



# Effects of an intensive data-based decision making intervention on teacher efficacy



Emmelien A. van der Scheer <sup>a,\*</sup>, Adrie J. Visscher <sup>b</sup>

<sup>a</sup> University of Twente, Department of Research Methodology, Measurement and Data Analysis, P.O. Box 217, 7500 AE, Enschede, The Netherlands

<sup>b</sup> University of Twente, Department of ELAN, Department of Teacher Development, P.O. Box 217, 7500 AE, Enschede, The Netherlands

## HIGHLIGHTS

- The effects of a data-based decision making intervention on Teacher Efficacy.
- A delayed treatment control group design with randomization.
- Significant positive effects for two groups of grade 4 teachers.
- The positive effects persisted one school year after the intervention.

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## ABSTRACT

Research into the effects of interventions on teacher efficacy is scarce. In this study, the long-term effects of an intensive data-based decision making intervention on teacher efficacy of mainly grade 4 teachers were investigated by means of a delayed treatment control group design (62 teachers). The findings showed significant strong intervention effects on teachers' efficacy for instructional strategies, and student engagement in both treatment groups. No significant effects were found for teacher efficacy regarding classroom management. Improved teacher efficacy in the first treatment group persisted throughout the second school year. Suggestions for future research are presented.

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## 1. Introduction

Despite the emphasis on data-based decision making (DBDM) in educational policy in several countries (Lai & Schildkamp, 2013), evidence regarding the intended effect of improved student achievement is still scarce (Campbell & Levin, 2009; Kaufman, Graham, Picciano, Popham, & Wiley, 2014). Professional development programs, designed to support schools and teachers with respect to the analysis and interpretation of the results of standardized assessments, infrequently lead to the desired effects (Carlson, Borman, & Robinson, 2011; Slavin, Cheung, Holmes, Madden, & Chamberlain, 2013). The Dutch Inspectorate of Education (2014) reported that although Dutch teachers improved in their ability to analyze the results of standardized assessments, they are yet to adapt their instruction sufficiently

towards the needs of students (as shown by the data analyzed). Possibly, teachers need more support, beyond a training course in data analysis skills, to manage adapting their instruction. Teachers for example, need to master differentiation skills for the full implementation of DBDM as students differ in terms of academic progress (Datnow & Hubbard, 2015; Dunn, Airola, Lo, & Garrison, 2013b). However, such skills are advanced teaching skills not mastered well by a considerable proportion of teachers (Van de Grift, 2007).

To provide the professional support that teachers need to be able to analyze and interpret classroom data, and to provide instruction that is adapted to students' needs, the researchers developed an intensive DBDM professional development program that addresses the various aspects of DBDM, with a strong emphasis on DBDM implementation in mathematics lessons. Little (2012) emphasized the need of insight into how teachers respond to data-use in practice, and of how teachers need to be supported in the implementation of DBDM.

Insight into a teacher's efficacy (TE), might be important in this

\* Corresponding author.

E-mail addresses: [e.a.vanderscheer@utwente.nl](mailto:e.a.vanderscheer@utwente.nl) (E.A. van der Scheer), [a.j.visscher@utwente.nl](mailto:a.j.visscher@utwente.nl) (A.J. Visscher).

respect as TE reflects whether teachers *think* they are able to support student learning (Bruce, Esmonde, Ross, Dookie, & Beatty, 2010). Teachers with a high sense of efficacy are confident about their ability to enhance student learning. Teachers with a low sense of efficacy predominantly attribute student learning to factors other than themselves (Bruce et al., 2010). A high sense of efficacy might therefore be an important prerequisite for working in a data-based way as it requires from a teacher to reflect on the impact of one's instruction, and on how this may be improved (Schildkamp & Kuiper, 2010). Moreover, teachers with a higher sense of efficacy are more likely to implement new teaching practices and will persevere, if confronted with difficulties (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Wolters & Daugherty, 2007). Therefore, it is important to investigate how teacher efficacy might promote the implementation of new (DBDM) practices in the classroom (Stein & Wang, 1988).

TE is mainly formed on the basis of a teacher's own experiences within the classroom (mastery experiences), observing well-performing peer teachers who succeed (vicarious experiences), and verbal persuasion by significant others (e.g. school leaders) (Bandura, 1997). In the professional development program (PDP) described in this study, teachers were provided with feedback on their instructional practices from both an external expert and from peers. Teachers were required to reflect on their professional behavior, to implement new practices, and provide feedback to other peers involved in the intervention. As these characteristics of the intervention are closely aligned with the three sources of TE, and, promoting TE could be important for the implementation of DBDM, the effects of this intervention on teacher efficacy were examined.

