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Challenges and opportunities of using a cooperative digital educational plan. Evaluation of the implementation

Research Article

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Abstract: The virtual school board (VSB) offers teachers a browser-based platform to support a multilevel, evidence-based educational plan. The present study examines teachers' use of the VSB. Based on technology acceptance model (TAM), 17 teachers from nine schools were interviewed about their use of the VSB. The evaluation was based on qualitative content analysis (QCA). For seven categories the intercoder reliabilities were acceptable. After 24 months, the users said that they used the VSB for support planning, diagnostics, discussions with parents and other documentation. They rated the overview gained and the interdisciplinary exchange as beneficial. However, a lack of technical expertise within the staff, the technical equipment and the user interface hindered teachers, such that almost a fifth never used the software completely. The challenges are complex. Needless to say, missing, little or old technical hardware is likely to decrease the usage of a digital tool; the implementation also faces the challenges of recontextualisation, and additionally faces the resource-labelling dilemma. Therefore, these challenges must be dealt with in the mutual interaction between school practice, educational research and professional information and communication technology (ICT) development.

Keywords: *Adult learning; Human–computer interface; Mobile learning; Pedagogical issues; Distance education and online learning*

Introduction

Contact restrictions, coronavirus lockdowns and distance learning are three terms that characterised everyday school life in 2020 and 2021. As a result, schools needed to digitalise their work. Despite extensive attention to this topic, the challenge to digitalise seems to be particularly high and students' learning is at risk, especially for students with the need for special education. Casale, Börnert-Ringleb and Hillenbrand (2020) analysed distance learning in special education in Germany and found that digital solutions encounter specific challenges and have so far only been used to a limited extent. Mølster and Nes (2018) found that many teachers lack digital skills and need more education and training in this area. In addition, the importance of information and communication technology (ICT) for written language classes is not recognised by teachers for children with learning difficulties. Arhipova and Sergeeva (2015) indicated that ICT can be little used due to poor technical and material equipment in the school; however, the lack of computer skills of teachers, students and their parents make the implementation of ICT in the educational process considerably difficult. For example, among teaching staff, 50% (ibid. p. 165) of respondents said they have basic computer skills but find it difficult to apply them when teaching students with special needs; 10% (ibid. p. 165) of teachers do not even have basic computer skills and are unwilling to acquire them for their work. The need is also evident on the part of conference of the German ministers of education (KMK), which wants to advance the digitisation of teaching and learning (2020a) and was finally able to approve the equipping of all teachers with digital devices (2020b) in Germany.

There are currently only a few findings on the opportunities for innovative technologies. In their systematic review, Starcic and Bagon (2014) investigated which ICT-based learning research topics were published between 1970 and 2011 on students with special educational needs (SEN). They identified 118 papers, almost half of which were investigated and released in 2006. The most frequent topic was the use of ICT to support children with learning difficulties. The main finding of the review was that the potential of ICT-based learning for use with people with special

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needs has not been adequately investigated. The authors demand that research on educational ICT use should be significantly intensified. Kirkpatrick et al. (2022) identified 19 studies in their systematic review that showed the effectiveness of behavioural analytic interventions in reducing problem behaviour at school. In contrast to other countries, the use of evidence-based practice is not common in German schools and even less so with the support of ICTs. Teachers often fail to identify effective approaches to support students (Grosche & Grünke, 2008).

However, next to digitisation, the planning, design and assessment of individual learning opportunities for students with SEN is a huge challenge for teachers. In their international review on the implementation of an inclusive education and training mandate, Forlin, Keen and Barrett (2008) found that inclusion increases the complexity of the requirements of an already highly complex profession. Within the sample of teachers, 93% fear that inclusion will make it difficult to monitor all pupils, and more specifically, 87% state concerns about providing adequate support. Imhäuser (2012) identified bureaucratic structures in Germany as a further challenge. In school, these sometimes create a complex and difficult-to-understand landscape of responsibilities for individual support. It can take a long time before a student's relevant needs are identified. Resources are made available for these needs and information about the support for a child with SEN is communicated between the people and systems involved. For children with learning and behaviour problems with SEN, individual education plans are very important in order to facilitate their participation. However, Keiser et al. (2020) found that 50% of special education teachers use support plans less than once a month. For classroom teachers, 75% use support plans less than once a month. This is a big problem because these children need support continuously and thus the support plan must be updated frequently by a multi-professional team. During the COVID-19 pandemic, it was necessary to carry out support work in cooperation with different professions at a distance.

To sum up, there are two major challenges for inclusion. The first is that German teachers hesitate to use ICT, especially with regard to students with SEN, although there is evidence of its effectiveness. The literature suggests that a major reason for this might be a lack of relevant competencies. The second problem is that individual support plans are used infrequently. To address these problems, we developed a digital tool, the virtual school board (VSB), to promote individual support work in a multi-professional team.

The VSB

The VSB (Hövel & Hennemann, 2019) is a browser-based platform for teachers and other educational staff to digitally structure and document individual support for students in inclusive settings. It offers a range of opportunities to support school staff in meeting the challenges of the inclusive distance-learning education system mentioned above. It helps with the structuring and documentation of individual support, the planning, implementation and evaluation of learning and behavioural diagnostics and multi-professional cooperation and thus represents an opportunity to improve the planning and design of educational trajectories.

