which in turn led to the emergence of a growing market for affordable personal and home computers in the late 1970s and early 1980s.[7]

The increasing prevalence of computers in society and the economy triggered a broad, general debate on education in the age of computers, which was underpinned by a sense of urgency and pressure to act. Euphoric advocates of computer education elevated the use of computers to the rank of an indispensable cultural technique that children and young people needed to acquire just like reading, writ-

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4 Bundesrat, *Informationstechnik. Konzeption der Bundesregierung zur Förderung der Entwicklung der Mikroelektronik, der Informations- und Kommunikationstechniken* (Drucksache 291/84) (Bonn, 1984), 4–6.

5 Bundesregierung, *Bericht der Bundesregierung zur Förderung von Forschung und Entwicklung auf den Gebieten Datenverarbeitung, Informationstechniken* (Drucksache 9/1556) (Bonn, 1982); U. Thomas, "Technologie, Politik und Innovation," in *Mikroelektronik Information Gesellschaft. Informationstechnik und Datenverarbeitung*, ed. Heinrich Niemann, Dieter Seitzer, and Hans Wilhelm Schüßler (Berlin and Heidelberg: Springer, 1983), 188–189; Bundesrat, *Informationstechnik*, 3.

6 Annette Schuhmann, "Der Traum vom perfekten Unternehmen. Die Computerisierung der Arbeitswelt in der Bundesrepublik Deutschland (1950er- bis 1980er-Jahre)," *Zeithistorische Forschungen/Studies in Contemporary History* 9, no. 2 (2012): 231–256, https://doi.org/10.14765/zzf.dok-1596.

7 Thomas Haigh and Paul E. Ceruzzi, *A New History of Modern Computing* (Cambridge, MA: MIT Press, 2021), 191–192.

ing and arithmetic.[8] Thus, the need to familiarize the younger generation with new technologies in schools was emphasized: "Only a generation who cannot just make use of this new technology, but truly 'understands' it, will be able to use the positive opportunities of microelectronics without prejudice for the benefit of all of us".[9] Pupils ought not to only learn how to use computers for their later professional life, but also to understand its implications in a wider social context. Following the premise of "learning by doing", pupils were also meant to learn how to use computers to solve problems by practically learning with and working on computers. However, attempts to realize this idea were doomed to failure in most schools during the early 1980s due to the lack of computer hardware. While many public schools in Germany did not offer any computer education at all, others had to resort to "frontal teaching about computers, with the help of blackboard and chalk, at best loosened up by the use of school television films and then perhaps followed by a 'gala performance' by the computer specialist on the one and only computer owned by the school".[10]

One argument of why computer education needed to be taught in schools often recurred: competition. According to the proponents of computer education in schools, computer skills promised to be a great advantage in the competition of individuals for career opportunities. And on a macro level, the German economy would require a large pool of computer literate, skilled workers to remain competitive in the global market. This rationale reminded Jochen Schweitzer, board member of the German Education Union (GEW), of the Sputnik-shock in 1957, and the fear of falling behind other countries in terms of the skills and qualifications of the workforce. He criticized the German obsession with competition – the "ideology of always having to be a little bit better than the others", while failing to reflect upon the social and pedagogical implications of computerizing education.[11] While some opposed the idea of computers in schools altogether, others were displeased by the way this endeavour was approached. Opponents and sceptics like Schweitzer criticized that computers were being rushed into schools under the discursive pressures of economic competitiveness and with reference to the alleged needs of an emerging "information society" – at the expense of a thought-through pedagogical approach to bringing computers into schools. At the heart of their criticism was the concern over the growing influence of the computer industry over German

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8 Jürgen Danyel, "Zeitgeschichte der Informationsgesellschaft," *Zeithistorische Forschungen/Studies in Contemporary History* 9, no. 2 (2012): 198, https://doi.org/10.14765/zzf.dok-1598.

9 Udo Ulbricht, "Verschlafen die Schulen die Mikrochip-Revolution?," *Die höhere Schule*, no. 2 (1984): 63.

10 Ulbricht, "Verschlafen die Schulen die Mikrochip-Revolution?," 64.

11 Peter Körfgen, "Hart am Rande der Sprachlosigkeit," *Erziehung & Wissenschaft*, no. 6 (1984): 25.

schools. Once schools were equipped with a certain brand of computer systems, they would be unlikely to change the provider again any time soon.[12] Moreover, they feared a lack of possibilities for democratic participation and control once the computer industry had taken control over the educational market. As a result, students would be put at the mercy of corporate profit and sales interests. If the task of equipping schools with computers was left to private businesses and companies, they would possibly privilege certain regions or types of schools, while others were left out.[13]

Despite such debates and concerns about the specific ways in which computers should be introduced into schools, a broad consensus was forming in the early 1980s that schools needed to respond to the new reality of an increasingly computerized society by providing all children with a basic computer education. However, both the necessary computer equipment and the qualification of teachers for the implementation of computer education in schools required substantial costs. Moreover, this task came at an unfavourable time. Following a long period of economic growth, West Germany had entered a phase of stagnation in the 1970s and 1980s, accompanied by inflation and rising unemployment. In response to chronic deficits in the federal budget and mounting public debt, a fiscal regime of austerity was established.[14] In face of the tight financial situation of the West German state sector in the 1980s, the task of equipping all public schools with computers seemed almost impossible to accomplish within a reasonable time. In line with the promotion of neo-liberal policies under chancellor Helmut Kohl, great faith was put in the forces of the free market and partnerships between the public and the private sector to address the pending challenges.[15] As representatives of businesses and industry in particular had publicly called for the rapid introduction of school-based computer education, there was an increasing expectation on the part of educators and educational authorities that the private sector would also contribute to meeting this challenge: "If [our industry] wants to be taken seriously with its lamentations about the computer illiteracy of most German citizens and the increasing hostility towards technology, even among parts of the young generation, it must make a financial and/or material contribution to ensure that our

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12 Jochen Schweitzer, "Absatzmarkt Schule. Bildungsbürokratie und Wirtschaft Hand in Hand," *Erziehung & Wissenschaft*, no. 5 (1984): 22.

