

# Teachers' Self-Efficacy at Maintaining Order and Discipline in Technology-Rich Classrooms with Relation to Strain Factors

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**Abstract.** Teachers' operational control is challenged by pupils' access to computers with internet in the classroom. The teacher's control of operations will be diminished in a technology-rich classroom. Professional growth is conditioned by teachers' experience of mastery in their work. Therefore, it is interesting to study strain factors that are associated with teacher efficacy at maintaining order and discipline in technology-rich classrooms. This study splices two theoretical lenses: theory on teacher efficacy and strain factors and theory of teachers' learning orientation. The purpose of this article is to explore the factors that are associated with teacher efficacy at maintaining order and discipline in technology-rich classrooms. The data set comes from a survey of 156 teachers in Norway. The analysis shows that the perception of conflict is negatively associated with teacher efficacy. Stress and perception of shortcomings in the ability of the teacher to influence the pupils is associated in a slightly weaker manner associated with teacher efficacy for classroom management. There is a strong, positive relationship between stress and conflict, and there are positive associations between teachers' sense of shortcoming and both stress and conflict. Teachers' emphasis on practical knowledge rather than expert recommendations is positively associated with shortcomings, stress and conflict. Implications for practice are discussed.

**Keywords:** self-efficacy; classroom management; strain; technology-rich classrooms; ICT; teachers' work.

## **Introduction**

The Norwegian educational authorities have defined "using digital tools" as "a core skill" that is to be stimulated by schools (Ministry of Education and Research, 2014). Computers are used in school as writing tools, for the gathering of information and for communication, and students are expected to make

academic use of the Internet. Norwegian sixth-form colleges have thereby seen an equipment revolution in terms of accessibility to computers in the classroom (Elstad, 2016a). Each pupil has his own computer with internet access and some school districts expect these machines to be used often.

Off-task activity on the part of pupils during lesson time is a recurrent problem (Elstad, 2006; Blikstad-Balas, 2012) and represents a frequent challenge to teachers, whose work is often in the form of the teacher going through new material on the blackboard or guiding pupils in their individual or group-based studies. The physical design of the classroom includes the classroom artefacts. In the traditional classroom, the arrangement of the desks is physically designed to allow monitoring of pupils' academic work. Desks are generally laid out in rows in order that each pupil can see the blackboard. This physical layout creates a challenge in terms of the teacher's ability to see whether the pupils are using their computers for the purpose of academic work or off-task behaviour. In the technology-rich classroom, classroom control of this kind is harder to maintain because it is more difficult to monitor the pupils' behaviour. Classroom management is "the actions teachers take to create an environment that supports and facilitates both academic and social-emotional learning" (Evertson & Weinstein, 2011: 4). It is interesting to explore the potential managerial challenges that teachers confront in technology-rich classrooms. Professional growth for teachers is an important ambition in Norwegian educational policy (White Paper no. 11, 2008) and teacher efficacy in terms of classroom management is important if the teacher is to increase skills and professional growth in their work. A teacher's first experience of teaching can be a challenge: situations are often complex and the teacher needs to take account of several, often unforeseen, things happening at once. This can easily create stress and working-memory overload among inexperienced teachers when decisions need to be taken (Leinhardt & Greeno, 1986). Through experience, teachers learn to tackle complex decision-taking situations in a better way: the skill becomes procedural (Anderson, 1982). In this way, the cognitive overload experienced by beginners becomes reduced. After the initial phase in which the goal is survival, teachers attempt to consolidate their pedagogic repertoire and experiment with ways of carrying out their roles in ways give them mastery over new challenges (Berliner, 1986; Huberman, 1989; Chi et al., 2014). Several studies document that professional growth among teachers – allowing for certain nuances – is related to improved pupil performance (Rivkin et al., 2005; Rockoff, 2004).

Teacher efficacy is conceptualized as a teacher's judgment of one's capabilities to plan and enact specific tasks (Bandura, 1994). The study of teacher efficacy in various teaching-related aspects shows a surprising curvilinear pattern: expectations of mastery increase with experience but can sink again after many years of teaching experience (Klassen & Chui, 2010). The same pattern is observed in studies of the teacher's contribution to pupil learning performance: performance has a positive association with the number of years of teaching experience; (Rockoff, 2004) but learning improvement reaches a plateau after a few years' experience or even sinks slightly after 5-6 years of practice (Rivkin et al., 2005).

