ICSEI data use network symposium:
Building data, literacy and cultures that inform instructional decision making

Introductory abstract
This symposium investigates data use practices and culture for educational change. It focusses on data use at the instructional level. The first study (Germany) examines the perceived usefulness and the application of information sources that have the possibility to inform practice. The second paper (The Netherlands) addresses the role of data in differentiated instruction of teachers. The third paper (Germany) addresses the question of how principals and teachers can be supported with realizing a systemic inclusion of data in their development processes. The fourth conceptual contribution (USA) opens up and inspires the discussion on how to prepare teachers and administrators to become data literate and on how to create data cultures. The discussion part will have a focus on capacity building in the context of encouraging pupil competences. Also the topic ‘what counts as data’ will be touched as the papers also raise the question whether a positivistic stance should be taken or evidence can also be understood as a result of interpretation and negotiating among those involved. This proposal focusses on conference strand III “Leading Capacity for Change”, as it focusses on the use of capacity building in the field of data use for educational change and improvement.

Paper 1: What data do school leaders and teachers use and why? Evidence from a mixed-methods study
Sobering results in the PISA 2000 study served as a starting point for ongoing debates about the efficiency of the German school system. Subsequently, several instruments of a standards-based school reform have been implemented in Germany, such as statewide exams or school inspections. The data collected is not only used for monitoring by the administration, but should also inform decision-making and practices in schools. Grounding actions and decisions in evidence are considered a prerequisite for efficient and effective practitioner performance, and an increase in student achievement (Honig & Coburn, 2008). Yet indications about the extent to which German practitioners use data is limited, and little is known about factors influencing data-driven school improvement. Moreover, research on practitioners’ data use has mainly focused on single instruments, such as school inspections, whereas comparative examinations of different sources of information have failed to appear. Accountability is low in Germany, which might have consequences for data-driven school improvement in an educational system characterized by multiple principal-agent-relationships (Jensen & Meckling, 1976).

We conducted a mixed-methods study to investigate data use practices among German practitioners. We examined the perceived usefulness and the application of 13 different sources of information that can inform teachers’ and school leaders’ practice. 1,230 teachers and 297 school leaders from 151 schools took part in the questionnaire study. Descriptive statistics and multilevel regression analyses were used to analyze these data. Furthermore, detailed analyses were conducted in seven schools to help to further understand the causes and motivations for data-driven school improvement or a neglect of information sources.
respectively. The selected schools either showed an intense use (N = 4) or a minor use (N = 3) of data in the questionnaire study. In each of these schools, one school leader interview and four teacher interviews were conducted. These interviews were transcribed and analyzed by means of qualitative content analysis (Mayring, 2007).

The results showed that practitioners attributed little usefulness to instruments of a standards-based reform and consequently hardly used these data. Instead, they claimed to prefer process-oriented information sources, such as student feedback. Intra-class-correlations for the use of the different information sources ranged from zero (collections of assignments) to 0.18 (school-based comparative tests), indicating that the school level affects the use of most data sources. In the multilevel analyses, the perceived usefulness was a strong predictor for the use of an information source.

The interviews revealed different reasons for the use of data, with ease of work being mentioned most frequently. This was particularly true for the use of pedagogical journals focusing on a specific subject, as teachers were looking for practical teaching material. It also showed that most practitioners had difficulties in recontextualising external data to utilize it for their own practice; they also questioned the usefulness of these data. Hence, these findings not only pose the question of how useful standardized data are for practitioners, but also raise the issue of capacity building for data use.

**Paper 2: Data-based instructional differentiation: what does it require from teachers?**

It is generally assumed that for differentiated instruction (DI) teachers need to have an accurate picture of students’ levels of understanding, and that they also need to know which instruction and learning activity is appropriate for students performing at different levels (Deunk, Doolaard, Smale-Jacobse, & Bosker, 2015). In practice, DI is often reduced to grouping students based on their achievement, with only minor instructional differences between these groups (Deunk et al., 2015; Park & Datnow, 2017). However, the key to successful DI is not the grouping of students, but the quality of adapting teaching to what each student needs (Deunk et al., 2015).

The implementation of data-based decision making in Dutch primary education has led to an increased and better use of student monitoring systems, more thorough analyses of student achievement data, and a better picture of students’ educational needs (Inspectie van het Onderwijs, 2017; Keuning, Van Geel, & Visscher, 2017). However, most teachers find it very difficult to translate student progress data into differentiated teaching. Little is known about what it takes to do this well, and as a result teachers do not feel prepared for this important professional activity (Inspectie van het Onderwijs, 2015).

The present study was therefore aimed at investigating: a) which constituent skills are required for DI, b) the role of data use in DI, and c) what kind of knowledge DI requires from teachers. To answer these questions, a Cognitive Task Analysis (CTA) was conducted. CTA is a technique to identify, analyze and structure skills and knowledge used by experts to perform a complex task.
Based on classroom observations, stimulated recall interviews, and expert meetings with both teachers as well as with other differentiation experts, a detailed skill hierarchy of the constituent skills of DI was developed. Findings show that DI requires a wide range of skills, and that adapting instruction during the lesson cannot be separated from both the preparation of a lesson and a lesson period, as well as from the evaluation of the lesson afterwards.

Expert teachers indicate that they especially use data in the preparatory phases, but also that these data contribute to their ‘knowledge about students’ which is essential throughout the entire process. Although knowing how to use data does not necessarily lead to DI, since many other skills are needed as well, data are regarded crucial for being able to differentiate. Furthermore, two types of knowledge were regarded essential for DI. Knowledge about students’ educational needs, and knowledge of the subject matter taught (including pedagogical content knowledge).

