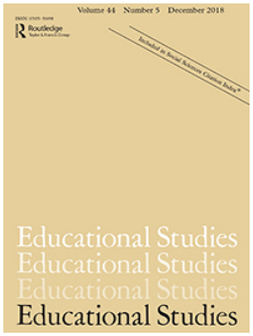

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Instrumental, conceptual and symbolic effects of data use: the impact of collaboration and expectations

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ABSTRACT

The contribution of data use in schools has been proven via visible changes in policy and practice in schools (instrumental effects), changes in practitioners learning or cognition (conceptual effects) and changes in opinions or attitudes regarding teaching or policy-making (symbolic effects). Nevertheless, limited research is available on the extent to which data use in schools results in the aforementioned effects and how they can be explained by data use expectations and collaboration. This paper addresses both issues by describing and explaining data use effects via a large-scale study in Flanders. Data collected from 1472 teachers indicate that, although teachers are moderately positive about the extent to which data use results in different types of effects, data use effects cannot be taken for granted. Structural Equation Modelling (SEM) shows that explicating data use expectations and data use collaboration are essential in order to facilitate data use effects in schools.

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Data use; collaboration; instrumental effects; conceptual effects; symbolic effects; expectations

1. Introduction

Over recent years, the idea has grown that data use contributes to school improvement (OECD 2014). Therefore, schools are increasingly expected to use data in order to improve their policies and practice. Up to now, research that invests in exploring and explaining data use in schools has grown considerably.

With regard to data use in schools, a change of direction from descriptive to explanatory research has been introduced. In describing data use practices, Flemish and international researchers have demonstrated a rather pessimistic state of the art (Schildkamp, Visscher, and Luyten 2009; Vanlommel, Vanhoof, and Van Petegem 2016). Generally, researchers do not assume that data are used (adequately) in schools. Recently, this has led to attempts to explain the (non-) use of data in schools from various angles of incidence (Coburn and Turner 2011; Schildkamp and Poortman 2015; Datnow and Hubbard 2016).

In order to explain data use at the school level, two important elements recur: expectations in or towards schools and collaboration in schools (Daly 2012; Marsh, Farrell, and Bertrand 2016; Van Gasse et al. 2017).

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First, expectations with regard to data use can be derived from inside or outside the school and from an accountability or a school improvement perspective (Vanhoof et al. 2014). Although the general assumption is that accountability expectations subvert qualitative processes of data use, discussion about (merely) positive effects of school improvement expectations is still ongoing in the context of data use (Ehren and Swanborn 2012; Van Gasse, Vanhoof, and de Vos 2014; Vanhoof et al. 2014). Whereas a strong accountability focus might lead to data use being experienced as a practice to be reckoned with, a strong school improvement focus might imply that data use is experienced as (too) non-binding without compelling expectations. However, across research studies, neither the negative nor the positive impact of (one or) both types of expectations on data use in schools has been clear.

Second, it has been widely agreed that collaboration contributes to qualitative data use (Daly 2012). The concept involves internal support among teachers, alignment in terms of norms and agendas, and a shared responsibility with regard to data use (Datnow, Park, and Kennedy-Lewis 2013; Farley-Ripple and Buttram 2014; Hubbard, Datnow, and Pruyn 2014; Jimerson 2014). Therefore, collaboration is considered an important factor in terms of overcoming personal barriers that influence data use in schools.

Despite the growing body of descriptive and explanatory literature on data use in schools, available research hardly provides insights into the effects of data use practices (Carlson, Borman, and Robinson 2011; van Geel et al. 2016). In fact, if studies do so, they are generally built upon data use interventions in which a lot of external support is available in order to foster change in schools and they focus on a particular outcome that data use in the school should impact (e.g. students' mathematical grades) (van Geel et al. 2016). However, a variety of data use effects can occur as a result of data use processes, ranging from visible changes within the school, such as more differentiated practices (i.e. instrumental effects), over learning gains at teacher or policy level (i.e. conceptual effects) or changes in opinions or attitudes regarding teaching or policy-making (i.e. symbolic effects) (Rossi, Lipsey, and Freeman 2004). Therefore, a greater emphasis is needed on the effects of data use, and particularly out of the niche of intervention studies. There is lack of research that makes attempts to gain more general insights into the effects of data use and, at the same time, is a sufficiently detailed approach to data use effects.

