

Dataveillance and Care in Teachers' Work with Early Warning Systems

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Abstract

It has now become a widespread practice in both public and private organisations to analyse data collected through digital systems and tools. Datafication in schools has resulted in additional work tasks for teachers and an increased level of accountability on their part. One of these data-work-related tasks of teachers is to proactively recognize students who may be at risk of dropping out of school and help them. Machine learning holds significant promise in the creation of advanced early warning systems (EWS) for predicting such student dropouts. Such systems are in line with a positive discourse supporting teachers' effective decision making and a deeper understanding of student behaviour. In contrast, critical scholars raise concerns about the impact of data-driven practices in education on the teaching profession. This study adds to this body of literature by exploring how teachers are regulated by and regulating EWS as part of their work practice.

In this study as part of a larger working life funded project, we focus on one digital tool used in Swedish upper secondary schools called StudyBee, integrated with Google Classroom and connected to the Swedish National Agency for Education. We conducted a combination of ethnographic methods such as desktop research of application's website and social media posts to gain a deeper knowledge on the StudyBee's Graphical User Interface, interviews with teachers and principals, as well as go-alongs with teachers to understand their interactions with EWSs. Based on Decuyper's (2021) topological framework, we analyse what is happening on, with, behind, and beyond EWS.

To argue that teacher work is shaped by accountability mechanisms, we use a critical perspective on teacher work within the digital platform/accountability discourse, aiming to reveal underlying power dynamics. We apply the concept of dataveillance (datafied surveillance, Clarke in Lyon, 2022) to illustrate how power operates, encouraging teachers to self-regulate in alignment with school accountability. Furthermore, we utilize the concept of care (Zakharova & Jarke, 2022) to understand technology-related aspects and care for students.

Our analysis shows how EWSs bring heightened accountability and dataveillance of teachers' work. Our findings show that the student data reports can be monitored by various parties, including the policymakers, school staff and third parties within the Google Ecosystem. The normalised, continuous, and ubiquitous dataveillance of students, maintained by teachers' extra work as well as other stakeholders in the pursuit of care of students and accountability demand. Schools raise concerns over the overtrust regarding the reliance on emerging datafication practices such as superficial classifications of EWSs.

Keywords

early warning systems, teacher work, accountability, dataveillance, care with technology, machine learning

Introduction

Over the last two decades, educational systems across the world have embraced globalised trends prioritising accountability through digital data-driven practices. Both teachers and students are subject to continuous measurement through the collection, recording and storage of data, which is commonly known as the 'datafication' of education (Knox, Williamson & Bayne, 2020). Datafication can be defined as "*something is made into data [...] out of human life*" (Mejias & Couldry, 2019, p. 1). In academic discourse, it is employed to describe the increasing reliance on big data, numerical analysis, learning analytics, machine and algorithmic learning and decision-making facilitated by digital technologies and platforms (Hartong & Förschler, 2019). Early warning systems (EWSs), provide one example of such emerging datafied practice for detecting, predicting and intervening on students "at risk" of dropping out or being "off track" for graduation. EWSs are often integrated with digital platforms in education and combines automated as well as the manual data work of teachers. In teacher

work, EWSs holds the promise of proactively recognizing students in need of help, making decisions more efficient and deepening the knowledge of student behaviour. However, there exists a limited body of literature that delves into how teachers are regulated by and regulating EWS as part of their work practice. In this study, we adopt Decuyper's (2021) methodological framework to critically explore how teachers work and interact *with* early warning systems in relation to what is *on*, *behind*, and *beyond* the digital system. Our case is based on the StudyBee application, integrated with the Google platform in Swedish schools.

Recent research shows that datafication in education has brought significant changes in the nature of teacher work (Daliri-Ngametua, Hardi, & Creagh, 2021; Mockler & Stacey, 2020). According to Hwang, Chu and Yin (2017), data-driven practices demand new work tasks for teachers including collection, analysis, and interpretation of data of students' learning performance and behaviour. New forms of teacher work responsibilities are therefore emerging and for providing accurate and objective delivery of datafied decisions (Holloway & Brass, 2018). This stands in contrast to how teachers have needed to distance themselves from external accountability measures such as standards, tests, indicators, and evaluations. Instead, they placed a higher value on their professional judgment, experience, and relationships with students as the primary guide for effective teaching (Holloway & Brass, 2018). In a similar vein, Lewis and Holloway (2019) and Daliri-Ngametua et al. (2022) illustrate the way that the traditional reliance on teacher judgment in teaching has gradually been replaced by measurable tools. Not only are students monitored, but data also plays a crucial role in evaluating teacher work as well, providing tangible proof of their effectiveness to deliver education in a 'quality' manner that aligns with the standards set within performative accountability systems (Holloway & Brass, 2018; Mockler & Stacey, 2020).