Only a small number of teacher efficacy studies was conducted with either an experimental (nine percent of 218 studies), or a longitudinal research design (six percent) (Klassen, Tze, Betts, & Gordon, 2011). As a result, little is known about the extent to which teacher efficacy can be improved through interventions (Henson, 2001; Klassen et al., 2011). This study incorporates both an experimental and longitudinal research design. The effects of the PDP on teacher efficacy were investigated at three stages: prior to the intervention, immediately after it, and a school year later. The main question answered in this study is:

What is the effect of an intensive DBDM intervention on teachers' efficacy?

## 2. Theoretical framework

In this section, first a description of what teacher efficacy entails (and the broader term 'self-efficacy') is provided, why it is important, and what is known about the influence of professional development programs on teacher efficacy. This is followed by a short description of the nature of DBDM, and of how the professional development intervention implemented in this study was designed to support teachers in implementing DBDM. Finally, an explanation will be offered as to how the DBDM-intervention was assumed to influence teacher efficacy.

### 2.1. Teacher efficacy

Bandura (1997) described self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Self-efficacy therefore reflects the *perception* of one's competences, and not necessarily of one's *actual* competences (Tschannen-Moran et al., 1998). It is constructed on the basis of four sources of information, namely enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997). Mastery

experiences are the most important source in the development of self-efficacy, and relate to one's own experiences regarding a competence. A successful experience will raise one's self-efficacy, while experiences of failure may lower a person's self-efficacy (Bandura, 1997).

Vicarious experiences involve observing someone else (for example a peer teacher) performing the competence that has to be learned by the observer. Generally, if the observed peer succeeds in the competence to be learned, this will positively influence the observer's self-efficacy (Bandura, 1997). However, the *extent* to which this will impact the observer's self-efficacy depends on the degree to which the observer identifies himself with the observed peer (Tschannen-Moran et al., 1998). When the observer perceives great similarity between the observed peer and himself, the impact on the observer's self-efficacy will be strong.

Verbal persuasion means that significant others, like peers, or experts, can express their faith in the capabilities of another person. However, the extent to which verbal persuasion contributes to efficacy generally is assumed to be limited.

Finally, one's physiological and affective state (e.g. anxiety, or excitement) when performing the task affects efficacy as well (Bandura, 1997; Tschannen-Moran et al., 1998). When, for example, a teacher experiences excitement while performing the competence that has to be learned, this is likely to positively affect that teacher's self-efficacy (Tschannen-Moran et al., 1998).

*Teacher efficacy* (TE) is a special case of self-efficacy, which is defined as "a teacher's expectation that he or she will be able to bring about student learning" (Ross & Bruce, 2007, p. 50). There is considerable evidence that higher levels of teacher efficacy is associated with more effort, more challenging goals, more perseverance etc. (Tschannen-Moran & Woolfolk Hoy, 2007; Tschannen-Moran et al., 1998). Tschannen-Moran et al. (1998) describe the development of teacher efficacy as a reinforcing cyclical process in which a teacher's TE ultimately becomes stable. This cyclical process entails the following: a teacher's efficacy affects that teacher's effort and persistence regarding the competence at stake, which will influence how the teacher performs in the classroom. The teacher's performance functions as a new source of efficacy information, which again influences the teacher's expectations regarding his or her ability to bring about learning. As the experiences gradually add less new information overtime, an individual's efficacy becomes more stable. TE therefore generally is formed during the early years of teaching (within approximately three years) (Bandura, 1997; Henson, 2001; Tschannen-Moran & Woolfolk Hoy, 2007; Tschannen-Moran et al., 1998; Woolfolk Hoy & Spero Burke, 2005).

#### 2.1.1. Teacher efficacy and professional development

Teachers with a higher sense of efficacy put more effort into organizing, planning and delivering their lessons, and display different, more difficult, instructional practices than teachers with lower levels of efficacy (Bandura, 1997; Wolters & Daugherty, 2007). Ross and Bruce (2007) found that teachers with a higher sense of teacher efficacy promote student autonomy and pay more attention to the needs of low-performing students. Moreover, TE is not only correlated with teacher behavior in the classroom, but also with student efficacy, motivation and achievement (Tschannen-Moran et al., 1998; Wolters & Daugherty, 2007). Because of the importance of TE for teacher behavior in the classroom and its effects on students, teacher efficacy might be an important factor to strengthen when trying to improve education (Tschannen-Moran et al., 1998). As mentioned in section 2.1., TE is assumed to become stable after some time when teachers leave their teacher training institutes and start their careers. Thereafter, self-efficacy may however be influenced by learning from feedback and

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