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# Computers in Europe's Classrooms: An Introduction

**Abstract:** As new information technology became more prevalent in more sectors of society and industry during the 1970s and 1980s, people were confronted with new skill requirements in their professional as well as their personal lives. The concept of computer literacy as the basic skills and knowledge needed by everyone to participate fully in society and the economy became increasingly relevant to governments, educational policy makers and educators across Europe. However, historical sources point to a plethora of different understandings and wordings of computer education and computer literacy, as well as an abundance of different pedagogical approaches to the introduction of computers into the classroom. Similarly, existing literature highlights the involvement of various interest groups in the introduction of computers in schools, including students, parents, teachers, educators and policy makers, as well as manufacturers and vendors of computer technology. Exploring the history of how computers have entered the classroom in Europe through national and transnational case studies can shed light on the different facets and dynamics of the introduction of computer technology in education and, in particular, how different stakeholders and coalitions have negotiated and shaped this process.

**Keywords:** computer education; Europe; case studies; national; transnational; history

Towards the end of the 20th century, electronic computers became steadily smaller, more affordable, more powerful, and increasingly connected.<sup>1</sup> More people gained access to digital devices and computers could be used for more tasks in business

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1 Thomas Haigh and Paul E. Ceruzzi, *A New History of Modern Computing* (Cambridge, MA: MIT Press, 2021); Kevin Driscoll, *The Modem World* (New Haven: Yale University Press, 2022); Gleb J. Albert, “Der vergessene ‚Brotkasten‘. Neue Forschungen zur Sozial- und Kulturgeschichte des Heimcomputers,” *Archiv für Sozialgeschichte* 59 (2019): 495–530.

and everyday life, albeit this democratization of computer technology was neither a linear nor a smooth process.<sup>2</sup> Digital technologies gradually permeated interactions within the spheres of home, work, education, and leisure. This transformation of the computer into a mass consumer product also saw the rise of a budding home computing culture. A growing body of literature is concerned with how people formed communities of hobbyists and hackers where knowledge of computing was formed and circulated.<sup>3</sup> Early hobby computer users in the 1970s were often self-taught and built their own simple home computers from “computer kits”, containing a printed circuit board and the necessary electronic components, following the instructions shared in electronics hobbyists’ magazines or within their own communities.<sup>4</sup> Only the availability of pre-assembled microcomputers at an affordable price, and the increase in user-friendly software during the 1980s allowed for computers to become less intimidating to a growing number of consumers.<sup>5</sup>

## Computers and Education

As the use of new information technology became widespread across more spheres of society and industry, people were confronted with new skill demands not just in the workplace, but also in their private lives. To be able to operate a

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2 Frank Bösch, “Wege in die Digitale Gesellschaft. Computer als Gegenstand der Zeitgeschichtsforschung,” in *Wege in die Digitale Gesellschaft: Computernutzung in der Bundesrepublik 1955–1990*, ed. Frank Bösch (Göttingen: Wallstein, 2018), 7–36; Martin Campbell-Kelly et al., *Computer: A History of the Information Machine* (Boulder, CO: Westview Press, 2014), 229–305; Thomas Haigh, *Finding a Story for the History of Computing* (Siegen: Universität Siegen, 2018), <https://doi.org/10.25969/mediarep/3796>; Malte Thießen, “NRW 2.0: Zur Digitalgeschichte eines Landes von 1960 bis heute,” *Geschichte im Westen* 34 (2019): 65–94.

3 e.g., Benjamin Thierry, “Révolution 0.1. Utilisateurs et communautés d'utilisateurs au premier âge de l'informatique personnelle et des réseaux grand public (1978–1990),” *Le Temps des Médias* 18 (2012): 54–64; Gerard Alberts and Ruth Oldenziel, eds., *Hacking Europe: from computer cultures to demoscenes* (New York: Springer, 2014); Zbigniew Stachniak, “Red Clones: The Soviet Computer Hobby Movement of the 1980s,” *IEEE Annals of the History of Computing* 37 (2015): 12–23, <https://doi.org/10.1109/MAHC.2015.11>; Jaroslav Švelch, *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games* (Cambridge, MA: MIT Press, 2018); Julia Gül Erdogan, *Avantgarde der Computernutzung. Hackerkulturen der Bundesrepublik und der DDR* (Göttingen: Wallstein, 2021).