13 Schweitzer, "Absatzmarkt Schule," 22.

14 Wolfgang Streeck and Daniel Mertens, "Politik im Defizit: Austerität als fiskalpolitisches Regime," *dms – der moderne staat – Zeitschrift für Public Policy, Recht und Management*, no. 1 (2010): 7–29, https://doi.org/10.3224/dms.v3i1.01.

15 Detlef Sack, *Vom Staat zum Markt. Privatisierung aus politikwissenschaftlicher Perspektive* (Wiesbaden: Springer VS, 2019), 151.

schools are adequately equipped with hardware and software. This will show whether the fundamental willingness expressed in the public media by some computer manufacturers for immediate support measures was more than mere lip service".[16] Eventually, it was the federal ministers themselves that formulated a public appeal to the private sector to take an active part in tackling the challenge ahead.

Equipping Schools with Computers – Fast and with very Limited Funds

On 19 March 1984, the Federal Minister of Education and Science, and the Federal Minister of Research and Technology organized an action day for a joint action on "Computers and Education" through a partnership between industry, science, and education. The main goal was to quickly equip all secondary schools with computers to prepare and implement a new field of instruction for basic computer education and to qualify teachers accordingly. Both ministers maintained that the equipment of schools and the training of teachers in computer technology could not be achieved without the support of the private sector. Without their involvement, schools and educational administration would not be able to successfully manage these tasks in the foreseeable future as they lacked the necessary technical competence and financial resources. However, if it was left to the private sector alone, schools would risk being bypassed by suppliers of computer hard- and software that pursued a technocratic implementation strategy that would not meet the pedagogical requirements of schools and teachers.[17]

Therefore, only a joint effort was seen as a viable solution to solve these tasks. The central argument put emphasis on the extraordinary speed with which the computerization of the economy and society progressed. As a result, long-term development processes of adapting schools to this new reality would not be sufficient. An additional effort by everyone "beyond their actual mandate"[18] was

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16 Gregor Krämer and Udo Ulbrich, "10 Thesen zur Realisierung eines zeit- und sachgemässen Einsatzes von Mikrocomputern im Unterricht," *Die höhere Schule*, no. 5 (1984): 150.

17 Georg-Berndt Oschatz, "Einführung durch den Präsidenten der Ständigen Konferenz der Kultusminister der Länder und Niedersächsischer Kultusminister, Georg-Berndt Oschatz," in *Computer + Bildung, Eine Gemeinschaftsinitiative von Politik, Wirtschaft und Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum in Bonn*, ed. BMBW/BMFT (Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation, 1984), 27.

18 Dorothee Wilms, "Einführung durch den Bundesminister für Bildung und Wissenschaft, Dr. Dorothee Wilms," in *Computer + Bildung, Eine Gemeinschaftsinitiative von Politik, Wirtschaft und*

deemed necessary to speed up the introduction of computers into schools and to train a large enough number of teachers in informatics and programming. On the occasion of the action day "Computers and Education" on 19 March 1984, a number of companies in German computer industry made offers of support towards schools. A substantial amount of equipment was donated, and price reductions on computers and peripherals as well as support for the further training of teachers were offered to schools. To coordinate and intensify the initiatives and efforts of the private sector, the German Engineering Federation VDMA (*Verband Deutscher Maschinen- und Anlagenbau*) and the Central Association of the Electro-technical Industry ZVEI (*Zentralverband der Elektrotechnischen Industrie*) initiated the formation of a support association, which would act as an intermediary between the federal states, individual schools, and representatives of the computer industry. It was formally established in September of the same year that the action day had taken place under the identical name of "Computers and Education". In cooperation with the Ministries of Education in the federal states of Germany, the support association pledged to help in tailoring the efforts of the private sector to the actual needs and requirements of educational institutions. The support association was chaired by Karl Joachim Döring, managing director of the Hewlett Packard distribution centre in Frankfurt, and his deputy Hermann Stähler, who at the time was managing director of Philips Communication Industry. Managing director of the support association was Günther Möller, who also served as managing director of the Office and IT Association within the VDMA, and his deputy Paul-Albert Ruhr, managing director of the ICT Association within the ZVEI. The support association represented all member firms of both the VDMA and the ZVEI, and thus covered a large majority of the German electronics and ICT industry. However, the member companies did not make any formal commitment regarding the forms and extent of their involvement, nor was there a direct financial contribution to the support association envisaged. From the industry's point of view, the main task of the support association was to publicly represent and communicate the private sector's efforts and initiatives to support the introduction of ICT in schools, rather than having a dedicated budget at its disposal to take direct action and launch its own initiatives to equip the schools.

