

Powerful algorithms in education

Social science researchers acknowledge that algorithms and the people who produce them now play a significant role in our everyday lives. Algorithms are not merely neutral mathematical devices but powerful parts of the digital technologies that we use in our social lives, work and education.

UNDERSTANDING ALGORITHMS

Technically, algorithms are step by step instructions written by computer programmers to solve particular problems. Modern software consists of thousands of complex coded algorithms, many of which are constantly being tweaked and refined as their producers monitor their performance.

Algorithms are complex technical systems, but also social products designed to accomplish the goals of their producers and promoters

Algorithms also need to be understood as social products. Any algorithmic system is ultimately the product of human hands and minds, designed to accomplish the purposes and goals of its producers and promoters.

ALGORITHMIC EDUCATION

The role of complex algorithms in contemporary education is proliferating. The new technology of 'learning analytics' has been developed to track and monitor learners' progress, and then to make automatic recommendations that might optimize

their future learning and the environments in which it occurs.

Learning analytics systems make sophisticated use of machine learning algorithms. These systems have to be 'trained' on data from huge numbers of learners, and are infused with goals determined by their producers.

Algorithm-driven applications are transforming educational practices, processes and places

The global education publisher Pearson has become a major promoter of learning analytics systems through a partnership with Knewton. Knewton provides the back-end analytics algorithmic systems that enable Pearson e-learning products to conduct automatic assessment of learning as it happens. Together, these companies are amassing data on millions of learners that can then be analysed by machine learning algorithms in order to determine appropriate interventions.

Algorithmic systems can also be used in the assessment of behaviour. ClassDojo is a sophisticated algorithmic system for awarding points for good behaviour in the classroom. Informed by emerging psychological theories, the app depends on algorithmic processes that can turn the awarding of points into behavioural profiles of each learner. The goals and purposes of ClassDojo are expressed psychologically and accomplished algorithmically, all animated by



the aim to normalize new forms of classroom management practice.

ALGORITHMIC EXPERTISE

New developments in the application of algorithmic systems to education are the result of activities by powerful commercial, governmental

Organizations with expertise in algorithmic systems are becoming new legitimized authorities in diverse educational matters

and civil society organizations. They have the capacity to produce and promote algorithmic systems that are changing the practices and processes of contemporary educational institutions. The design of algorithmic education systems is infused with the aims and aspirations of such organizations.

Global commercial education companies such as Pearson and Knewton have sought to make contemporary educational practices, processes and places seem problematic and in need of fixing. Their business plans make algorithmic systems into marketable technical solutions.

While Pearson is a well-known commercial company, many of the organizations advocating more algorithmic forms of education are less publicly visible.

ClassDojo owes its existence to Silicon Valley venture capital firms and ‘ed-tech incubator’ programs. These new invisible actors in the contemporary education landscape have considerable authority in deciding which technologies to fund and support, and therefore in shaping educational practices. They share the conviction that algorithmic systems are the key to improving education.

Outside of the commercial domain, influential think tanks including [Nesta](#) and the [Education Foundations](#) are campaigning for better appreciation and use of algorithmic systems in key areas of government such as education. These intermediary organizations act as policy influencers and lobbyists to make algorithmic processes seem like the best solution to current educational problems.

ALGORITHMS OF THE POWERFUL

Historically, critical educational research has focused on the reproduction of ‘official culture’ and ‘knowledge of the powerful’ through the institutions of education. In this debate, school was understood to be under the control of political and economic elites, which shaped what versions of culture and knowledge would be passed on to the next generation.

Debates about the organization of education need to acknowledge the powerful new role played by algorithms and their producers and promoters

With new algorithmic forms of education, power over the social organization of educational practices, processes and places is being concentrated in the hands of new technical experts, companies and intermediaries. These organizations are producing and promoting algorithmic systems that are changing the nature and work of education systems. They are reshaping the ways that learners encounter knowledge, how teachers assess behaviours and progress, and how learners understand their own learning processes.

Through the work of commercial companies, funders and think tanks, the [algorithms of the powerful](#) are becoming significant influences in educational practices and places.