4 Haigh and Ceruzzi, *New History*, 172–173.

5 Victoria E. M. Cain, *Schools and Screens: A Watchful History* (Cambridge, MA: The MIT Press, 2021), 144–145.

computer at all, a certain degree of technical skill was required.<sup>6</sup> The advent of the microcomputer, thus, triggered the spillover from computer technology education into higher to vocational education and training, and finally into general education for all. The early discussions in Europe in the 1960s and 1970s on computer education were directly related to developments in universities and the computer industry, but also to broader trends in society. As soon as professional careers could be pursued in the computer industry, computer-related jobs also became relevant in terms of educational policy. While the first curricula had been very technical, the advocates of computer education in schools now pursued broader approaches. However, even in the 1970s, computer education remained very much centred on machines.<sup>7</sup> In the late 1960s, the Organisation for Economic Co-operation and Development (OECD) turned its attention to computer education. This was in line with the OECD's longstanding commitment to promoting educational technology as a critical means to future-oriented education. The computer was seen in the context of other educational media that were intended to make learning more stimulating and efficient. In particular, the OECD's Centre for Educational Research and Innovation (CERI) gave a decisive boost to the discussion of computer education.<sup>8</sup>

Over the course of the 1980s, computers became more widely considered as a promising technology in education,<sup>9</sup> which prompted governments across Europe to introduce computer literacy programmes. The notion of computer literacy as a basic set of skills and knowledge required by everyone to fully participate in society and economy became more pertinent to educators and educational policymakers. Computer education, in one form or another, was subsequently introduced as part of general schooling in many industrialized countries, either included in regular subject area courses, as a subject in its own right, or as an elective course. However, computers were introduced into schools not only to teach pupils how

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6 Laine Nooney, Kevin Driscoll and Keira Allen, "From Programming to Products: Softtalk Magazine and the Rise of the Personal Computer User," *Information and Culture* 55 (2020): 108, <https://doi.org/10.7560/IC55201>.

7 Richard Capel, "Social Histories of Computer Education: Missed Opportunities?," in *Technological Literacy and the Curriculum*, ed. John Beynon and Hughie Mackay (London: The Falmer Press, 1991), 38–65.

8 Barbara Hof and Regula Bürgi, "The OECD as an Arena for Debate on the Future Uses of Computers in Schools," *Globalisation, Societies and Education* 19, no. 2 (2021): 154–166, <https://doi.org/10.1080/14767724.2021.1878015>.

9 Neil Selwyn, "Learning to Love the Micro: The discursive construction of 'educational' computing in the UK, 1979–89," *British Journal of Sociology of Education* 23 (2002): 427–443, <https://doi.org/10.1080/0142569022000015454>; Tom Lean, "Mediating the microcomputer: The educational character of the 1980s British popular computing boom," *Public Understanding of Science* 22 (2012): 546–558, <https://doi.org/10.1177/0963662512457904>.

to use them for their future careers and private lives, but also to reimagine and transform the ways children learned and teachers taught.

The examination of historical sources from different countries and origins reveals a wealth of different understandings and wordings of computer education. Informatics, computer science, information and communication technology education, or computer instruction are just a few examples. At times, the same terms are used with different meanings; in other cases, different words are used in diverse contexts to refer to the same – or at least similar – idea or concept. Thus, the fuzzy terms used by historical actors are inherently problematic, as they do not help to clearly distinguish and define various pedagogical approaches in introducing computers into classrooms. Rather, it is necessary to carefully assess each case and examine what historical actors conceived or implemented under the guise of these various concepts.