In addition to the promotion of charitable support from the private sector, the aim of the "Computers and Education" initiative was also to encourage education policymakers at the level of the federal states to address the issue of introducing

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Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum in Bonn, ed. BMBW/BMFT (Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation, 1984), 17.

computer education into schools more seriously. In the federal system of Germany, the federal states have primary responsibility for legislation and administration in education. Thus, it is not the responsibility of the Federal Ministry of Education, but of the individual federal states to develop new pedagogical concepts and curricula for the introduction of ICT in schools to take measures for teacher training and to finance the equipment of schools with computers. To coordinate cooperation in the field of education and training, the federal states established the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) in 1948. In addition, the Commission of the Federation and the federal states for Educational Planning and Research Promotion (BLK) served as a joint body to coordinate efforts between the federal states and the national government in the field of educational planning and policymaking.

The same year that the "Computers and Education" initiative was launched, the BLK adopted a framework concept for information technology education in schools and vocational training.[19] The framework concept distinguished between a basic computer education for all pupils, an in-depth informatics education and vocational education, and training in new information technologies. The proposed curriculum for a basic computer education in lower secondary schools focused on simple computer applications, as well as possible uses, risks, and the control of information technology. Moreover, pupils ought to be introduced to issues of privacy and data protection. The informatics curriculum for upper secondary schools was more strongly oriented towards computer science. It entailed the teaching of problem-solving strategies and programming skills and focused on the use of computers for the simulation of processes, graphical representations, and calculations. It also covered data structures and the use of microprocessors for process control. In addition, the framework concept also mentioned the use of computers as universal tools in all subjects where it was deemed appropriate.

Part of the concept also dealt with the hard- and software that schools needed to be equipped with, which had to be in line with pedagogical considerations and goals. It stated that not every device on the market was suitable for educational purposes.[20] Thus, a sensible choice had to be made from what was currently offered. Computer hardware had to be robust and versatile in use, equipped with widely used and compatible operating systems, and allowing for the use of higher programming languages. With regard to the purchase of software, it was argued that pupils should primarily develop their own programs and that the use of read-

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19 BLK, "Rahmenkonzept für die Informationstechnische Bildung in Schule und Ausbildung," *Bildung und Erziehung* 38, no. 1 (1984): 123–129.
20 BLK, "Rahmenkonzept," 129.

ily available software was of subordinate importance. If such software was needed, it had to be designed in accordance with didactic principles and adapted to curricular guidelines. Consequently, educational administration had to decide on the suitability of specific computer programs for use in classrooms. In addition, a central institution was proposed to collect, document, and lend out software to schools, as well as to offer consulting and support to teachers and school administrators. Thus, individual schools would not have to be equipped with all the necessary and available software, but instead could borrow the programs they needed. However, the framework concept did not elaborate on who should develop the necessary educational software that met the requirements of schools. Instead, it was left to the initiatives of commercial software developers or committed teachers and educators to respond with tailored solutions to grade-level- or subject-specific needs.

Concurrently, the BLK established a funding program to make the integration of ICT and computer education into schools the focus of its state-funded pilot projects. The scheme allowed for the federal states to submit project proposals to the BLK, which were then evaluated by both national and federal state representatives. Accepted projects were subsequently jointly funded on a cost-sharing basis by the federal government and the applicant state.[21] For the federal states, these pilot projects provided an opportunity to experiment with computer education in schools, to purchase the necessary computer equipment, and to implement new teaching materials and teacher training, while the federal government bore half of the costs. For the federal government, the funding of pilot projects served as an effective lever to encourage the widespread introduction of computer education into schools without infringing on the sovereignty of the federal states in the field of education. In addition, this mode of governance allowed for the alignment of the conceptual work in the federal states with the BLK framework concept, which was required by the funding criteria for model projects. Selective funding of projects also helped to avoid duplication of effort and to focus on key developments and pressing issues that were of national interest for the implementation of computer education in schools.

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21 Between 1983 and 1989, 69 pilot projects concerning the introduction of new ICT into schools were jointly funded by the federal government and the states with a total sum of over 35 million DM. Additional funding was provided for pilot projects in VET and continuing education (see Hans-Georg Rommel, *New Information Technology in Education in Germany* (Luxembourg: Office for Official Publications of the European Communities, 1992), 36).

Diverging Expectations and Conflicting Roles

At first, education policymakers and school authorities seemed to understand the "Computers and Education" initiative mainly as a charitable effort by the computer industry and as an opportunity to acquire computer equipment at a significant discount or even for free. But the two industry associations painted a different picture when they first announced their intention to form the "Computer and Education" support association. The support association "Computers and Education" saw its primary purpose as connecting schools in need with corporations eager to help. It vaguely stated its aim as "to support the relevant authorities in the integration of information technology education into schooling".[22] On the part of the federal ministries, the association was expected to coordinate and reinforce sponsorship and donation activities of the private sector. The president of the KMK, Georg-Berndt Oschatz, argued at the launch of the community action initiative on 19 March 1984 that the federal states desperately needed such support to tackle this task for the future and should proactively approach the support association and cooperate closely with it.[23] Oschatz expressed the hope that the support association would provide for an institution "without too many bureaucratic constraints and restrictive requirements which could operate and act in the common interest of everybody involved" and allow for educational authorities of the federal states to get involved directly in its activities.[24]

Against the backdrop of the concerns regarding a growing corporate influence over German schools, the support association was meant to act as an intermediary between educational authorities and the computer industry in bringing computers into the classrooms. The setting of coordination meetings with the support association within the BLK and regular bilateral discussions with representatives of the federal ministry of education was meant to assure that the latter would keep a certain degree of control and oversight over the activities of the support association and its negotiation with individual federal states. Moreover, the federal minister of education Dorothee Wilms considered the regular joint discussions with the support association within the BLK as the preferable mode of cooperation, in order to avoid that computer manufacturers would pursue their own implementation