Based on the above, there has been a growing emphasis on researching the impact of data-driven practices in education, especially concerning the regulating effects on the teaching profession in terms of accountability. Critical research more focused on the actual interface of data-collecting and automated functionalities integrated with teachers' work have related to the regulating powers of dataveillance in schools (Selwyn, 2015) allowing for the normalisation of surveillance through data which at least partially, can replace teachers' own monitoring of students. This study contributes to this field by ethnographically exploring the powers of EWSs for mitigating the challenges of students at risks, and dataveillance of school performance that form as parts of teacher work practice. This study is part of a larger project funded by The Swedish Research Council for Health, Working Life and Welfare that has explored how the work of Swedish teachers has been influenced by the integration of digital platforms and technologies in schools, in response to significant political and economic influences both in Europe and other regions across the globe. The project has specifically focused on whether there are gaps or tensions between the demands put on teachers' digital work in relation to the available resources. The project for example has shown the differentiating and relational powers of how platforms and socio-technical infrastructures are affecting teacher work depending on school resources (Bergviken Rensfeldt & Hillman, 2023). The project employed several ethnographic methods such as observations in classrooms and teacher meetings, teachers' reports on their digital activities, interviews with teachers, principals, and IT school administrators, and policy infrastructural mappings in order to gain a rich understanding on the research topic. In this particular study, we have conducted ethnographic field work in two upper secondary schools, one private and one public school, and especially gathered data that included examples of automated EWS functionalities in one of the schools. The study includes desktop research covering websites (e.g., www.studybee.se/tools) and posts on social media sites for EWSs, interviewing teachers and principals, as well as go-alongs with teachers to explore the platforms and EWS plug-ins they use, how they work with them, and the data practices.

In this study, we argue that Swedish teachers' work is regulated by the accountability discourses and mechanisms associated with the datafication of schools (e.g., primarily including standardised tests, performance assessments, learning evaluations, recording and predicting student behaviour in datafied forms). Analytically, we understand the kind of accountability regulating teacher work inscribed onto school platforms and plug-in applications such as EWSs adapted by teachers themselves, can be conceptualised as dataveillance or 'datafied surveillance' (Clarke in Lyon, 2022), relating to the surveillance concept to describe the practice of monitoring and classifying behaviour of students (Foucault, 1977). Our analytical framework relates to research by Perotta et al. (2021), Selwyn (2015) and Nichols and Monea (2022), evidencing how the penetration of platforms and datafication practices allows for many forms of surveillance in education. Added to this, we also needed a theoretical concept for understanding aspects of *care with technology* (Zakharova & Jarke, 2022), as the care for students were prominent parts of the discourse and materiality of the datafied work practices that aligned with EWSs. Thus, we apply a critical perspective of teacher work in digital platform/accountability discourse, seeking to uncover power dynamics at play within this regulating discourse.

The digital tool- StudyBee

StudyBee is a Swedish edtech startup company based in Malmö and backed by the state-owned Almi Invest. It is a Google for Education Partner in the form of a digital application focusing on student development and assessment. Notably, it facilitates ongoing assessment aligned with course learning objectives. StudyBee provides a history of all educational activities, enabling teachers, principals, and special educators to make informed decisions regarding action plans, planning adjustments, and communication with students and their guardians. One of its standout features is an integrated EWS that identifies students at risk of not meeting course objectives. It allows principals and special educators to access real-time data on students' achievements across various courses without necessitating manual document submissions from teachers. Additionally, students and their guardians can easily monitor their progress in different courses. The broad adoption of StudyBee in various educational institutions throughout Sweden, including both small and large schools in the public and private sectors, renders it an interesting subject for research.