The presentation will provide a detailed picture of what DI requires from teachers in terms of professional skills (including data use) and knowledge. To our knowledge, CTA into differentiation has never been done before. It provides a valuable basis for the design of teacher training trajectories for DI.

**Paper 3: Data-Driven Interpretation and Negotiation Processes. School Development in Socioeconomically Disadvantaged Areas.**

Studies show that schools that encourage competence in challenging circumstances incorporate data strongly into their school development practice (e.g. Muijs at al., 2004; Racherbäumer et al., 2013). However, this does not allow any conclusions about how and to what extent the school’s capacity for improvement interacts with processes designed to improve the quality and effectiveness of schools (Bremm et al., 2017).

We address the question of how schools can be supported in regard to the systemic inclusion of data in school development processes. From the perspective of organisational theory, it raises questions about the “ability to influence collective decision-making processes” (Feldhoff et al., 2014) in the organisation of schools. From a heuristic perspective it raises questions about the understanding of evidence as ‘objective truth’ and negotiation- and recontextualisation processes among stakeholders.

Studies dealing with evidence-based school development repeatedly report gaps between the various data available, reception, and actual involvement of data in school development decisions (Rousseau, 2006). Data that, once aggregated, may contain useful steering knowledge for school administrators can be perceived as having little significance at the individual level because it lacks the cultural significance of the specific context in the individual school.
(Heinrich, 2013), or it is not consistent with the experience of those involved (van Ackeren et al., 2013). An understanding of evidence as objective truth can be questioned in this regard because it can lead to the complex perspectives of the actual stakeholders being devalued. From a constructivist perspective encouraging discursive processes with a focus on matters of interpretation, incorporating stakeholders’ perspectives, and seeing evidence as part of a negotiation process could be helpful raising acceptance for data. A decisive factor in the transfer of data-based evidence into professional action seems to be the process of ‘recontextualising’ (Fend, 2008).

The project “Developing Potentials – Empowering Schools” is accompanying 35 schools in their evidence-based school development processes. In the context of this project, evidence is understood as a result of complex interpretation and negotiating processes among those involved. The interpretation of data collected on school processes and how they are used to define the need for action have not been pre-defined as part of the project; instead, they are negotiated among stakeholders themselves. To close the gap between available data and its use, providing support in the processing of the data is a key part of this project. Stakeholders of participating schools reflect on and validate the data within school networks and during on-site appointments in the project schools. The aim is to support schools in developing internal capacities for school development that systematically includes data, enabling them to establish school development as a sustainable part of their organisational culture.

The initial results of the evaluations accompanying the process suggest that the approach has been widely accepted by the project schools and is helping them to assume responsibility for systematic and evidence-based development processes in their schools. The corresponding findings will be reported.

**Paper 4: Creating Data Cultures in Educator Preparation Programs**

Two issues have emerged in educator preparation in the United States concerning the use of data. First, it is imperative that educator preparation programs (EPPs) prepare teachers and administrators to become data literate; that is, that they know how to use data effectively and responsibly. Second, EPPs must become data cultures to embrace the use of data for programmatic continuous improvement. This paper will examine what EPPs are doing to address both issues.

Data literacy for teachers (DLFT) is a construct that has been developed based on several years of empirical and theoretical research (Gummer & Mandinach, 2015; Mandinach & Gummer, 2013, 2016a, 2016b). It lays out the skills required to use data effectively and situates data use within a theory of teacher knowledge (Shulman, 1986, 1987). Because of the triangulation of data use skills with content knowledge and pedagogical content knowledge, colleges of education are the most likely venue for educators to receive their first exposure to data literacy concepts. Just like other critical knowledge and skills, educators should not be expected to
graduate and go out into practice without at least a passing exposure to data literacy and its importance in practice. This paper will describe the DLFT construct and explicate what educator preparation programs need to do to help educate future professionals to use data effectively and responsibly. This explication will describe the system in which effecting such educational is situated and why it is so complex. For example, significant organizations include not only the colleges of education but also governmental agencies, testing companies, school districts, and professional educator organizations.

Using data in EPPs for continuous improvement requires the development of a data culture within the institution. It also requires systemic change. Researchers and institutional leaders have begun to consider the data that need to be collected (Allen, Coble, & Crowe, 2014; Deans for Impact, 2016; Peck & MacDonald, 2014) and the structural and systemic changes that need to happen to create such cultures (Mandinach & Gummer, 2016c). Typically, the data that programs collect are: entrance data like grades and test scores; performance in courses and practical experiences; and post-graduation indices. But few if any of these data provide malleable variables that can be acted upon for actual improvement. So programs now are considering the data that can inform such improvement processes.

Having the right data is essential but EPPs must develop a data culture and organizational structures to make data collection actionable. For example, if an institution finds candidates are deficient in classroom management, there must be feedback linking to appropriate professors to help them modify their courses to ensure improved preparation. Yet, there is more to just the feedback loop. Professors must be willing to change their own practice. Such change is stimulated by leadership, a vision for data use, incentives to change, and help to minimize possible resistance. That is, there must be data cultures similar to those created in schools and districts. This paper will describe the complexities involved in effecting such change.

References


• Mandinach, E. B., & Gummer, E. S. (2016a, September). Data and educator preparation programs: Data for programmatic continuous improvement and data literacy for teachers. Keynote address at the annual CAEP conference, Washington, DC.


• Mandinach, E. B., & Gummer, E. S. (2016c). What does it mean for teachers to be data literate: Laying out the skills, knowledge, and dispositions. Teaching and Teacher Education, 60, 366-376.