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22 BArch B 138/70110, Brochure "Fördergemeinschaft Computer + Bildung," 7.
23 BArch B 138/70110, BMBW press release 30/1984, March 19, 1984.
24 Oschatz "Einführung," 29.

policy without any consideration for the schools' needs.[25] Wilms also stated that future collaboration with the support association could not be aimed at the development of concepts for the content or the organization of instruction in schools as this clearly fell into the competence of the federal states. Nevertheless, the support association was meant to provide them with the opportunity to draw on the expertise and advice of the private sector in these matters too. Especially regarding the training of teachers in IT, the equipment of schools with computers, and the development of software suitable for the use in classrooms, Wilms hoped that the federal states would join forces with industry to draw upon the private sector's extensive material, technical and personal resources.[26]

At first, the focus of the support association was on the equipment of schools with computers. The ZVEI and the VDMA estimated, that roughly 25'000 schools in the federal republic of Germany and West Berlin lacked the necessary hardware. The ZVEI and VDMA's conservative estimate of the necessary investment amounted to 400 to 600 million DM, which was equal to approximately 1% of total public spending on schools in West Germany in 1985.[27] The two founding organizations of the support association assured that industry would, within the limits of their abilities and resources, participate in meeting this need. However, the chairmen of the support association made their standpoint clear, that the issue at hand was to be primarily solved by the state.[28] Namely, the financing of computer equipment as well as the necessary conceptual and organizational tasks to introduce basic computer education into schools were considered to be the responsibility of the state. Nevertheless, due to the "high economic importance and urgency of including new technologies into schooling", the VDMA and ZVEI as well as their member companies saw a need to become involved in a joint effort between

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25 BArch B 138/51176, Speaking note of Dorothee Wilms for the meeting within the BLK on the results and further proceedings of the community action "computers and education" on March 30, 1984.

26 BArch B 138/51176, Speaking note of Dorothee Wilms for the meeting within the BLK on the results and further proceedings of the community action "computers and education" on March 30, 1984, 3–4.

27 In 1985, total public expenditure in West Germany for schooling amounted to 48,503 million DM (Gabriele Franzmann, *Bildung in Deutschland: Bildungsstatistische Zeitreihen von 1960 bis 2000 zur Schüler- und Studentenzahl, zum Lehrpersonal und zu den Bildungsausgaben. GESIS-Datenkompilation auf Grundlage der amtlichen Statistik* [Köln: HISTAT, 2006]). The cost estimate by the ZVEI/VDMA only covered the initial investment for acquiring a minimum computer equipment of 8 to 10 computers per school and did not include software or follow-up costs for maintenance, repairs and replacements.

28 BArch B 304/3136, ZVEI/VDMA press release on the proposition to establish a support association, March 19, 1984.

state and private actors. Initiatives by private actors could support and provide impulses for the introduction of computers into education, but a systematic effort to achieve the necessary broader impact that would reach all educational institutions needed to be taken by the state or through state resources. In addition, representatives of the information technology industry had expressed their hope that the state would encourage private-sector sponsorship of technical equipment for schools through tax incentives, instead of meeting their offers of cooperation with mistrust.[29]

A first coordination meeting between representatives of the German ministry of education, the federal states, and the support association took place in the summer of 1984. On this occasion, it was decided that the activities of the support association should at first focus primarily on the pilot projects aimed at introducing new information and communication technology into general and vocational education.[30] The federal states were asked to submit a list of their demands and needs regarding computer equipment and teacher training. The support association would then try to mobilize and coordinate further aid from firms to cover unmet needs. Giving priority to pilot projects in distributing donations meant that neither the support association, nor its member firms had a say with regard to the aims, contents, and implementation of these projects that had been designed by education policymakers and pedagogues within the federal states and recommended for funding by the BLK. The support association was meant to merely reduce the budget required for the realization of approved pilot projects by providing the necessary computer equipment and teacher training opportunities offered by its member companies. Thus, by focusing private sector involvement on pilot projects that were already fully developed and approved by the state, the German government sought to ensure that strategic guidance on how and for what purpose computers should be used in schools would remain solely with state education authorities.

On the occasion of the well-publicized community action launch day on 19 March 1984, a number of firms had already committed to a variety of sponsoring offers which now needed to be allocated to projects in the federal states. The launch of the community action had provided private actors with a platform to make education initiatives by the computer industry particularly visible, while local efforts of schools, teachers, and governments of certain federal states re-

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29 BArch B 138/70110, Statement by Dr. Helmut Lohr, Chairman of the Executive Board ZVEI, at the press briefing with Federal Minister Dorothee Wilms on January 13, 1987, 4–5.

30 BArch B 138/51176, Speaking note of Dorothee Wilms for the meeting within the BLK on the possibilities of cooperation with the private sector regarding the "Impacts of new media and technology on education and science" on May 16, 1984.

ceived far less public attention.[31] This somewhat distorted representation provided context for the accusation that the state had remained idle for too long and had not responded with timely measures on a larger scale to introduce computer technology into schools, which was why some private actors had gotten involved locally. IBM Germany had just started a new program in 1983 to support educational projects in Baden-Wuerttemberg, Hesse, and Rhineland-Palatinate with 150 personal computers and software to give a boost to the use of computers in schools.[32] Leybold-Heraeus had donated six Computer-Aided-Physics-Interfaces and personal computers to upper secondary schools in Cologne and Hanau.[33] Siemens had allowed for the free training of Bavarian teachers in its data technology schools since the summer of 1983 and gifted 140 personal computers to schools in Bavaria.[34] Following the call to action by the BMBW and the BMFT, these activities were expanded and other companies, such as Commodore, Apple, Triumph-Adler, Standard Elektrik Lorenz and Digital Equipment joined in with discount offers, donations of equipment, and offers of free computer training for educational institutions.