A premise of our study is that a teacher's experience of mastery of the job is a condition for professional growth (Tschannen-Moran, Hoy & Woolfolk, 2007). Too low a feeling of mastery can be unfavourable for a future professional career. It is therefore interesting to study which factors we presume will have a connection with teacher efficacy. The purpose of this article is to investigate strain factors statistically associated with teacher efficacy in maintaining order and discipline in a situation in which the pupils each have a computer and internet access. The purpose is also to investigate the relationships between all the factors that form part of the theoretical framework. We will therefore investigate how a disparity in teacher efficacy for the maintenance of order and discipline corresponds with a disparity in how these teachers perceive (i) opportunities to influence pupils in the 15-19 age range (in the Norwegian school system, these pupils have a say in a number of significant matters), (ii) teachers' self-perception of experience as a starting point for their own professional development and their experience of (iii) stress and (iv) conflict when they are to lead learning work in their own classes.

### **Theoretical assumptions**

Two theoretical lenses are brought together in this study: (1) Bandura's self-efficacy theory (1994) and (2) the theory of "teacher orientation to learning" (Opfer, Pedder & Lavicza, 2011: 5). A self-efficacy belief is an assessment of a person's capabilities to attain a desired level of performance in a given endeavour. Bandura assumed that belief in one's abilities was a powerful driving mechanism influencing motivation to act, the effort put forth in the endeavour, and the persistence of coping mechanisms in the face of setbacks. The other theory concerns teacher orientation to learning which is integrated set of attitudes, beliefs and practices as well as the alignment of oneself and one's ideas to circumstances and context. These learning orientations are context dependent. A part of teachers' orientations to learning remain unchanged overtime, while the context, the phase of teacher experience and the pupils a teacher has influence the orientation to what, how and why they learn as professionals.

Zee and Koomen (2016) present a recent review of teacher efficacy studies. They integrated four decades of teacher efficacy research to explore the consequences of teacher efficacy for the quality of classroom processes, students' academic adjustment, and teachers' psychological well-being. Their results suggest that teacher efficacy shows positive links with students' academic adjustment, patterns of teacher behaviour and practices related to classroom quality, and factors underlying teachers' psychological well-being, including personal accomplishment, job satisfaction, and commitment. Negative associations were found between teacher efficacy and burnout factors. However, they do not explicitly focus on teacher efficacy at maintaining order and discipline in technology-rich classrooms.

A new kind of managerial challenge has appeared with the advent of free Internet access in the classroom: motivational conflicts between immediate rewards of electronic chatting, surfing and games and the long-term rewards of academic achievement (Elstad, 2008). Van Acker et al. (2013) explored the role of

teacher efficacy, subjective norm and attitude in technology-rich situations. They found that teachers' ICT skill was the strongest predictor of teacher efficacy. Subjective norm played only a limited role in the intention to use the educational use of digital learning materials. Basing on the outcome of this study, the authors regard persuasive communication focusing on positive outcomes and skills based training seem appropriate interventions to promote a positive attitude towards the educational use of digital learning materials and improve teacher efficacy in using digital learning materials. However, these scholars do not focus on teacher efficacy at maintaining order and discipline. Quite few researchers focus explicitly on teacher efficacy at maintaining order and discipline (Evertson & Weinstein, 2011:3). This is especially true for classroom management and technology: Bolick and Cooper (2011) and Bolick and Bartels (2015) address how little research exists on how 1:1 computers affects classroom management. In this article we have attempted to fill this gap in the literature.

We argue that educators and policymakers need to understand better teachers' challenges of classroom management in technology-rich classrooms. In this article we assume that factors such as teachers' general perception of the limitations of what can be achieved through teaching, as well as stress and conflict in connection with the high availability of technology in the classroom can determine their self-efficacy in highly technological learning environments. Self-efficacy is primarily influenced by experiences of mastery<sup>1</sup> (Bandura, 1994). Skaalvik and Skaalvik (2007) identify strain factors statistically associated with self-efficacy among primary and lower secondary teachers. Burnout is among the factors they find to be strongly associated with teacher efficacy, while teachers' general perceptions of the limitations on what can be achieved through teaching are indirectly associated with teacher efficacy. In other words, the study provides confirmation that issues perceived as stressful help account for teacher efficacy. Teacher stress originates in a conflict between pupil interests and the teacher's need for control over pupils' academic activities in the classroom. We connect experiences both of stress and conflict to teacher efficacy in classroom management (hypothesis no. 1 and no. 2).