As a general distinction, approaches to introducing computers into classrooms can be distinguished into two broad categories. On the one hand, computer-aided instruction or learning (CAI/CAL) describes efforts to bring computer technology into schools with the aim of making education more effective and transform teaching and learning. CAI/CAL approaches focus on computers as an educational technology: a means of teaching and learning in a variety of subjects. ICT or computer education on the other hand refers to the introduction of computers as an object of learning, that is, teaching and learning *about* computer technology. ICT or computer education is aimed at preparing future generations to shape, contribute to, and thrive in the digital society and economy.

During the 1970s and 1980s, the concept of “computer literacy” crept into the language of educational debates and programmes.<sup>10</sup> The term was closely aligned with the traditional concept of literacy, referring to the cultural techniques of reading, writing, and arithmetic. The concept of computer literacy insinuated a contemporary perception of computing as a new addition to the basic sets of ideas, beliefs, and methods of communication in society. However, while there was widespread agreement that some level of computer literacy ought to be part of a modern education in the “information society”, it seemed less clear exactly what this would entail.<sup>11</sup> Numerous labels for introductory forms of computer education were brought forward, such as computer awareness, computer appreciation, computer

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<sup>10</sup> Norbert M. Seel and Nancy C. Casey, “Changing Conceptions of Technological Literacy,” in *Disadvantaged Teens and Computer Technologies*, ed. Norbert M. Seel and Paul Attewell (Münster: Waxmann, 2003), 36.

<sup>11</sup> Peter Kelman, “Computer Literacy: A critical Re-examination,” *Computers in the Schools* 1, no. 2 (1984): 3, [https://doi.org/10.1300/J025v01n02\\_02](https://doi.org/10.1300/J025v01n02_02); Seel and Casey, “Changing Conceptions,” 40.

initiation, computer familiarization or computer fluency.<sup>12</sup> Similarly, computer literacy curricula differed widely in terms of their aims and contents. Occasionally, the variety of different conceptions and associations of the term is reflected in the literature by using the plural form of “computer literacies”.

On the one hand, concepts for computer literacy can take on a more “socially-oriented” form that focuses on the digital transformation of society and the economy and how it can be shaped by the people, covering topics such as data privacy, automation of jobs, and changing conditions of working and living in a digital society. On the other hand, computer literacy approaches may also take a more “technically-oriented” form, focused on the functioning and use of computer technology, aimed at training skilled soft- and hardware users, as well as teaching programming and algorithmic thinking.

As the case studies in this edited volume illustrate, concepts of bringing computers into the classroom are seldom that clear-cut, and often serve a variety of different goals and stakeholders' priorities. Different actors involved in the introduction of computers into education advocated for diverse concepts and approaches, and both national and local policies and curricula shifted in priorities over time.

## Actors, Interests, and Coalitions

In his groundbreaking study on the implementation of new information technologies in Silicon Valley schools, Larry Cuban, almost twenty years ago, impressively demonstrated the importance of a historical perspective for understanding the digital present.<sup>13</sup> Cuban distinguishes three different goals that were associated with the introduction of computers in schools. First, computers were intended to make school teaching more efficient and effective. Here, computers were in line with the longer history of teaching machines, as recently traced by Audrey Watters.<sup>14</sup> They were seen as an educational tool in the hands of teachers and administrators. Second, the exponents of increased computer use had a progressive education agenda and wanted to use the new devices to make teaching more stimulating and learn-

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<sup>12</sup> Tjeerd Plomp and Jan Van de Wolde, “New Information Technologies in Education: Lessons Learned and Trends Observed,” *European Journal of Education* 20, No. 2/3 (1985): 243, <https://doi.org/10.2307/1502953>.

<sup>13</sup> Larry Cuban, *Oversold and Underused: Computers in the Classroom* (Cambridge, MA: Harvard University Press, 2001).