A first conflict between the support association and educational authorities already arose at their second meeting in September 1984; differences in expectations and responsibilities between educational authorities and the support association became clearly perceptible and evident. The association's chairmen declared that they would not be raising or allocating donations as they rejected the role of the support association as a fundraiser or a distributor of charitable donations. Rather, they defined the competencies of the association primarily along the lines of a platform for the exchange of views and ideas, as well as for the reconciliation of interests between stakeholders in education and industry. This clarification raised profound dismay and disappointment among the education delegates within the BLK. They interpreted this statement as a breach of the agreement that had been reached at the first meeting where it had been established that the support association would raise and distribute donations from private companies. The chairmen of the support association declared that for reasons of competition

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31 By June 1984, the BMBW together with the federal states had jointly funded over 50 pilot projects with 52 million DM since the early 1970s to introduce computer technology into education and training (BArch 138/51178, Press release of the BMBW "Gemeinschaftsaktion ,Computer und Bildung' erfolgreich", July 12, 1984, 2)

32 BMBW/BMFT, *Computer + Bildung. Eine Gemeinschaftsinitiative von Politik, Wirtschaft und Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum Bonn* (Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation, 1984), 54.

33 BMBW/BMFT, *Computer + Bildung*, 55.

34 BMBW/BMFT, *Computer + Bildung*, 61.

law and association policy, the central coordination of private sector donations was neither possible nor desirable. Instead, the current and prospective donations would have to be handled bilaterally between individual firms and donation recipients.[35] As a result of the association's reluctance to organize the distribution of the donations pledged on 19 March 1984, some firms had already chosen the recipients on their own,[36] which conflicted with the federal ministry's concern for a fair and equal distribution of donated computer equipment, as well as with the consensus to prioritize pilot projects. Nevertheless, the representatives of the federal states in the BLK were willing to continue cooperation with the support association as they still hoped for discounts and donations of computer equipment for their pilot projects. Moving forward, it was decided that a list of approved pilot projects under the BLK's "New Information and Communication Technology in Education" funding scheme would be made available to the support association and its member firms. The association would then establish contact between interested firms and the concerned federal state to initiate public-private cooperation in specific projects. Nevertheless, the issue had undermined the educational authorities' trust in the value and usefulness of cooperating with the support association. Possible areas of cooperation such as the development of educational hard- and software as well as consultations regarding didactics and methodology in teaching with and about computer technology were deferred at the request of the federal states. The federal ministry of education noted in an internal letter to Dorothee Wilms, dated September 1984, that the support association had failed to meet the expectations it had raised. It had "clearly distanced itself from its previous promises and declarations of intent with regard to its activities for the mobilization and coordinated mediation of donations. According to the information available to us, this is in response to pressure exerted by the member companies, which apparently do not want to grant such coordinating power to the association. Association policy and competition law are claimed to be the reasons. However, the true reason is probably that the companies use the donation activities primarily as part of their market strategy and therefore do not want to be involved in a coordinated action with competing companies".[37] The Ministry of Education insisted that the support association had to think of itself more as a representative of the interests of the education system if it wished to collaborate successfully with the federal and state governments. It would only be accepted as a partner of the federal and state

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35 BArch B 138/51178, "Vermerk betr. Ergebnis des Gespräches Bund/Länder/Kommunale Spitzenverbände/Fördergemeinschaft ‚Computer und Bildung' am 5.9.1984 im BMBW," September 17, 1984.
36 BArch B 138/51178, "Aktion ‚Computer und Bildung' am 19.3.1984 – Spenden und sonstige Angebote von Firmen," status as of June 28, 1984.
37 BArch B 138/51178, Letter from the BMBW to Dorothee Wilms, September 21, 1984.

governments if more could be achieved with its help than in bilateral contacts with individual companies: "The ministry of education did not bring the support association together with the federal states in order to make it easier for industry to sell equipment".[38]

In the following year, the support association made little progress regarding the support of pilot projects by the private sector. The BLK had submitted a list of approved projects that contained merely the titles of the pilot projects and listed the respective applicant federal state. The support association complained in several letters to the BMBW that it needed more details on the contents, aims, and necessary equipment of the projects to be able to mobilize the support of its member companies. The federal states, however, shielded their detailed plans and concepts to introduce computer technology into schools from private industry and denied this request. Firms would only be granted access to the full application file if they displayed a serious interest in supporting a specific pilot project. Even though the support association warned that it would be practically impossible to spark its member companies' interest in supporting a project if they did not have more detailed information on it, the federal states remained firm in this matter. The support association had to accept defeat in this matter and focused on a different area of activity, namely the training of teachers for the use of computers in the classroom. The support association declared itself willing to gather a list of computer education and training offers for teachers in collaboration with its member firms but declined to centrally administer the matching of interested parties. The list would be made available to the educational authorities in the federal states who then could engage in bilateral negotiations with the providers of ICT training courses. However, the BMBW urged that the issue of teacher training would be dealt with by the joint discussion group within the BLK in order to prevent such issues from being negotiated bilaterally between the federal states and industry to the exclusion of the federal government.[39] A working group on teacher training measures in ICT was set up to discuss concepts and organization of in-service and further training measures for teachers. Meanwhile, the association put together a list of offers that was subsequently discussed within the BLK and made available to the federal states.