Additionally, given the emphasis in explanatory research on expectations in and towards schools and school-wide collaboration, insights are needed into how these factors (can) have an impact on the effects of data use in schools. Despite the fact that the research relates the aforementioned factors to the (quality of) data use processes (Vanhoof et al. 2014), we currently do not know whether the impact of expectations in and towards schools and school-wide collaboration affect data use in schools to such an extent that they have instrumental, conceptual or symbolic effects.

As a result of the described gaps in the data use literature, the purpose of the present study is twofold. First, this study aims to generally describe data use effects in schools with respect to the diverse types of effects that potentially occur in schools. Second, the aim is to explain the different types of effects by factors that have already been identified as influencing data use in schools. Therefore, the following research questions will guide this study:

(1) To what extent are instrumental, conceptual and symbolic data use effects reported in schools?
(2) What is the impact of expectations in, and towards, schools and school-wide collaboration on instrumental, conceptual and symbolic effects of data use?

2. Theoretical framework

In the theoretical framework, we will first describe the different types of data use effects. Afterwards we will delineate the factors of influence that are proposed in this study: expectations and collaboration. The relations between these different variables are shown in Figure 1.

2.1. Effects of data use

Central in this study are the effects of data use in schools. Generally, the effects of data use are conceptualised as increased (student) learning outcomes. Profound analysis and interpretation of different types of data for educational problems is emphasised due to its opportunities for increased student achievement (Campbell and Levin 2008). However, increased student achievement is a type of effect that is hard to determine and strong causal relations between data use and increased learning outcomes are almost absent in the literature (Carlson, Borman, and Robinson 2011).

Nevertheless, there is some literature on data use effects that has the potential to impact students' learning and outcomes positively. This type of effect implies visible changes in schools and classrooms. For example, although the effects on student achievement can be difficult to determine, data use has been found to establish more effective teaching strategies (Schildkamp, Visscher, and Luyten 2009) or differentiation (Kerr et al. 2006; Carlson, Borman, and Robinson 2011). Rossi and colleagues (2004) classified these concrete changes in behaviour or decision-making processes in the school or the class as *instrumental effects*. Examples are: *inter alia*, discontinuing a particular method on the basis of disappointing learning outcomes, arriving at learning processes that are better tailored to the needs of the target group, or carrying out structural modifications within the school (Johnson 1997).

Data use does not always result directly in visible changes in schools or classrooms. However, this does, not necessarily imply that data use has no effect at all. Therefore, in data use research, emphasis has been laid on the indirect effects of data use as well. For example, an important indirect effect of data use is reflection upon school practices (Feldman and Tung 2001; Wayman and Stringfield 2006; Schildkamp, Visscher, and Luyten 2009). Reflection

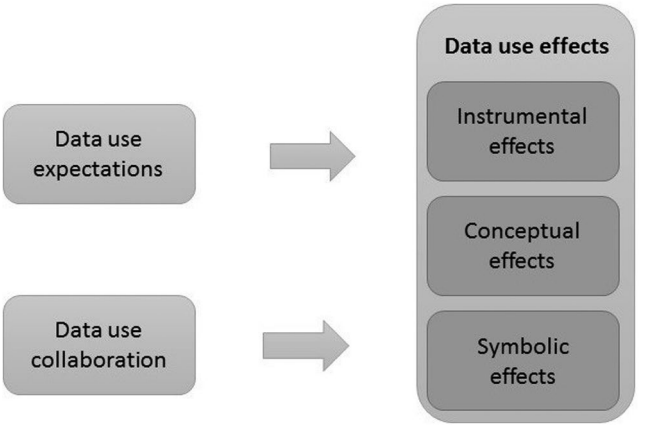

Figure 1. Conceptual framework.