We anticipate a range of opinions regarding how teachers perceive, for instance, conflict with pupils and personal stress when enforcing the rules for acceptable use of technology. We will therefore also investigate the range of teacher efficacy in terms of classroom management. In addition, our assumptions suggest that a perception of inadequacy in this respect is negatively associated with teacher efficacy in maintaining order and discipline (hypothesis no. 3).

There is relatively limited theoretical knowledge about how teachers should tackle the non-academic use of PCs. However, it is interesting to contrast the significance of practical skills for teachers' perception of expert knowledge and to investigate connections between this and teacher efficacy in relation to maintaining order and discipline (hypothesis 4).

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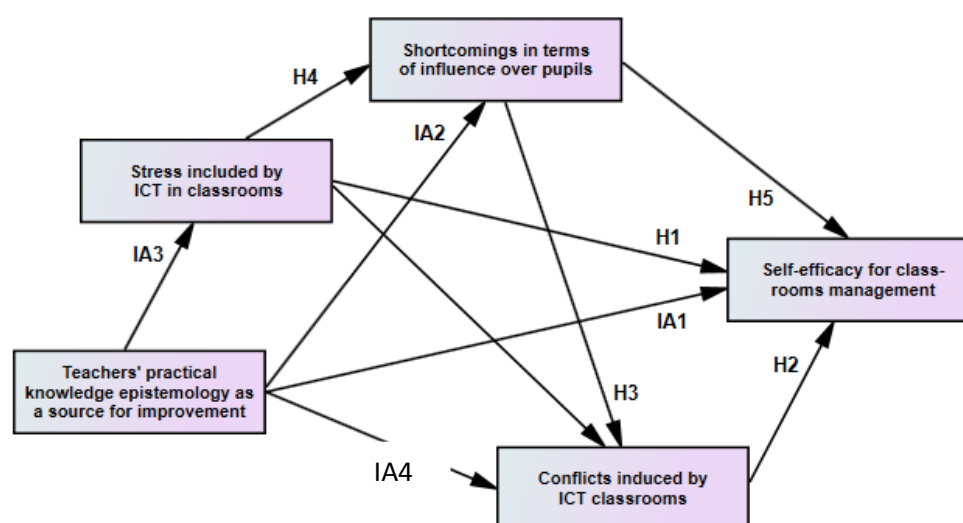
<sup>1</sup> According to Bandura (1997), expectation of mastery is based on five types of information source, one of which is personal experience.

The high degree of access to technology in Norwegian schools provides opportunities both for the use of adequate technology for the purposes of learning (for instance investigating what takes place “within” an electrical circuit, Zacharia & de Jong, 2014), but at the same time, various kinds of challenges such as the non-academic use of technology in the classroom (Blikstad-Balas, 2012). We assume that some people will experience this as a source of stress that can influence teacher efficacy. Situations may also arise in which some pupils cast doubt on the rights of the teacher to limit, for instance, off-task pupil behaviour. In other words, teachers may experience both stress and conflict-laden situations when they are dealing with rules, but also in situations in which technology is used to promote learning: it is a stated political goal that teachers must be able to teach using digital tools and integrate digital skills as one of the five so-called core skills (Ministry of Education and Research, 2014). For this reason we assume that both skills and conflicts have a positive relation with an experience of shortcoming (named ‘con’) in terms of influence over pupils (investigative assumption nos. 1 and 2). Most sixth-form pupils are in the 15-19 age range, in which pupils as they grow older will claim rights to self-determination and personal positioning (Koepke & Denissen, 2012). The rationale behind the teacher's work is to exercise a positive influence on the pupil's learning process (the teacher has in this respect a clearly-defined responsibility for pupil learning outcomes; White Paper no. 11, 2008), but pupil engagement in learning processes will nevertheless depend on their motivation and self-discipline when working in technology-rich learning environments. The result depends on input from several parties. In other words, the teacher's task of influencing pupils is dependent on their self-discipline.