Despite these efforts, none of the federal states responded to the member companies' offers to support teacher training in informatics and the use of computers

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38 BArch B 138/51179, "Vermerk betreffend Fördergemeinschaft 'Computer und Bildung' des VDMA und ZVEI; Gespräch von Herrn Staatssekretär mit den Herren Stähler (VDMA) und Döhring (ZVEI) am 24.10.1984," October 22, 1984.

39 BArch B 138/51179, "Vermerk betr. Vorbereitung der Sitzung des Ausschusses Bildungsplanung der BLK am 13.11.1984," November 5, 1986, 3–4.

in the following months.[40] Instead, the federal states had begun to rapidly expand their existing facilities for further teacher training and to establish their own courses to introduce teachers to new information technology and its use in education. The federal ministry of education and science criticized many of the offers made by computer companies that the support association had gathered in its list were not specifically designed to meet the needs of teachers, but rather consisted in generic computer courses for clients. In addition, most training courses were not offered to teachers for free. The associated costs were estimated to be at least as high as those of the federal states' own in-service teacher training measures which were tailored to the specific needs of schools.[41] The low popularity of the support associations' list of teacher training courses in IT among the federal states, thus came as no surprise.

Instead of retreating, the support association took a last step forward and became more directly involved in offering its own courses and seminars. A three-day seminar for teachers was prepared and offered to the federal states that encompassed a visit to a local company or computer centre, as well as lectures on the current state of ICT, its socioeconomic and -cultural implications, and its opportunities and limitations regarding the use in school. But only a few federal states showed interest in the seminar. The first seminar was attended only by school authorities and not teachers. The support association also expressed its interest to collaborate both with the ministry of education and science as well as the federal states to develop educational software for schools. The idea was to develop simple tutoring systems not for informatics education itself, but for the use of computer technology as a means of instruction in other subjects.[42] However, no new projects developed from these ideas within the organizational framework of the support association. Interested companies, local educational policymakers, and school authorities started their own initiatives and collaborations without the support association as an intermediary. What had been heralded only three years ago as a hub for public-private partnerships, which would lessen the financial burden of the federal states and open school doors to computer businesses, had faded into insignificance.

Consequently, the support association informed the ministry of education and science at the beginning of August 1988 of its dissolution as its mission had been

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40 BArch B 138/70110, "Vermerk betr. Fördergemeinschaft Computer und Bildung," August 28, 1986.
41 Landtag Nordrhein-Westfalen, "Antwort der Landesregierung auf die Kleine Anfrage 704 des Abgeordneten Hilgers SPD (Drucksache 10/1748)," March 26, 1987, https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD10-1865.pdf.
42 BArch B 138/70110, Letter from Döring to state secretary Piazolo, August 15, 1986.

accomplished.[43] While the federal authorities acknowledged the association's descent into relative unimportance, they also pointed out that the task of introducing a basic computer education into schools could by no means be considered accomplished. The state-funded pilot projects and various private-sector initiatives had helped to lay the foundation and to tackle some of the conceptual questions that needed to be clarified. However, the practical implementation on a broader scale to reach all schools and pupils was expected to take full effect only in the early 1990s. In a letter to the chairman of the support association, the new German minister of education, Jürgen Möllemann, expressed his hope that companies, private organizations, and associations would continue to support educational efforts in the field of information technology despite the discontinuation of the support association as a coordinating institution.[44] After all, the private sector was considered an important partner in the state's efforts to introduce computers into schools – not least regarding vocational education and further training.

Conclusion

The case of the support association "Computers and Education" illustrates how continuous efforts to bring significant technological innovations into schools on a broad scale have triggered both increased national government involvement in education, as well as attempts to establish extensive public-private partnerships beyond bilateral contracts at the local or regional level in the Federal Republic of Germany. The dominant public discourse in the early 1980s was characterized by a sense of urgency to push ahead with the introduction of computers into classrooms in order not to fall behind in the struggle for global economic and technological competitiveness. This perceived need for quick and decisive action prompted the federal government to increase its involvement in promoting and harmonizing efforts in the federal states to introduce computer education into schools. From the perspective of the federal government, two instruments were of decisive importance in this process. On the one hand, the BLK framework concept for ICT in schools served to establish a common ground and provide general guidelines for the conceptual and curricular developments in the federal states. On the other hand, the BLK arranged a funding program in 1984 to make the integration of computer education into schools the focus of their mutual pilot projects. The federal ministry of education covered half of the cost of pilot projects which were recom-

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43 BArch B 138/70110, Letter from Döring and Möller to Möllemann, August 1, 1988.
44 BArch B 138/70110, Letter from Möllemann to Döring, August 23, 1988.

mended by the BLK and aligned with its framework concept in order to promote cooperation and coordination between the federal states in the introduction of basic information technology education.