can lead to deeper insights into teaching and learning (which may result in visible changes in the long term), but also to proactivity and evaluating possible alternatives for current practices (Feldman and Tung 2001). Therefore, researchers increasingly emphasise the potential of data use for practitioners' professional development (Vanhoof et al. 2014; Van Gasse et al. 2016). In their framework, Rossi, Lipsey, and Freeman (2004) labelled non-visible influences or changes in cognition and learning at practitioner level as *conceptual effects*. This means that data use has resulted in effects, but that the effects are not directly visible and may only become visible in the school or the classroom in the long term (Johnson 1997; Rossi, Lipsey, and Freeman 2004). For example, this can be the case when new ideas on schooling and instruction, or a more refined and sophisticated vision, or pupils' learning, are developed by examining the data in the school team (Johnson 1997; Schildkamp and Teddlie 2008; Verhaeghe et al. 2010).

Data use in schools cannot only result in direct changes in schools or classrooms (instrumental effects) or changes in practitioners' cognition and learning (conceptual effects). Data use can also result in effects at the level of the attitudes of practitioners. For example, using data on a regular basis can lead to practitioners being more conscious about practitioners' decision-making processes, or the need to support and argue their opinions using data. Although these effects may not lead directly or indirectly to visible changes in the school and the classroom, they can be valuable for the professionality among practitioners in the school. Rossi, Lipsey, and Freeman (2004) labelled this type of effect as *symbolic effects*. The symbolic effects that have been determined in the literature are, for example, the confirmation of existing ideas or the debunking of existing myths in school teams by means of data (Weiss 2001; Visscher 2002).

2.2. Expectations in and towards schools

An important factor that has been suggested in explaining data use at the school level is the extent to which expectations with regard to data use are perceived in schools (Verhaeghe et al. 2010). These expectations can derive from inside the school (e.g. colleagues or the principal) or outside the school (e.g. parents, the school board, school inspection, etc.) and may originate from a school improvement or an accountability perspective (Vanhoof et al. 2014).

From the perspective of school improvement, data acts as a guide in taking decisions for the development of policy and practice. From a shared vision, data are used to reach objectives that have been determined by the school itself. The intention is that policy and practice in the school are informed so that processes within the school are monitored and improved. Therefore, from a school improvement perspective, data use is expected to be a necessary counterweight to human intuition and to provide a framework in which decisions can be made (Schildkamp, Visscher, and Luyten 2009).

The accountability perspective derives from the idea that external actors must be able to evaluate (aspects of) the quality of schools. Therefore, schools can be expected to use data to provide insight into internal processes and outcomes (Ehren and Swanborn 2012). From an accountability perspective, internal school goals are subordinate to accountability purposes.

Research has shown that expectations, both from an accountability perspective and a school improvement perspective, have the potential to affect data use in schools (Van Gasse,

Vanhoof, and de Vos 2014; Vanhoof et al. 2014). Generally, accountability expectations are seen as counterproductive for qualitative data use in schools (Ehren and Swanborn 2012; Lee, Seashore Louis, and Anderson 2012). However, nuance is needed in the (negative) impact of expectations deriving from the school improvement and accountability perspective. The research of Vanhoof et al. (2014) showed a(n) (indirect) positive impact of both accountability and school improvement expectations in principals' data use. Additionally, I indicated that data use can benefit from accountability expectations (to some extent) when it comes to stimulating schools to use data, whereas school improvement expectations might make data use less compelling and actionable to start with. Thus, in formulating assumptions with regard to data use expectations, prudence is needed in expecting a (completely) different impact of expectations deriving from different perspectives. Given the remaining haziness of (differences in) the impact of expectations from both perspectives on the process of data use, this study does not explicitly distinguish between school improvement and accountability perspectives in data use expectations when investigating the effects of data use. Formulating assumptions with regard to distinct effects of accountability and school improvement expectations on data use effects (outcome level) in schools, would not be appropriate since the effects of both types of expectations are not (yet) clear at the process level. Nevertheless, given the general impact of expectations on the process of data use in schools (Ehren and Swanborn 2012; Lee, Seashore Louis, and Anderson 2012; Vanhoof et al. 2014), our hypothesis is that expectations with regard to data use affect (different types of) data use effects in schools.