Teachers are expected to be concerned with their own professional development. Since the 1980s, research has focussed on the significance of teachers' epistemic beliefs upon various aspects of teaching work (e.g. Fang, 1996; Chinn, Buckland, & Samarapungavan, 2011). Several studies have provided empirical support for suggesting a connection between teachers' personal epistemology and their actual actions in the classroom (e.g. Brown & Rose, 1995), but this research field is still immature (e.g. Greene & Seung, 2014). A theory developed by Opfer, Pedder and Lavicza (2011) indicates how teachers' approach to learning (including learning of practices) influences their skills development (“learning change”). This theory joins a succession of theoretical contributions emphasising practical skills alongside theoretical knowledge as fundamental for personal teaching development. All professional practitioners employ theory in the exercise of their profession. Theoretical development may be experience-based (and thus “weak”), but may also be based on, for instance, research (and thus “strong”). The emphasis can be contextual. When teachers need to master new classroom challenges they can look to both experience and theory as sources from which to learn how to tackle the situation. Norway has a deliberate policy of stimulating teacher networks and developing practical skills. It is therefore interesting to investigate how teachers use their own experiences and those of other teachers to develop their own classroom management in technology-rich classrooms, in other words, to develop practical skills.



Research about teachers' sense of their shortcomings and their development of practical skills has – so far as we can see – not come very far. If the development of practical skills is effective for professional development, it is reasonable to expect a negative association between practical skills and perceptions of personal shortcoming. If practical skills do not contribute to effective professional development in challenge solving, we can expect a positive association between shortcomings in terms of influence over pupils and practical skills (investigative assumption no. 3). We can make corresponding arguments in terms of the connection between practical skills and stress (investigative assumption no. 4).



**Figure 1** Theoretical model of hypotheses (abbreviated H) and investigative assumptions (abbreviated IA).

## Method

In order to investigate our hypotheses and investigative assumptions, we carried out a survey among 156 teachers at 3 Norwegian sixth-form colleges. The data collection took place in the form of a paper-based questionnaire filled in by the teachers in connection with a planning day. The advantage of this method is that all the teachers were required to take part in the planning day. No teachers declined to take part in the survey. This means that apart from those who were off sick on the day in question, the selection we have analysed can be regarded as complete. In other words the selection has no self-selection issues.<sup>2</sup> The three schools in question, however, cannot be regarded as representative of Norwegian sixth-form colleges and their teachers. All three, which offer the curriculum directed towards preparation for higher education, are regarded as

<sup>2</sup> Seven sixth-form colleges were originally included in the selection but the participation percent was too low at four of these schools. In order to avoid self-selection we have removed these four schools from the material to be analysed.

fairly similar. Pupils' average grades on entry were 4.25 [on a scale of 1-6] and the value-added measures of the three schools are relatively similar (averaging - 0.35) (Falch et al., 2016). In other words, the schools can be regarded as fairly average in terms of pupil attainment on entry and pupil progress during their time at the school (pupil entry statistics and school contribution indicators based on year group 2008-2009). This aspect of the selection – as we will describe later – is of significance in relation to the conclusions that can be drawn.

The purpose of the investigation was described at the beginning of the session in which the questionnaires were distributed in plenum and the teachers were given sufficient time to consider the alternatives while filling out the questionnaire. We thus believe that the answers are relatively well considered. In all three schools, the pupils each have a PC with internet access available and it is up to the individual teachers to tackle the challenges involved in terms of classroom management. To remind the teachers about this challenge we introduced the questionnaire with the following text:

The government's strategy document *The teacher promotion* states that 'Teachers must be able to teach using digital tools and integrate digital skills as one of the five core skills'. Consider that someone has decided that pupils are each to have their own computer and access to the internet during the lessons that you are teaching.

After this text, the teachers were asked to indicate on a seven-point scale (with named extremes) which alternative corresponded best to their own views. The teachers were asked to indicate values for the following questions or statements:

### **Teacher efficacy classroom management (secm)**

How certain are you that in such a situation you would be able to:

- maintain discipline in classes of over 25 pupils.
- persuade even the most games-addicted pupils to concentrate on academic tasks.
- persuade pupils who often switch between different social media to follow classroom rules.

These questions on teacher efficacy are inspired by Skaalvik and Skaalvik's (2007) "Maintain discipline" construct, but here adapted to the situation of technology-rich learning environments. The extremes of the scales regarding teacher efficacy were: 1= Not sure at all, 7= Absolutely certain. After these questions regarding teacher efficacy, teachers were asked to consider the following statements (the extremes of the scales were: 1=completely disagree, 7=completely agree):

### **Shortcomings in terms of influence over pupils (con)<sup>3</sup>**

- How much pupils learn at school through using ICT is primarily determined by their self-discipline.