An in-depth analysis of archival documents by the Federal Ministry of Education and Science and its correspondence with the support association revealed how the introduction of computer technology into German schools was accompanied by debates over financial, state, and corporate social responsibilities. Moreover, it was a process marked by power struggles over the choice and acquisition of technical equipment for schools and the design of curricula and educational policies to introduce computer education in public schooling. The Federal Ministry of Education and Science saw an opportunity in the creation of the support association as an intermediary under its own influence to maintain control and oversight over the federal states' negotiations with computer manufacturers. Its key concern was to balance the uneven progress across the federal states in equipping schools with computer technology and in developing new policies for school-based computer education. Private sector sponsorship and support were to be evenly distributed across the states in order to not further exacerbate the uneven playing field. Thus, by taking a seat on the advisory board of the support association, the Federal Ministry of Education wanted to ensure that the interests of the federal government were represented and that a balanced distribution of donations could be achieved. The advisory board was to decide on all projects supported by the support association. Thereby, the Federal Ministry of Education sought to rule out purely bilateral contracts between the support association and interested partners, about which the advisory board would only be informed after the fact and would hence not be able to intervene. In addition, the Federal Ministry of Education insisted that the activities of the support association be concentrated on the financial and material support of BLK pilot projects.

The federal states, however, cautiously guarded their competencies in developing policies and project plans for the introduction of computers into schools from unwarranted influence by industry and businesses. They expected both the federal government as well as the private sector to substantially contribute to the equipment of schools with computers while at the same time remaining in complete control over how this new technology was to be used in teaching and learning. However, computer businesses were not willing to take on such a large financial burden, which they considered to be the responsibility of the state. Rather, companies saw the creation of the support association as a means to gain access to schools as a new and budding market for the sale of hard- and software. In addition, it posed an opportunity for them to gain valuable insights into the federal states' plans, needs, and demands regarding educational computer technology. However, the individual companies proved reluctant to coordinate their charitable

actions and discounted offers to schools through a common body such as the support association. In doing so, they would not only have given up some of their negotiating leverage with individual states and schools, but they would also have compromised their ability to support and implement pilot projects according to their own ideas and preferences for computer education in public schools that were not necessarily in line with those of other businesses or the federal government. The lack of funding provided by the member companies of the VDMA and the ZVEI meant that the support association was unable to orchestrate a community effort among the private sector to launch its own larger model projects and initiatives independently of the objectives and priorities set out in the BLK framework concept.

Computer industry representatives, as well as educational policymakers and government authorities on both the national and local levels all shared the common goal of accelerating the introduction of computer technology into German schools. However, the different vested interests of the involved parties rendered the computer association's mission to kickstart and boost the introduction of computers into public education futile. This was because it failed to reconcile the various conceptions of responsibilities and competencies. To alleviate the financial burden, the federal states and schools were thus left with the possibility of conforming with the BLK framework concept to receive government funding by participating in pilot projects on the one hand, and negotiating more favourable prices with manufacturers of computer hard- and software on the other. The BLK framework concept largely achieved its purpose of exerting a harmonizing effect by pushing forward the introduction of computer science instruction into public schools in all federal states, albeit at different paces and following a range of approaches with regard to its implementation. However, without nationwide coordination of the equipping of public schools with computers and the central provision of funding to cover the associated costs, it was not possible to prevent notable differences in the level of equipment across the federal states and various school types. Only gradually did lagging states and schools catch up with the pioneers who had seized opportunities to participate in pilot projects and were able to invest significant resources to bring computers into their classrooms early on.

References

Unpublished Sources from the German Federal Archives (BArch) in Koblenz

B 138/51176: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines, Band 1 (März 1984 – Juni 1984).

B 138/51177: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines, Band 2 (Juni 1984).

B 138/51178: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines, Band 3 (Juni 1984 – Oktober 1984).

B 138/51179: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines, Band 4 (Oktober 1984 – Dezember 1984).

B 138/51180: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines, Band 5 (Januar 1985 – Dezember 1985).

B 138/70110: BMBW, Fördergemeinschaft "Computer und Bildung" – Allgemeines (einschließlich Pressegespräch), Band 6 (Januar 1986 – Mai 1987).

B 304/3136: KMK, Lehrpläne, Richtlinien, Curricula: Informatik (Dezember 1983 – März 1984).

Bibliography

Ball, Stephen J. *Education plc: Understanding private sector participation in public sector education.* Oxford: Routledge, 2007.

Bundesrat. *Informationstechnik. Konzeption der Bundesregierung zur Förderung der Entwicklung der Mikroelektronik, der Informations- und Kommunikationstechniken* (Drucksache 291/84). Bonn, 1984.

BLK. "Rahmenkonzept für die Informationstechnische Bildung in Schule und Ausbildung." *Bildung und Erziehung* 38, no. 1 (1984): 123–129.

BMBW/BMFT. *Computer + Bildung. Eine Gemeinschaftsinitiative von Politik, Wirtschaft und Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum Bonn.* Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation, 1984.

Bundesregierung. *Bericht der Bundesregierung zur Förderung von Forschung und Entwicklung auf den Gebieten Datenverarbeitung, Informationstechniken* (Drucksache 9/1556). Bonn, 1982.

Danyel, Jürgen. "Zeitgeschichte der Informationsgesellschaft." *Zeithistorische Forschungen/Studies in Contemporary History* 9, no. 2 (2012): 186–211. https://doi.org/10.14765/zzf.dok-1598.

Förschler, Annina. "Das ‚Who is who?' der deutschen Bildungs-Digitalisierungsagenda. Eine kritische Politiknetzwerk-Analyse." *Pädagogische Korrespondenz* 58, no. 2 (2018): 31–52. https://doi.org/10.25656/01:21106.

Franzmann, Gabriele. *Bildung in Deutschland: Bildungsstatistische Zeitreihen von 1960 bis 2000 zur Schüler- und Studentenzahl, zum Lehrpersonal und zu den Bildungsausgaben. GESIS-Datenkompilation auf Grundlage der amtlichen Statistik.* Köln: HISTAT, 2006.