2.3. Data use collaboration

The idea of collaboration in the context of data use is that a group of individuals initiates and undertakes data use, with the specific aim of problem solving or sharing expertise (Hammick et al. 2009). In the context of data use, this means that the initiation of data use inherits a shared responsibility (Stoll et al. 2006). In schools, the shared responsibility for data use generally lies in student learning (Wahlstrom and Louis 2008; Seashore Louis, Dretzke, and Wahlstrom 2010).

Next, collectively undertaking processes involving data use (collaboration) implies that more dense connections are present among practitioners. Practitioners build constructive relationships through conversations with colleagues (Stoll et al. 2006; Seashore Louis, Dretzke, and Wahlstrom 2010). These relationships allow them to better apply each other's strengths with regard to data use (Datnow, Park, and Kennedy-Lewis 2013; Jimerson 2014) and to engage in processes of knowledge creation and knowledge sharing (Stoll et al. 2006; Seashore Louis, Dretzke, and Wahlstrom 2010; Datnow, Park, and Kennedy-Lewis 2013; Farley-Ripple and Buttram 2014; Hubbard, Datnow, and Pruyn 2014). Furthermore, collaborative processes in the context of data use provide practitioners with help or support. Colleagues work with one-another in processes of analysing and interpreting data or introducing improvement actions (Datnow, Park, and Kennedy-Lewis 2013; Farley-Ripple and Buttram 2014; Hubbard, Datnow, and Pruyn 2014; Jimerson 2014).

Many forms of collaboration are possible in the context of data use (e.g. team work or communities) (Wayman and Jimerson 2014). Transcending the differences between several forms of collaboration, it can be seen as a way of structural support for data use. Collaboration allows practitioners to learn how to engage in data use and use it as a source of support

when needed (Young 2006; Farley-Ripple and Buttram 2014; Jimerson 2014). Several studies have attributed data use in schools to the existence of collaboration (Datnow, Park, and Kennedy-Lewis 2013; Hubbard, Datnow, and Pruyn 2014; Jimerson 2014). Engaging in collaboration in the context of data use motivates school leaders and teachers to use data in order to improve the school's policy and practice (Young 2006). That is why we assume that collaboration affects (different types of) data use effects in a positive manner.

3. Method

3.1. Context of the study

This study took place in Flanders, Belgium, when, compared to its surrounding countries, has a specific context in which to study data use. The Flemish government wields a school improvement-oriented perspective with regard to data use. Whereas standards are defined at the end of secondary education, schools are autonomous as to how to achieve these standards (the curriculum) (Penninckx, Vanhoof, and Van Petegem 2011). In addition, central exams do not exist. Therefore, no public databases or rankings of schools are available (OECD 2014). Schools themselves are responsible for obtaining insight as to whether or not they have achieved the Flemish standards at the end of secondary education. Thus, governmental expectations with regard to data use are rather implicit, and the responsibility for using data and the support for data use lies with individual schools and teachers. This implies that a great variance can originate in the extent to which expectations for data use are perceived in schools. This variance depends on how the governmental school improvement-oriented approach to data use is perceived in schools and on the school's internal expectations towards data use.

3.2. Participants

In this study, we used a quantitative research approach involving an online survey. The target population consisted of Flemish teachers in primary and secondary education. In order to generate a representative sample, we stratified for the schools' network (i.e. schools providing a Catholic education, schools from Flemish cities and provinces, and GO! education of the Flemish community), school size and school type (i.e. schools offering academic or vocational education). A total of 1472 teachers, from 63 primary schools and 54 secondary schools, participated in the study. A response rate of at least 50% was required for schools to be included in the analysis. In the majority of the schools (68%), a participation ratio of at least 70% was achieved. Our sample consisted of 22.2% male and 77.8% female participants: 77% of the participants held a bachelor's degree and 22% participants had a master's degree, 26% were newly qualified teachers (with less than five years of teaching experience) and 74% were experienced teachers (with more than five years of teaching experience). The final sample provides a good representation of the Flemish population in primary and secondary schools.