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<sup>3</sup> Items are inspired by, but not identical to, those that Skaalvik & Skaalvik (2007) term their "External Control Scale".

- It is difficult for a teacher to improve pupil performance by using ICT unless the pupil can be bothered working on the tasks.

#### **Stress in technology-rich classrooms (str1)**

- Allowing pupils free access to the internet during lessons creates an extremely stressful situation for me.
- When pupils have the freedom to do as they wish on the internet, I lose control.

#### **Where technology creates conflict situations (str2)<sup>4</sup>**

- Many conflicts with pupils arise when pupils are allowed to use the internet during lessons.
- Some pupils are unable to maintain focus on academic tasks when they use the internet during lessons.

#### **Teachers' practical skills development as a source of improvement (sop)<sup>5</sup>**

- In terms of developing my own teaching, I trust my own practice evaluations more than what the experts say.
- In terms of what teaching techniques work well, I have greater trust in experienced teachers than in experts.

#### **Analysis**

Structural equation modelling (SEM) and descriptive statistical analysis were used to analyse the relationships between the variables. Structural equation modelling is suitable for confirmatory factor analysis and path analysis. Assessments of fit between model and data are based on the following indices: root mean square error of approximation (RMSEA), Tucker-Lewis index (TLI), goodness-of-fit index (GFI) and comparative fit index (CFI). RMSEA < .05 and TLI, GFI and CFI > .95 indicate good fit and RMSEA < .08 and TLI, GFI and CFI > .90 indicate acceptable fit (Kline 2005).

The measurement and structural models were estimated with IBM SPSS Amos 22. The values of RMSEA, TLI, GFI and CFI indicate that the structural model in Figure 2 has acceptable fit.

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<sup>4</sup> Items are inspired by, but not identical to, those that Skaalvik & Skaalvik (2007) term “Strain Factors”.

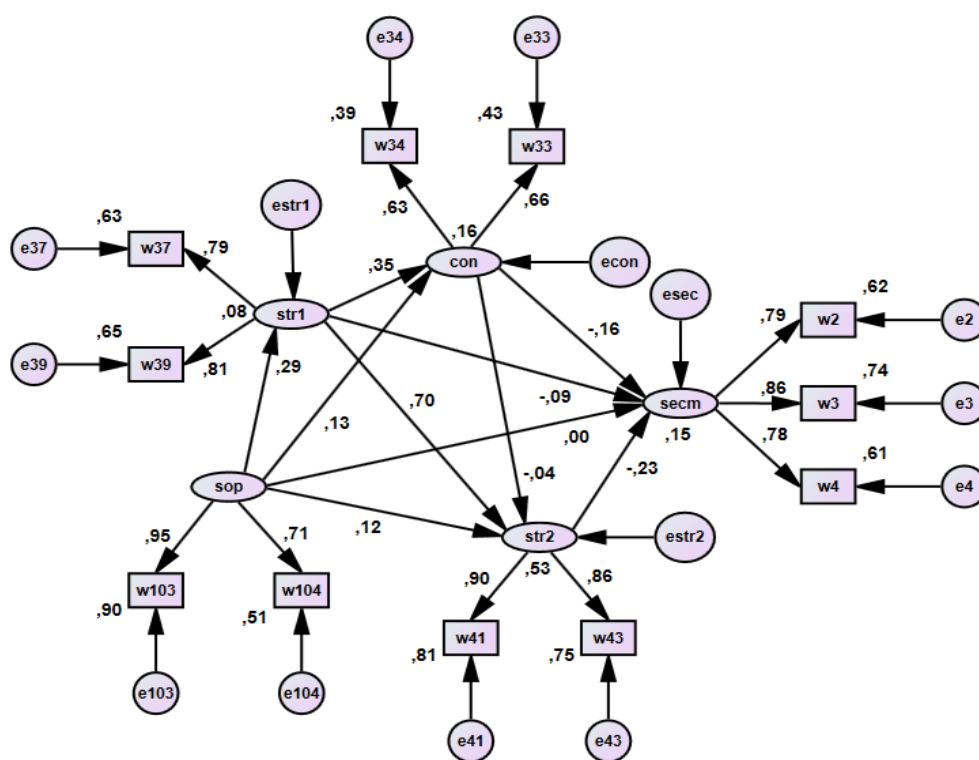
<sup>5</sup> Items are inspired by, but not identical to, measurements of teachers' “internal” attitudes to learning, developed by (Opfer, Pedder & Lavicza, 2011).