<sup>14</sup> Audrey Watters, *Teaching Machines: The History of Personalized Learning* (Cambridge, Massachusetts: The MIT Press, 2021).

ing closer to the real world. In this case, they were perpetuating a history that Katie Day Good has recently described for media use in classrooms in the first half of the 20th century.<sup>15</sup> Third, proponents of introducing computer education were concerned with preparing students for the future world of work. In this respect, the computer euphoria differed from earlier waves of technological transformation of the classroom. While teaching machines, slide projectors, school television, and language labs were thought of as more efficient and stimulating teaching tools, the computer in the classroom seemed to be a representative of future society. It was not just a means to an end, but already part of an emerging digital society.

Victoria Cain recently added an important perspective to Cuban's case study findings. In her historical analysis of computer education in the US in the last third of the 20th century, she argues that PC's as educational tools, unlike school television and other earlier media, were radically focused on personalization. The focus was no longer on providing shared educational experiences, but on individualized educational programmes on the computer, tailored to the needs of a particular social group. Since computers could still not be afforded by everyone, early computer education primarily addressed an affluent middle-class clientele. The internet then promised a new balance between personalization and more community-based approaches in the 1990s, but this was not realized.<sup>16</sup>

Cuban's history of introducing computers into Silicon Valley classrooms already attempted to answer who was backing the American computer education agenda. He identifies a "loosely tied national coalition of public officials, corporate executives, vendors, policymakers, and parents" for new technologies for schools in the 1980s. Cain sees a similarly wild coalition of school administrators, computer scientists, disability rights activists, parents, and concerned citizens behind the computer education agenda in the US.<sup>17</sup>

Joy Lisi Rankin puts a slightly different focus in her study of computer use in the 1960s and 1970s in the United States. She emphasizes the grassroots nature behind the many efforts to make greater use of computers in education. She pays particular attention to teachers and lecturers who built computer networks between schools or colleges – and to creative use by students.<sup>18</sup> This is in line with findings

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15 Katie Day Good, "Making Do with Media: Teachers, Technology, and Tactics of Media Use in American Classrooms, 1919–1946," *Communication and Critical/Cultural Studies* 13, no. 1 (2016): 75–92, <https://doi.org/10.1080/14791420.2015.1092203>.

16 Cain, *Schools and Screens*, 141–173.

17 Cain, *Schools and Screens*, 145.

18 Joy Lisi Rankin, *A People's History of Computing in the United States* (Cambridge, MA: Harvard University Press, 2018).

of historical research that emphasize the role of Swedish teachers as early adopters in computer education.<sup>19</sup> Thus, there are two opposing readings here: early computerization as the result of a bottom-up grassroots movement or as the result of an ad-hoc coalition between powerful allies (such as state authorities, companies, pressure groups and university professors). These different narratives are also accompanied by different historical foci. Those who emphasize the grassroots character of early computer education tend to paint a picture of decline.

But no matter which historical narrative is invoked, private technology providers play an important role in all accounts. It almost goes without saying that computer manufacturers and distributors had a vested interest in seeing schools use more computers. In Rankin's account, it was Digital Equipment Corporation that not only promoted its minicomputers as educational devices, but also published a successful BASIC manual. In Cain's account, it was Apple that targeted schools early and aggressively. For all the grassroots activism and commitment of dedicated math or physics teachers, it should not be forgotten that the hardware, at least in capitalist countries, often came from private companies that wanted to sell their products and get future customers acquainted with their system environments from a young age. This was countered by attempts, particularly in Europe, to produce government or nonprofit solutions and their own school computers instead.<sup>20</sup>

## How Computers Entered Europe's Classrooms

In research on the history of education in Europe, the question of how computers found their way into classrooms has so far been largely neglected. A few historical studies on individual national cases have been published, mostly by historians of technology. The edited volume by Plomp, Anderson, and Kontogiannopoulou-Polydorides is an early example of the attempt to collect national accounts of how computers were introduced into educational systems around the world.<sup>21</sup> Two edited

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<sup>19</sup> Lennart Rolandsson, "Teacher Pioneers in the Introduction of Computing Technology in the Swedish Upper Secondary School," in *History of Nordic Computing 3*, ed. John Impagliazzo, Per Lundin and Benkt Wangler (Berlin and Heidelberg: Springer, 2011), 159–167.