3.3. Instrument

For the purposes of the survey, we developed an instrument that was partly based on existing research instruments (i.e. scales on collaboration and data use effects) (Van Gasse et al. 2015), but which also included a self-developed (and validated) scale (i.e. data use expectations).

Table 1. Psychometric characteristics and descriptive statistics of the instrument.

Data use effects	Items	*n*	Ave.	SD	Cronbach's alpha
Instrumental effects					
In this school, the way in which we use data contributes to monitoring pupils' learning	7	1274	3.88	0.66	0.91
Conceptual effects					
In this school, the way in which we use data contributes to the development of new visions within the school	6	1312	3.81	0.71	0.92
Symbolic information use					
In this school, the way in which we use data contributes to a stronger substantiation of my opinions	5	1325	3.75	0.75	0.95
Influencing factors					
Data use expectations					
I perceive an expectation from public authorities concerning the use of information	6	1228	3.64	0.71	0.85
Collaboration					
In our school, by working together duplication is avoided with regard to information use	6	1257	3.41	0.88	0.93

All the scales presented were measured on a five-point Likert scale, ranging from "entirely disagree" to "entirely agree", with an additional "don"t know/not applicable' category. The construct validity of the scales was tested using confirmatory factor analyses. For all items, the cut-off factor loading on the latent concept was set at 0.50. Fit indices that were taken into account to evaluate the validity of the instrument were: CFI, TLI and RMSEA. Chi^2 was not included, given the potential bias due to the high sample size (Barrett 2007). For the CFI and TLI a cut-off value of 0.95 was used (Schumacker and Lomax 2004), which was exceeded for both indices (CFI: 0.98 and TLI: 0.97). For the RMSEA, a cut-off value of 0.05 was taken into account (Chen et al. 2008). The RMSEA-value of 0.04 thus indicates a good fit. Overall, the confirmatory factor analysis confirmed the validity of the instrument.

For the reliability of the scales, we used Cronbach's alpha values. The Cronbach's alpha range of 0.85 to 0.95 can be evaluated as good to very good (DeVellis 2012). On the basis of these values, we can conclude that the scales used have a good internal consistency. Table 1 explains the operationalisation of each scale by means of example items and shows the psychometric characteristics of the scales used in this study.

3.4. Analyses

Besides conducting a number of descriptive analyses, we also tested the relationships from the proposed conceptual framework empirically. Therefore, we carried out a path analysis in Mplus, using structural equation modelling (SEM). SEM makes it possible to combine different statistical analyses into a single model in order to check how well a particular theoretical model fits the data collected. With a view to representing the theoretical model as accurately as possible using the empirical data, we included the different variables in the model as latent factors that are measured by a number of manifest items. This way, all error deriving from the statistical measurement is optimally taken into account. In conducting the path analysis, we allowed for the nested structure of the collected data (teachers in schools) (TYPE = COMPLEX in Mplus). The model was constructed based on the theoretical hypotheses we had worked out and which were posited in the theoretical framework. The

model was further modified by the addition of correlations between manifest variables (i.e. correlations between two items in the instrumental effect and conceptual effect scales and between two items in the expectations scale). In order to guarantee the theory, these correlations were only tolerated if they measured the same latent variable. Given that further modifications did not improve the model strongly (evaluated by the amount of decrease in the Akaike Information Criterion), they were not considered for economy reasons. The fit indices (RMSEA = 0.02; CFI = 0.97 and TLI = 0.97) indicate that the theoretical model exhibits a good fit with the empirical data.