**Results**

**Table 1: Mean, standard deviation, skewness, kurtosis, and Cronbach's alpha.**

N = 156	Indicators	Mean	SD	Skewness	Kurtosis	Alpha
secm	w2	3.87	1.80	-0.08	-1.00	0.831
	w3	3.12	1.52	0.22	-0.98	
	w4	3.44	1.57	0.10	-0.83	
con	w33	5.43	1.28	-0.85	0.61	0.710
	w34	5.53	1.33	-0.53	-0.69	
str1	w37	3.84	1.90	0.14	-1.06	0.753
	w39	3.60	1.78	0.25	-0.86	
str2	w41	3.50	1.68	0.28	-0.76	0.876
	w43	3.46	1.64	0.24	-0.77	
sop	w103	4.76	1.45	-0.35	-0.31	0.801
	w104	5.24	1.38	-0.76	0.28	



Standardized estimates  
 Kji-kvdrat = 39,308 df = 34 p-kji = ,244  
 rmsea = ,032 tli = ,949 gfi = ,954 cfi = ,969

Figure 2: Structural equation modelling by using AMOS 22. Constructs and abbreviations: Self-efficacy for classroom management (secm), external control (con), stress (str1), conflicts induced by ICT in classrooms (str2), and teachers' practical knowledge epistemology as a source for improvement (sop).

**Table 2**

Hypothesis	Formulation	Result
1	Stress has a negative association with teacher efficacy for classroom management.	The association is negative ( $b(\text{str1} \rightarrow \text{secm}) = -.09$ ), but relatively weak (not significant).
2	Conflict has a negative association with teacher efficacy for classroom management.	The negative association ( $b(\text{str2} \rightarrow \text{secm}) = -.23$ ) is significant. Hypothesis supported.
3	Perception of shortcoming is negatively associated with teacher efficacy for classroom management	The association is positive but not significant ( $b(\text{str2} \rightarrow \text{secm}) = -.16$ ). Hypothesis not supported.
4	Practical skills re positively associated with teacher efficacy for classroom management.	Practical skills development is not associated with an expectation of mastery in classroom management: ( $b(\text{sop} \rightarrow \text{secm}) = .00$ )

In respect of the investigative assumptions, we find the following:

**Table 3**

	Formulation	Result
1	We investigate the relationship between conflicts and perceptions of shortcoming in terms of influence over pupil motivation and self-discipline	The association ( $b(\text{con} \rightarrow \text{str2}) = -.04$ ) is very weak.
2	We investigate the relationship between the significance of practical skills and shortcoming.	The association ( $b(\text{sop} \rightarrow \text{con}) = .13$ ) is positive.
3	We investigate the relationship between the significance of practical skills and stress.	The association ( $b(\text{sop} \rightarrow \text{str1}) = .29$ ) is positive.
4	We investigate the relationship between stress and perception of shortcoming in respect of influence over pupil motivation and self-discipline	The positive association ( $b(\text{str1} \rightarrow \text{con}) = .35$ ) is significant.

## Discussion

The purpose of the article was to investigate strain factors and the significance of teachers' practical skills development as a source of improvement statistically associated with teachers' self-efficacy for succeeding in classroom management, as well as reciprocal associations between the factors. The analysis indicates that a perception of conflict (str2) is negatively associated with expectations of mastering classroom management (secm). Stress (str1) and a perception of shortcoming in terms of influencing pupils (con) have a rather weaker negative association with teacher efficacy for classroom management (secm). There is a strong, positive association between stress (str1) and conflict (str2), as well as positive associations between shortcoming (con) and both stress (str1) and

conflict (str2). Teachers' emphasis on practical skills in preference to expert advice (sop) is positively associated with shortcoming (con), stress (str1).

If these path coefficients reflect causal processes, the causal direction<sup>6</sup> may be in several directions. Since this cross-section investigation is unable to prove causal direction, we must be cautious not to draw too strong conclusions about causality. Research incorporating sequential analysis or controlled experiments may help resolve questions about causal direction, but such research approaches are demanding to carry out. We also note the positive association between shortcoming in terms of influence on pupil motivation and self-discipline and perceptions of stress and conflict. Here too, the causal direction is uncertain even though it seems most plausible to assume that perceptions of stress and conflict cause the perception of shortcoming.