Methodology and Method

The research was carried out in two different upper secondary schools in Sweden, pseudonymized as Journeyman School (public-municipal school organiser) and Chamberlain Academy (privately run school consortia organiser). In each school at least two teachers, one man and one woman, from two different subject areas have participated, as well as two or three principals from each school. In the Journeyman School four teachers from two upper secondary programs, one national program and one international program, also participated.

For this research, we employed ethnographic research methods where we early on identified how teachers and principals in the two schools worked with and experienced different datafied platform applications for predicting or diagnosing student behaviour. Through observations and interviews, the EWS application 'StudyBee' in the Chamberlain Academy platform ecology was chosen as the case. From there, we explored StudyBee's Graphical User Interface (GUI) to determine its functions and features. Following Decuyper's (2021) analytical framework, we explored the platform *interface* (comprising text, images, videos, etc.) that enabled us "to disentangle what happens *on* the platform" (p. 75). This involved understanding what the platform actively does and how its design sets the parameters that impact user behavior and practices. Taking inspiration from the questions presented in Decuyper (2021, pp. 75-76), we wanted to explore the StudyBee interface to discern what it measures, calculates, and classifies, how information is organised, and how it is expected to be used by the teachers. In addition, we wanted to gain insights into "how users actually interact *with* the platform" (Decuyper, 2021, p. 76), focusing on how teachers use and work with StudyBee, what kind of work tasks and activities they perform, which features do they use most frequently, whether any invisible work might be happening aside from the work on the tool, and what work habits are adopted. For the GUI exploration, the go-along method (Jørgensen, 2016; Kusenbach, 2016) was conducted. In this method, a teacher guided one researcher through a virtual tour of the digital platforms including the StudyBee's functions at the GUI level by offering information on the visual arrangement, as well as how these visual elements are organized in a way that encourages specific behaviors in relation to the work. The researcher documented the actions taken by audio-recording the tour descriptions and capturing screenshots of the tool's features.

Following Decuyper (2021, p. 78), critical scholars are encouraged to adopt a perspective that goes *behind* the design of the platform, which means "inquiring the relational constellation that are generated *behind* the platforms' actual interface". It involves investigating the diverse entities, both human and non-human, that work together to enable the interface's functionality. To analyze StudyBee *beyond* its design, we conducted desktop research on the website and made use of the platform infrastructure mappings. This research aimed to uncover how the platform configures the teaching practice by understanding its infrastructure elements, including application programming interfaces (APIs) based on the information and documentation available on the website and school observation documentation. These elements were crucial to scrutinize because they shape the platform's purpose, and, in turn, (re)shape the practice of teachers' work. Lastly, we returned to the ethnographic fieldwork beyond the platform application itself to focus on the broader platform ecology and local particularities of Swedish schools to discuss these emerging educational data practices on and in relation to digital platforms.

Preliminary Findings and Analysis

In what follows, we provide an analysis drawing on the concepts of *dataveillance* and *care* in relation to EWS application. Focused on upper-secondary school teachers' experiences, who participated in the larger project, the

analysis demonstrates how dataveillance emerges when teachers work and aligns *with* the StudyBee application related to different types of dataveillance *on*, *behind*, and *beyond* the platform-integrated application.

Dataveillance and care on StudyBee application

Our observations and the go-along method with the teacher showed how teachers make decisions regarding students' performance based on the EWSs, particularly focusing on the visual cues provided by the colour-coded indicator system (see Figure 1). For instance, the green colour indicates students' typical performance with no immediate concerns, the yellow colour serves as a cautionary signal for minor concerns, and the red colour signals an emergency situation where teachers implement action plans to address the extra support on student's needs. In this way, it might be deemed that teachers show their care of students through the use of technology.