<sup>20</sup> Gerard Alberts and Ruth Oldenziel, "Introduction: How European Players Captured the Computer and Created the Scenes," in *Hacking Europe: From Computer Cultures to Demoscenes*, ed. Gerard Alberts and Ruth Oldenziel (London: Springer, 2014), 9; Sytze van Herck, "Re/Constructing Computing Experiences. From 'Punch Girls' in the 1940s to 'Computer Boys' in the 1980s" (PhD diss., University of Luxembourg, 2022), 221–341.

<sup>21</sup> Tjeerd Plomp, Ronald E. Anderson and Georgia Kontogiannopoulou-Polydorides, eds., *Cross National Policies and Practices on Computers in Education* (Dordrecht: Springer, 1996).

volumes by Arthur Tatnall, both entitled “Reflections on the History of Computers in Education”, were published in 2012 and 2014.<sup>22</sup> Their aim was to write both a history of technology and a social history of computing in education, drawing upon the memories and reflections of the authors who were themselves involved in bringing computers into schools. The case of the UK and the introduction of the BBC Micro has been the focus of publications by Tom Lean, Tilly Blyth and Neil Selwyn.<sup>23</sup> Scholarly work on the historical roots of computer education in Southern Europe is particularly scarce but could offer valuable insights for regional comparisons across Europe, and sheds light on transnational entanglements, as demonstrated by studies on the cases of Spain and Greece.<sup>24</sup> However, for many European countries, the histories of national policies and local initiatives for the introduction of computers into education are yet to be explored and written down. Especially from the perspective of the history of education, such case studies are urgently needed to historically embed current debates and developments regarding the digital change in education.

As Neil Selwyn points out, current critical scholarship around EdTech is pre-occupied with the allure of “sociotechnical imaginaries” and speculative “education futures” and remains largely disconnected from the histories of computers

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22 Arthur Tatnall, ed., *Reflections on the History of Computers in Education. Preserving Memories and Sharing Stories* (Berlin and Heidelberg: Springer, 2012); Arthur Tatnall and Bill Davey, eds., *Reflections on the History of Computers in Education. Early Use of Computers and Teaching about Computing in Schools* (Berlin and Heidelberg: Springer, 2014).

23 Tom Lean, *Electronic Dreams. How 1980s Britain Learned to Love the Computer* (London, New York: Bloomsbury Sigma, 2016); Lean, “Mediating the microcomputer”; Tilly Blyth, “Computing for the Masses? Constructing a British Culture of Computing in the Home,” in *Reflections on the History of Computing*, ed. Arthur Tatnall (Berlin and Heidelberg: Springer, 2012), 231–242; Tilly Blyth, *The Legacy of the BBC Micro. Effecting Change in the UK’s Cultures of Computing* (London: Nesta, 2012); Selwyn, “Learning to Love the Micro”; Neil Selwyn, “Making the most of the ‘micro’: revisiting the social shaping of microcomputing in UK schools,” *Oxford Review of Education* 40 (2014): 170–188, <https://doi.org/10.1080/03054985.2014.889601>.

24 On the case of Spain: Cristian Machado Trujillo, “Education and historical evolution of information and communication technologies: Background, international influences and their development in Spain in the 1980s” (PhD diss., University of La Laguna, 2021); Ramon Puigjaner, “Evolution of Computer Education in Spain: From Early Times to the Implementation of the Bologna Agreement,” in *Reflections on the History of Computers in Education: Preserving Memories and Sharing Stories*, ed. Arthur Tatnall and Bill Davey (Berlin and Heidelberg: Springer, 2012), 143–165; Javier Osorio and Julia Nieves, “The Beginnings of Computer Use in Primary and Secondary Education in Spain,” in *Reflections on the History of Computers in Education: Early Use of Computers and Teaching about Computing in Schools*, ed. Arthur Tatnall and Bill Davey (Berlin and Heidelberg: Springer, 2014), 121–130. On the case of Greece: Agapi Vavouraki, “The Introduction of Computers into Education as a State Directed Initiative: A Case Study of the Greek Policies Between the Years 1985 and 2000,” *Educational media International* 41 (2004): 145–156.