There are sometimes significant differences of opinion regarding the use of technology in schools, both amongst teachers, so-called experts, politicians and policymakers. This article focusses on teacher perceptions. If politicians and policymakers are to succeed with their leadership signals regarding improving pupil learning and using ICT, it is important to understand the opportunities and challenges and to respect the work done by teachers in present-day sixth-form colleges.

Relatively little research is to be found concerning the work situation of teachers in sixth-form colleges and teachers' perceptions, beliefs, preferences and managerial challenges. One reason may be that "classroom management is sometimes equated with a mechanistic, authoritarian orientation that minimizes the importance of positive interpersonal relationships and maximizes control and compliance" (Evertson & Weinstein, 2011:4). However, managerial challenge is a topic of enduring concern for teachers. Some opinions expressed by teachers may suggest that a gap exists between perceptions of reality among teachers, particularly in sixth-form colleges, and those who are in a position to shape educational policy (Kval, 2014)<sup>7</sup> plus educational researchers (Elstad, 2005). For example, a teacher in a sixth-form college writes the following:

As a teacher in a sixth-form college I experience every single day the problem of digital gadgets. PCs and a variety of apps may be very helpful to strongly-motivated pupils, but for a large proportion of pupils they are a distraction that removes focus from subject-based learning. Pretty much all research confirms this. As a county-council employee, however, I have to be loyal to the resolutions passed by county

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<sup>6</sup> Strictly speaking, the analytical design does not provide a basis on which to determine causal direction; only the strength of statistical associations.

<sup>7</sup> This is one example. One of the top civil servants in the Ministry of Education and Research, Ole Briseid, condemned some years ago teacher-centered instruction and emphasized progressive, student-oriented and activity-oriented teaching methods: "The Ministry has wanted to reform the teaching methods in schools (in Norway) for a long time. ... He (Briseid) wants more project work, less traditional teaching using the blackboard as a visual aid and more problem-based teaching. To a larger extent, pupils will work independently and in groups with topics they develop themselves. The teachers will be more like supervisors than lecturers, and computer technology forces the development of new teaching methods (Kluge 2001, emphasised here).

councillors and by the Norwegian Directorate of Education and Training. And they have decided that not just PCs but also the use of portable applications on mobiles and tablets should play a greater and greater role in teaching, in all subjects and at all levels. I have to accept this. I do not like this development, but during my 15 years in the school no-one has asked me (or my colleagues) whether we want this tremendous focus on digital tools (Sætre, 2016).

A task for future research is to determine the extent to which this type of opinion is widespread and explore how contextual factors influence teacher efficacy and performance in technology-rich environments. If there is a widespread perception of a gap between the managers and the managed, those who are responsible for political and administrative decisions should be concerned about how teachers can succeed in their work. For the sake of balance: opinions are also expressed at the other end of the scale. Some teachers, for instance, claim that “in the digital classroom, access to and use of tablets is a fantastic opportunity” (Ramo, 2016).

There are several limitations in our study. This type of analysis has limitations from a conceptual perspective and in terms of its methodological (cross-sectional) approach. We acknowledge these limitations and argue that they can serve as point of departure for future research.

#### *Conclusions and implications for future research*

The strong emphasis on the accessibility of technology in the school is controversial among politicians, teachers and researchers (Ministry of Education and Research, 2014). For more than three decades, political quarters have been expressing great expectations for the use of technology in schools (Elstad, 2016b). This belief has been dented in the wake of an OECD report that provides an empirical basis for stating that those countries that have invested in high availability of technology display disappointing results. The internet navigating skills of Norwegian pupils are actually poorer than those in countries with limited availability to technology (but in which they actually train in adequate navigating). Nor do computers improve pupil learning results (OECD, 2015). Hattie uses the term distraction politics to describe the faith in technology as a “magic bullet” in educational policy (Hattie, 2015:30). It is likely that views on educational technology in Norway are on the change. For more than three decades, researchers, policy makers and school professionals have all harboured great expectations towards the use of technology in schools. This belief has received a hard knock. School professionals and policy makers are seeking answers to the question of how schools ought to relate to challenges created by the use of technology in the school based on a firmer grasp on reality.