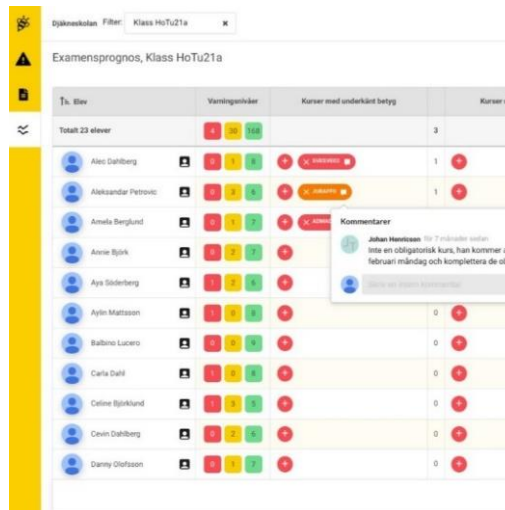


Figure 1: A post on Instagram of the StudyBee's official page (@studybeofficial)

The StudyBee application's features align with the quality standards for teachers when identifying students who may be at risk and face difficulties. According to the company website, teachers are expected to use and work with the EWSs on a daily basis, as it is considered to play a crucial role in the school's accountability. Historically, the discursive promises of such automations of teacher work are not new (Bergviken Rensfeldt & Rahm, 2023), the intensity of these data practices however seem to be escalating (Nichols & Monoa, 2022).

Dataveillance and care with StudyBee application

Despite the website's clear claim that StudyBee is designed to streamline tasks and help teachers avoid manual work, teachers' actual experiences differ. In the course of conducting the go-along method, all participants elaborated on the need for conducting manual work on generating and compiling comparable data either directly on the school's platforms or on their own Excel sheets documentation, for later integration into the school's platforms, rather than using merely the EWSs such as StudyBee directly. This choice is influenced by various factors, such as the preference for restricting data access solely to teachers and school staff while excluding parents and students and making the diagnostics temporary and not publicly documented. One of the teachers expressed the perspective of double work, this involves as follows:

This is how we can then re-enter, then it will be different colours here in any case. And so, if there are no problems in the class, you mark everything green and if you are afraid that some student, we probably need to keep an eye on this student, then you mark it in yellow and if there is a student who like this: "This one will have a really hard time passing the course. I'm already afraid it could be an F [indicating fail]", then you make it red. (Go-along with teacher)

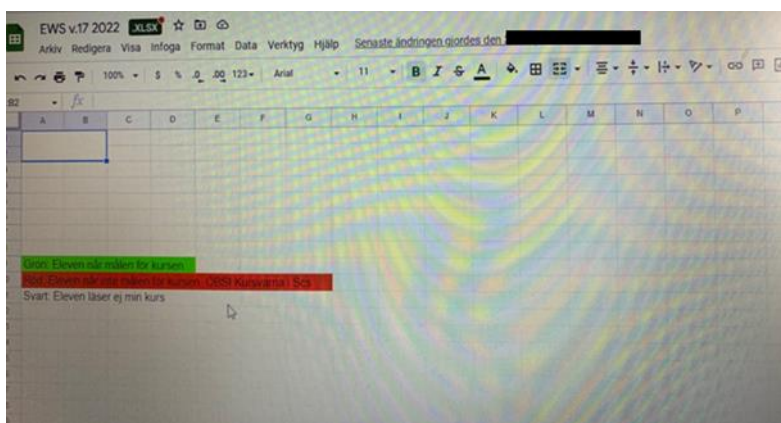


Figure 2: Picture captured from teacher’s laptop during the go-along method

Teacher’s role has been shaped by the acceptance of working with data as an integral part of the job. When asked by the researcher about their workload and the continuous need to stay updated on students’ knowledge and attendance, the response suggests that the teacher sees these tasks as fundamental aspects of being a teacher. Teacher’s statement, “mm, that’s what the teaching job is all about!”, underscores her/his recognition that data-related responsibilities are closely connected to teaching profession. This indicates that teachers nowadays show their care for students through technology by efficiently handling and utilising data to improve the overall learning experience of their students. However, the teacher acknowledges the presence of various responsibilities and tasks that must be adhered to in teacher’s role in relation to school datafication. During the go-along method, the teacher explained “we have very good throughput at this school, and it’s been quite a few years since we check things like this every six weeks.”

Thus, the teacher acknowledges the multifaceted workload, work effort and school’s commitment to effectively managing its tasks and responsibilities to produce a good throughput. Thus, teachers have accepted working with data and normalising dataveillance powers by internalising the belief that it is an inherent part of their professional responsibilities and care (Selwyn, 2015; Zakharova & Jarke, 2022), influenced by the norms of their profession and the accountability pressures.