4. Results

First, we will present the descriptive results for the different variables in this study. The descriptive results on data use effects will provide an answer to our first research question (i.e. "To what extent are instrumental, conceptual and symbolic data use effects reported in schools?"). The other descriptive statistics generate insights into the influencing factors of data use effects studied (i.e. collaboration and data use expectations), which will be used in the explanatory analysis. The explanatory results will provide insights into the answers regarding the second research question (i.e. "What is the impact of expectations in and towards schools and school-wide collaboration on instrumental, conceptual and symbolic effects of data use?")

4.1. Descriptive results

An overview of the descriptive results is provided in Table 1. With regard to data use effects, we found moderately positive average scale scores. When it comes to instrumental or visible effects in schools (average = 3.88), teachers indicated that data use contributes to a certain extent to, *inter alia*, concrete actions to improve their teaching or monitoring pupils' cognitive outcomes and well-being. Conceptual effects of data use in schools were also evaluated as moderately positive, although slightly less positive than instrumental effects on average (average = 3.81). This means that teachers indicated a slightly smaller impact of data use in schools when it comes to non-visible (or long-term) effects. According to the teachers, data use contributes to a certain extent to, *inter alia*, vision development in the school, increased insights into pupils and into the school's strengths and weaknesses and a more critical attitude towards their own functioning. The last of the types of data use effects, symbolic effects, were evaluated as the least positive, although the average scale score was also moderately positive (average = 3.75). This means that teachers perceived that data use contributes to a certain extent to, *inter alia*, increased consciousness in making decisions or support or better argumentation for personal visions or opinions.

Also, the items regarding data use expectations were on average evaluated as moderately positive among teachers. The average of 3.64 indicates that teachers experience data use expectations to a certain extent. These expectations can be both school improvement and accountability oriented and can derive from within the school (e.g. expectations from the principal or from colleagues) or outside the school (e.g. expectations from the government or the inspection).

Overall, teachers responded neutrally to moderately positively to the subject of collaboration in the context of data use. The average of 3.41 implies that teachers neither agree nor

disagree that support is provided with regard to analysing and interpreting data, that data use is a responsibility of the whole school team, or that teachers collaborate intensively with regard to data use. Therefore, we found that collaboration among teachers in the context of data use is relatively uncommon.

4.2. Explanatory results

The explanatory results are summarised in the visualisation of the SEM model (Figure 2). The model indicates that both data use expectations and collaboration in the school affect the different types of data use effects.

With regard to data use expectations, we found that they influence instrumental, conceptual as well as symbolic effects of data use, positively. The extent to which teachers perceive data use expectations, affects their perception of the extent to which data use results in instrumental, conceptual and symbolic effects. Teachers, who perceive data use expectations to a higher extent, are also more likely to believe that data use contributes to visible effects (i.e. instrumental effects), learning gains (i.e. conceptual effects) and impact on visions or opinions (i.e. symbolic effects). Standardised regression coefficients of 0.24, 0.26 and 0.25, respectively, indicate significant but small effects of data use expectations on instrumental, conceptual and symbolic effects of data use. From the model, we conclude that data use expectations explain about 6% of the extent of teachers' perceptions of visible (instrumental) effects of data use in the schools. For conceptual effects, the way in which teachers perceive data use to contribute to changes in cognition or learning, the impact of expectations is slightly higher (about 7% of the variance explained), although it is still small. The standardised regression coefficient of 0.25 indicates that 6% of the variance of symbolic effects that are perceived by teachers can be explained by their perception of data use expectations.