Our study documents empirical associations between teachers' perceived shortcoming, stress, conflict, and teacher efficacy in respect of classroom management. We note that the average for teacher efficacy for classroom management (3.48) is lower than the neutral mid-point of the scale (which is 4), which provides an indication of the challenges encountered by teachers in these schools when they are to master class management in technology-rich

surroundings. This should generate humility regarding teachers' work challenges. There is a fairly high standard deviation to the various items used to measure teacher efficacy (see Table 1). This reveals a considerable disparity in how teachers view this question. As mentioned earlier, the selection is taken from schools with a score of roughly the national average in terms of school added value indicator and that admit pupils with average grades from secondary school. Since we have found that the challenges of leading pupil groups in classrooms in which each pupil has a computer with full internet access are fairly different in schools whose pupils have high entry grades, we would not like to claim that measurements which show how teachers at such schools perceive mastery of teaching are representative of Norwegian sixth-form colleges in general. More research is needed here based on a selection of schools at which pupils have a generally high motivation for schooling and schools in which pupils have a low educational motivation in technology-rich learning environments. Our measurements strictly speaking are only valid for the three schools included in the selection, but we believe that our estimates provide an indication of how teachers perceive self-efficacy and similar at sixth-form colleges that are located in the mid-stream of pupil performance. The three schools had no previous history of ICT-supported teaching before the system of one PC per pupil was introduced beyond the fact that this system was a consequence of national and local management signals.

Indications exist that schools with a strong focus on ICT-supported teaching attract teachers with a particular interest in technologically-supported teaching (Hauge, 2016). The selection effect in terms of teachers' choice of workplace has been documented (Bonesrønning, Falch & Strøm, 2005) and as such our estimates are not valid for with a predominance of this type of teacher. In addition, this research should be followed up by studies relating to courses other than the pre-academic study programme. For instance it seems plausible that pupils on vocational programmes display other types of unwillingness than pupils on the pre-academic study programme. This may not least depend on the subject that the teachers are teaching. Our analysis explains some, but not all, of the variance in the dependent variables. It is a matter for future research to develop larger analytical data sets that will provide opportunities to analyse the significance of subjects, programme and different types of pupil groups.

The challenges of the technology-rich classroom create pressure on teachers when leading educational politicians state that: "good classroom management and very clear rules are required regarding how PCs are used in the school. It is up to the teacher and the school to ensure that these exist" (Nilsen, 2011). A natural conclusion from such statements is that anyone who does not succeed is quite simply not good enough. There is a high degree of non-academic activity in the lessons (Hatlevik et al., 2013). That the teacher has a clearly-defined responsibility for what the pupils learn at an age range at which many pupils feel that they themselves should be deciding what they should do during lesson times, creates pressure on teachers. If teacher efficacy for maintaining order and discipline is contextual, it is unhelpful when responsible politicians express themselves in this manner. For this reason we need more research about the significance of context.

We also need more research to provide normative conclusions about how teachers can succeed better with classroom management. An emphasis on practical experience and skills has a negative association with self-efficacy for teaching and a positive association with stress, conflict and a sense of shortcoming. Future research should investigate whether an emphasis on experience-based knowledge dissemination through teacher networks (Larsen & Nilsen, 2012) is useful for promoting teachers' professional development in technology-rich environments. However, the averages for items measuring teachers' belief in experience rather than expert advice as a source of improvement are fairly high (Table 1). A plausible interpretation is a low level of faith in research providing information on pedagogic implications. A broader set of terms and items is needed here in order to draw clear conclusions. Our survey indicates no statistical association between teachers' belief in experience as a source of improvement and their teacher efficacy for classroom management.

In another article we have attempted to deduce the implications for classroom management of what we regard as research-based knowledge about teaching and learning in technology-rich environments (Arnesen et al., 2016). There are grounds for saying that even subtle differences in the physical setting for interaction between teacher and pupils and the terms of the teacher's authority (computers with internet access for all pupils, tightening up of the final assessment principle and the removal of the absence limit in Norway are examples from the period 2007-2014) can have significance in relation to the opportunities a teacher have to exert influence. If teachers are to succeed in exerting an influence to promote pupil learning in technology-rich classrooms, the teachers need adequate tools for classroom management (Ifenthaler and Schweinbenz, 2013). There has been too little awareness of this matter (Elstad, 2016c). We need more knowledge about the significance of the management tools in one-to-one laptop environments.

### **Acknowledgement**

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