Dataveillance and care behind StudyBee application

A multiplicity of actors has the capacity to monitor both student data and the performance of teachers on the StudyBee application. This is explicitly articulated on the platform’s website, where it mentions that “principals and other school leaders’ access to a constantly up-to-date picture of the students”. In addition, the StudyBee mobile app should ‘empower’ both students and their guardians to stay informed. Consequently, the StudyBee application incorporates a power dynamic that operates both from the top-down and the bottom-up, rendering teachers’ digital work subject to dataveillance and accountability of showing care of students’ performance. During an interview with one of the school principals, the school seldom question the EWS data practice and “what those colours actually mean”, arguing that people “think that they are securing things”, while they rather distribute the trust to the system when they rather should rely more on their own judgment and interpretations of data. According to the principal, it “requires quite a lot of systematics and control to be worthwhile and might end up in a work environment issue as it requires extra work and produce professional insecurities. Overtrusting in these automated systems therefore is a problem raised (Selwyn et al., 2023).

Dataveillance and care beyond StudyBee application

Moving *beyond* StudyBee application reveals how school data and digital work of teachers are subject to be scrutinised by other actors within the broader platform ecology in which it operates. As noted in both the go-along method and our website observations, the Google platform ecology plays a significant role in teachers’ digital work, and more detail, in the process of datafying teachers and students’ activities. The website clearly states that “StudyBee’s digital tool is directly integrated with Google Classroom to give school leaders and students increased opportunities to succeed in achieving their goals and at the same time feel good.” Clearly, the StudyBee application cannot stand on its own and relies on extra work of both people and integrations such as API. The importance of the Google ecology beyond StudyBee was also reported by a teacher during a go-along exploration of the StudyBee interface, stating that the teachers now could bypass the EWSs, and start running similar data work on Google Drive applications instead. Such preference suggests that Google Drive may better align with their work needs or offer greater convenience compared to the StudyBee application. However, the teacher

indicates that the transition of integrating data between the EWS and Google Drive to ensure consistency and accuracy requires double work or manual work from teachers, invisible work to others. The adaptation to the Google platform ecology includes both third-parties such as the StudyBee application as well as the teachers. Consequently, the influence and values of big tech like Google driven by market and commercial profit data generation and aligning dataveillance conceal powers *beyond* the use of StudyBee.

Furthermore, as teachers serving a wider public accountability, it is their responsibility to adhere to public values, including demonstrating care for students by reporting and showing all the educational activities in StudyBee application, a platform similar to other school platforms, interoperable and connected with the Swedish National Agency for Education's API. This is evident in the website statement that "[I]n the StudyBee Assess view, teachers can link subject areas to the Swedish National Agency for Education's curricula." The data collected and documented by teachers within the application can inform education policy and policymakers. According to a teacher commenting during a go-along, it could perhaps be that "Statistics Sweden has something that they want to have reported" and exemplifies "how many students in the upper secondary school in Sweden receive special needs support plan". For teachers, it seems unclear how and who is benefitting on their data, nevertheless, they are regularly involved in compiling such data reports and quite invisibly under the dataveillance of external stakeholders and by various political and corporate actors. Therefore, the connection between the lack of knowledge and transparency on how the data is being used and the constant data monitoring through dataveillance practices make teachers maintain data work but still remain unaware of who is observing their work.

Conclusion

With this study, our intention has been to contribute to the critical research of datafied teacher work practices by ethnographically exploring EWSs, in this case the StudyBee application. In our analysis, we have traced the work of teachers and EWSs to reveal some of the powers involved as datafied and automated applications meet work practices. Our analysis shows the normalised, continuous, and ubiquitous dataveillance of students, maintained by teachers' extra work as well as other stakeholders in the name of care of students and accountability demand. Schools however raise concerns over the overtrust in emerging datafication practices epitomised by often superficial classifications of EWSs, implicating distrust in its value and working life consequences "when what can be counted isn't all that counts" (Mockler & Stacey, 2020). Whether limiting and de-escalating the powers of dataveillance (Nichols & Monea, 2022) is possible with the strong accountability and care inscribed in these practices is an open question. We can only point to that teacher professionals should decide how well platform applications and emerging practices align with their priorities and public matters of concerns for education.

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