We also found that collaboration has positive effects on instrumental, conceptual and symbolic effects. Teachers who reported a higher extent of collaboration around data use

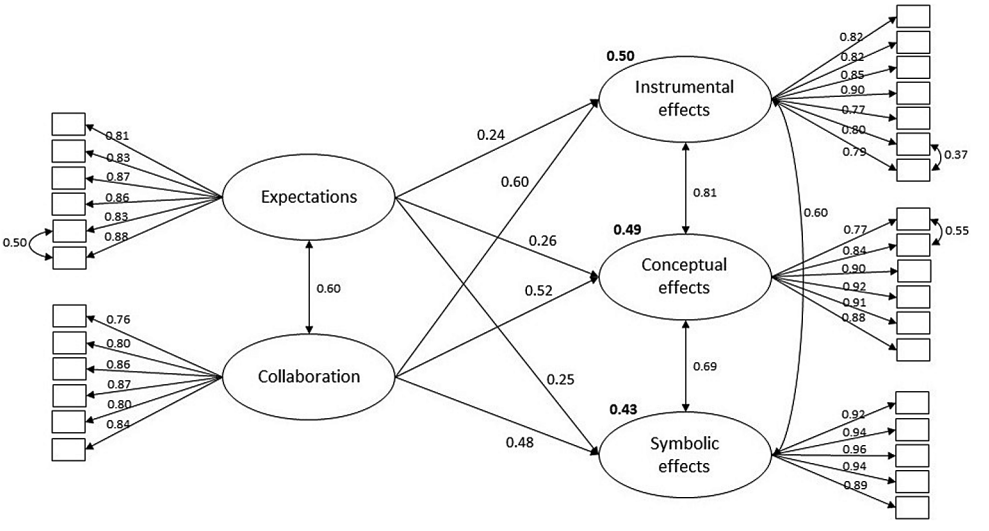

Figure 2. Results of the structural equation model.

in the school also indicated that data use in their school results in visible changes to a greater extent (i.e. instrumental effects), learning gains (i.e. conceptual effects) and in new or confirmed visions or opinions (i.e. symbolic effects). Compared to the positive influence of data use expectations on data use effects, the impact of collaboration on these effects was much higher. Standardised regression coefficients of 0.60, 0.52 and 0.48, respectively, indicate quite strong effects of collaboration on data use effects. For instrumental effects, 36% of the variance can be explained by the extent to which teachers report data use collaboration in the school. The impact on conceptual effects, or the extent to which teachers indicate that data use contributes to learning gains, is smaller with about 27% of the variance explained. The smallest impact of collaboration was found on the symbolic effects, or the way in which data use affects ideas or opinions. For this variable, about 23% of the variance can be explained by the extent to which teachers report school-wide collaboration in the context of data use. Although the impact of collaboration on symbolic data use effects was smaller than its impact on instrumental (and conceptual) effects, a reasonable amount of variance in symbolic effects is explained by the concept.

Overall, we found that our model provides a good explanation for the occurrence of (different) data use effects in schools. The R^2 values indicate that, respectively, 50% (instrumental effects), 49% (conceptual effects) and 43% (symbolic effects) of the variance in the dependent variables in the model can be explained by data use expectations and data use collaboration.

5. Conclusion and discussion

Although researchers generally assume that data use contributes to school improvement through different types of data use effects, (diversity in) effects of data use in schools have hardly been studied. Therefore, small-scale studies invest in examining particular types of data use outcomes without addressing the granularity of the concept by taking into account different types of effects. In order to contribute to this research gap, the current study investigated the extent of visible changes (i.e. instrumental effects), learning gains (i.e. conceptual effects) and new or confirmed visions or opinions (i.e. symbolic effects) in Flemish schools. Furthermore, given their importance in the data use literature, the impacts of data use expectations and school-wide collaboration on (different) data use effects in schools were examined. In order to generate large-scale answers to these questions, we used questionnaire data of 1472 teachers, from 63 primary schools and 54 secondary schools. Descriptive statistics were calculated and Structural Equation Modelling (SEM) was conducted.

We firstly found that, in general, teachers were moderately positive about the extent to which data use practices in their school results in different types of effects. Teachers indicated that they believed that data use practices in their school to a certain extent resulted in instrumental, conceptual and symbolic effects. They were moderately positive about the contribution of data use to clear school improvement initiatives, vision development or learning in the team or support for personal opinions in the school. Therefore, the different types of effects that we proposed from previous literature (Rossi, Lipsey, and Freeman 2004) are confirmed in this study.