Haigh, Thomas, and Paul E. Ceruzzi. *A New History of Modern Computing.* Cambridge, MA: MIT Press, 2021.

Hartong, Sigrid, and Annina Förschler. "The rising power of business interests through intermediary policy networking: insights into the 'digital agenda' in German schooling." *Working Paper*, 2020. https://doi.org/10.13140/RG.2.2.27433.62568.

Körfgen, Peter. "Hart am Rande der Sprachlosigkeit." *Erziehung & Wissenschaft*, no. 6 (1984): 24–26.

Krämer, Gregor, and Ulbrich, Udo. "10 Thesen zur Realisierung eines zeit- und sachgemäßen Einsatzes von Mikrocomputern im Unterricht." *Die höhere Schule*, no. 5 (1984): 150–153.

Landtag Nordrhein-Westfalen. "Antwort der Landesregierung auf die Kleine Anfrage 704 des Abgeordneten Hilgers SPD (Drucksache 10/1748)." March 26, 1987. https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD10-1865.pdf.

Ministerium für Kultus und Sport Baden-Württemberg. "Computer- und Informatikunterricht in den Fächern Mathematik und Technik ab Klasse 9." *Kultus und Unterricht Baden-Württemberg* 33, no. 9 (1984): N 101–N 103.

Oschatz, Georg-Berndt. "Einführung durch den Präsidenten der Ständigen Konferenz der Kultusminister der Länder und Niedersächsischer Kultusminister, Georg-Berndt Oschatz." In *Computer + Bildung, Eine Gemeinschaftsinitiative von Politik, Wirtschaft und Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum in Bonn*, edited by BMBW/BMFT, 21–29. Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation, 1984.

Parreira do Amaral, Marcelo. "Neue Akteure der Governance des Bildungssystems – Typen, Einflussmöglichkeiten und Instrumente." In *Handbuch Neue Steuerung im Schulsystem*, edited by Herbert Altrichter and Katharina Maag Merki, 455–477. Wiesbaden: Springer, 2016.

Rommel, Hans-Georg. *New Information Technology in Education in Germany.* Luxembourg: Office for Official Publications of the European Communities, 1992.

Sack, Detlef. *Vom Staat zum Markt. Privatisierung aus politikwissenschaftlicher Perspektive.* Wiesbaden: Springer VS, 2019.

Schmerr, Martina. "Sponsoring an allgemeinbildenden Schulen – Erfahrungen, Probleme, Handlungsmöglichkeiten." In *Die verkaufte Bildung*, edited by Ingrid Lohmann and Rainer Rilling, 189–206. Opladen: Leske + Budrich, 2002.

Schuhmann, Annette. "Der Traum vom perfekten Unternehmen. Die Computerisierung der Arbeitswelt in der Bundesrepublik Deutschland (1950er- bis 1980er-Jahre)." *Zeithistorische Forschungen/Studies in Contemporary History* 9, no. 2 (2012): 231–256. https://doi.org/10.14765/zzf.dok-1596.

Schweitzer, Jochen. "Absatzmarkt Schule. Bildungsbürokratie und Wirtschaft Hand in Hand." *Erziehung & Wissenschaft*, no. 5 (1984): 22.

Streeck, Wolfgang, and Daniel Mertens. "Politik im Defizit: Austerität als fiskalpolitisches Regime." *dms – der moderne staat – Zeitschrift für Public Policy, Recht und Management*, no. 1 (2010): 7–29. https://doi.org/10.3224/dms.v3i1.01.

Thomas, U. "Technologie, Politik und Innovation." In *Mikroelektronik Information Gesellschaft. Informationstechnik und Datenverarbeitung*, edited by Heinrich Niemann, Dieter Seitzer, and Hans Wilhelm Schüßler, 180–200. Berlin and Heidelberg: Springer, 1983.

Ulbrich, Udo. "Verschlafen die Schulen die Mikrochip-Revolution?" *Die höhere Schule*, no. 2 (1984): 62–68.

Williamson, Ben, Annika Bergviken Rensfeldt, Catarina Player-Koro, and Neil Selwyn. "Education recoded: policy mobilities in the international 'learning to code' agenda." *Journal of Education Policy* 34, no. 5 (2019): 705–725. https://doi.org/10.1080/02680939.2018.1476735.

Williamson, Ben. "Mediating Education Policy: Making Up the 'Anti-Politics' of Third-Sector Participation in Public Education." *British Journal of Educational Studies* 62, no. 1 (2014): 37–55. https://doi.org/10.1080/00071005.2013.857386.

Williamson, Ben. "New power networks in educational technology." *Learning, Media and Technology* 44, no. 4 (2019): 395–398. https://doi.org/10.1080/17439884.2019.1672724.

Williamson, Ben. "Meta-edtech." *Learning, Media and Technology* 46, no. 1 (2021): 1–5. https://doi.org/10.1080/17439884.2021.1876089.

Wilms, Dorothee (1984). "Einführung durch den Bundesminister für Bildung und Wissenschaft, Dr. Dorothee Wilms." In *Computer + Bildung, Eine Gemeinschaftsinitiative von Politik, Wirtschaft und Wissenschaft. Bericht einer Tagung vom 19. März 1984 im Wissenschaftszentrum in Bonn*, edited by BMBW/BMFT, 10–14. Bonn: Arbeitsgemeinschaft für politische und wirtschaftliche Kommunikation,1984.