in education.<sup>25</sup> But the historical perspective is useful, if not indispensable, to attend to the important issues of social, economic, and political contexts. Narrating the histories of the computers' entry into the classroom involves being mindful of economics and government policy as shaping forces in the introduction of computers into education, as well as the messy social realities of classroom life.

This edited volume addresses this gap in the historiography of education by asking how computers were introduced into classrooms in different transnational or national, political, and economic settings across Europe. The contributions shed light on the computerization of general education from a historical perspective, by attending closely to the different actors involved – such as politicians, computer manufacturers, teachers, and students –, political rationales and ideologies, as well as financial, political, or organizational structures and relations.

The case studies explore how the educational challenge of new information technology has been addressed since the 1960s in Europe. The volume highlights differences in political and economic power, as well as in ideological reasoning and the priorities set by different stakeholders in introducing computers into education. However, the contributions also suggest that simple cold war narratives fail to capture the complex dynamics and entanglements in the history of computers as an educational technology and a subject taught in schools. The national case studies show striking similarities between very different political and economic systems with regard to rationales and educational strategies, as well as the hopes and promises, challenges and issues that accompanied the advent of new information technology in education. Furthermore, the case studies point to different paths in bringing computers into the classroom, for example, regarding the division of responsibilities in hard- and software procurement and financing.

The introduction of computers into education often started out with local initiatives by teachers, parents and students, followed by efforts of government or coordinating bodies to harmonize and boost efforts, e. g., through active national programmes.<sup>26</sup> Centralized governance, such as in the case of France or Sweden, seems to have led to more standardization in computer education. Local or regional responsibility and decentralized approaches, as in West Germany and Switzerland, led to more heterogeneous approaches on the ground.

This edited volume comprises, on the one hand, studies that follow the historical developments from a top-down perspective, focusing on political strategies, in-

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<sup>25</sup> Neil Selwyn, "The 'wonderful usefulness' of historical perspectives on EdTech," *Ed Tech Key Issues* 4 (2022), <https://criticaledtech.com/2022/03/03/the-wonderful-usefulness-of-historical-perspectives-on-edtech/>.

<sup>26</sup> Bob L. Taylor and Monika M. Strauss, "Computer Education in Western European Secondary Schools," *The High School Journal* 71 (1987): 51–56.

itiatives, and realities on transnational and national levels. Some contributions, on the other hand, consider the perspectives of teachers and students in the classrooms. They tell the story of how computer technology unfolded in the specific social sphere of the classroom, from which new peer groups of computer pioneers and enthusiasts among students and teachers emerged. In addition, several case studies also point to the involvement of private industry, in particular hard- and software providers. Their offers of assistance in the development of curricula, teaching aids, educational software, and teacher training programmes complemented or even partially replaced the state-mandated development of school computers and software, often helped by the efforts of teachers who developed their own instructional software.

The contributions in this book focus on different national cases. They also emphasize different facets of the introduction of computers into the classroom. The variety of aspects covered by the different case studies highlights how the history of computers in education is a history of power, money, technology, and emotions. In the process of introducing computer technology into schools, excitement over novel approaches, the pride of being considered a pioneer, the concerns over lagging behind the international competition and both the hopes and fears in face of a new and yet unfamiliar technology in the classroom have been driving forces behind the actions of politicians, teachers, pupils, and parents. This edited volume strives to provide these missing narratives to understand and make sense of the historical role of the computer in education and its entanglements, as this new technology entered the classrooms of emerging digital societies in Europe.

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