Although teachers were moderately positive about the extent to which data use results in instrumental, conceptual and symbolic effects, we cannot conclude that data use effects are common in Flemish schools, since teachers do not generally respond entirely positive

on items that map perceived data use effects. This finding is not completely surprising, given that data use is not considered a prevalent practice in the Flemish context, in which low policy expectations with regard to data use are experienced (Van Gasse, Vanhoof, and de Vos 2014; Vanhoof et al. 2014).

Secondly, this study shows that both data use expectations and collaboration around data use are explanatory for instrumental, conceptual and symbolic effects of data use in schools. Whereas the impact of expectations on data use effects is comparable to what is known about its impact on data use practices (Vanhoof et al. 2014), the impact of collaboration is considerable. This may result out of the fact that collaboration is a way of structural support, since collaborating teachers are continuously provided with learning opportunities and mutual support (Young 2006; Farley-Ripple and Buttram 2014; Jimerson 2014). The great impact of collaboration on data use effects thus emphasises the important role of collaboration in data use in schools.

The fact that the impact of collaboration on data use effects is much larger than the impact of data use expectations can be explained by the fact that collaboration inherits the process characteristics of data use, while expectations are a purely contextual factor. Generally, data use practices are evaluated as more qualitative processes when they are undertaken in interaction with colleagues (Van Gasse et al. 2016). Therefore, the collaboration variable incorporates process information, which the expectations variable does not, that can explain the great difference in impact on data use effects. It is not surprising that teachers who perceive more qualitative data use practices (i.e. involving more collaboration), are also more positive about the (different types of) effects of data use in their school. However, the considerable amount of variance in data use effects that is explained by collaboration in this study is remarkable, since the impact of data use collaboration on data use (learning) effects has not necessarily become visible at teacher level (Van Gasse et al. 2016).

This study sheds some interesting new light on the (different types of) effects of data use in Flemish schools and how these effects can be explained. However, some footnotes need to be made. Firstly, although the Flemish context is an interesting one in which to study data use practices, given the school improvement orientation of the Flemish government, cross-contextual studies are needed to further clarify the impact of (policy) expectations on data use effects. The school improvement orientation of the Flemish government towards data use has previously proved that, in some schools, data use is seen as quite open-ended, lacking concrete expectations, tools and stimuli to get the data use process started (Van Gasse, Vanhoof, and de Vos 2014). Therefore, we assume that the impact of expectations can be very different in other educational contexts. Replication of this study in educational contexts that (sometimes) suffer from very strong accountability expectations in the context of data use can be interesting to provide further insights into the impact of data use expectations on data use effects in schools. Secondly, although this study is interesting because the impact of collaboration on data use effects is proven statistically, in-depth qualitative research is needed in order to further explore the container concept "collaboration" and the impact of certain aspects of collaboration on data use effects. This way, the effectiveness of (different types of) collaboration to improve the results of data use practices in schools could be further investigated. To this end, it is recommended that data use effects be considered in evaluating (qualitative) data use collaborations.

The results of this study emphasise the importance of both data use expectations and collaboration for the extent to which data use results in (directly visible or long-term)

outcomes in schools. The significant effects of data use expectations imply that, despite the fact that strong accountability expectations are criticised in the literature, some extent of expectations are important to achieve data use effects in schools. Both at policy level and among practitioners in schools, it is crucial to explicate and premise data use expectations so that data use practices result in the outcomes that are set. Additionally, the strong impact of collaboration on data use effects implies that practitioners should carefully think about how data use practices can be shaped in a way that they are effective. The right preconditions need to be set in schools for collaborative practices that incorporate a fair number of learning opportunities and collegial support.

Given the importance of collaboration in data use settings, different types of data use effects cannot be taken for granted in schools. It is crucial that both policy makers and researchers think about, and investigate, the preconditions that are crucial for teachers to engage in qualitative, collaborative data use practices. When the aim is to design data use practices that can have an impact on teaching and learning in schools, collaboration among teachers is the key.

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