The content preparation of the VSB is based on the school-wide positive behaviour support (SWPBS) model (Sugai & Horner, 2009, a description of this model can be found at: https://www.pbis.org/pbis/what-is-pbis). The SWPBS follows a preventive orientation and is based on ethical norms and values. Furthermore, it is characterised by close integration of diagnostics and educational support. Therefore, prevention in the VSB is multistage and multi-professional. A universal level of the VSB addresses all students. The regular use of diagnostics is intended to track the success of preventive interventions used and to identify children and adolescents who are exposed to an increased development risk so that they may receive additional attention at an early stage. A key attribute of SWPBS is data-based decision-making. This second level, secondary prevention, has its foundation in primary prevention but then offers the possibility of integrating individualised support into the funding process at an early stage. Based on course diagnostics, the success of preventive interventions is continuously reviewed for individual cases so that, in the absence of development progress, attention can be further intensified on a third-level, tertiary prevention. The transitions between general pedagogical and special education support are fluid and understood as a common task of a multi-professional team. To increase support levels, certain conditions must be met, for example, a cooperative intervention, target agreement and its evaluation. These conditions are technically modelled. A level increase is not possible without fulfilling these rules.

There is a broad international body of evidence for the use of SWPBS. Positive effects include an increase in academic performance (Gage, Sugaim, Lewis, & Brzozowy, 2013), a reduction of problematic behaviours (Bradshaw & Leaf, 2012), an increase in appropriate behaviour and an improvement in school climate (Bradshaw, Mitchell, & Leaf, 2010).

The VSB has been in use since 2017 and is used at project schools in the Mettmann district of North Rhine-Westphalia, Germany. The implementation showed significant heterogeneity in the acceptance and use of the VSB. First, findings from an evaluation of technology acceptance on the part of school administrators are available (Hövel, van Zadelhoff, Hennemann, & Fränkel, 2020). The study was able to show that, in addition to technical barriers (e.g. lack of WiFi in schools), the attitude of users towards the new technology and the user interface also exercises significant effects on the probability of use. The current challenge in implementing the platform in an ongoing pilot project is low usage behaviour by the teachers. Therefore, the current study aims to systematically evaluate the acceptance of the tool.

Technical acceptance of information technology

Based on the extended technology acceptance model TAM; figure 1 (Venkatesh & Davis, 2000), both the perceived usefulness and the perceived user-friendliness moderate the intended use and behaviour of ICT. Venkatesh and Davis (2000) have shown in a confirmatory model analysis that users' perceptions are significantly influenced by social influence processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability and perceived ease of use). The model provides a detailed account of the key forces underlying judgements of perceived usefulness, explaining up to 60% (Venkatesh & Davis, 2000, p. 198) of the variance in this important driver of usage intentions. The TAM is therefore well suited as an analysis grid to improve the use of ICT.

The TAM was confirmed by Anni, Sunawan and Haryono (2018) for deployment and use by school counsellors.

Research aim and questions

This article aims to systematically record the technical acceptance of the VSB along with the TAM. The goal is to identify influencing factors based on the TAM (Venkatesh & Davis, 2000), which determine the perceived usefulness, perceived user-friendliness, intention of use and thus usage behaviour. Support from school management, an individual and collective self-efficacy experience, and a good illustration of the work-relevant processes in the VSB are expected to be potential influencing factors for the improvement
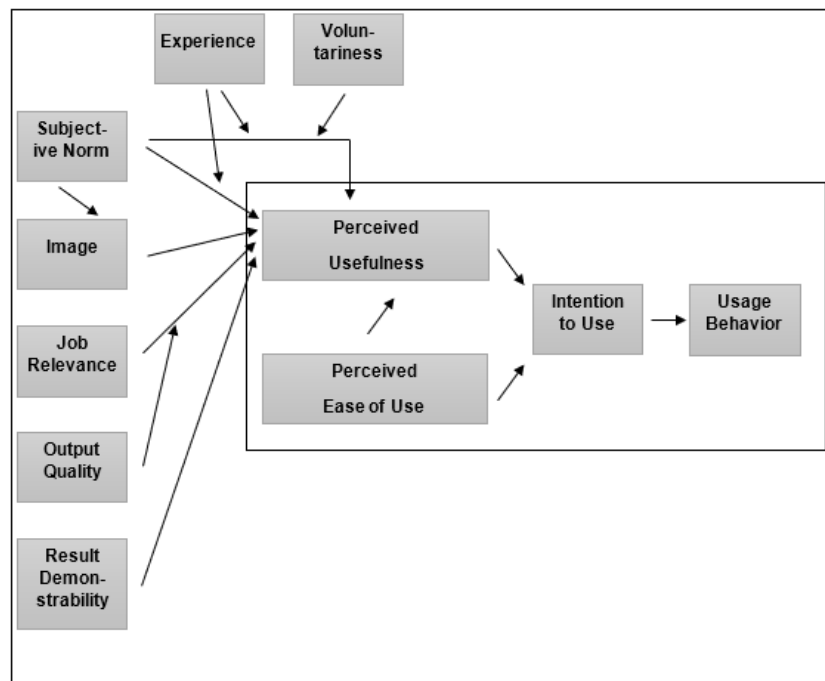

Figure 1. Technology Acceptance Model (Venkatesh & Davis, 2000, p. 188)

and acceptance of the VSB. By identifying relevant influencing factors, clear action plans for the sustainable implementation of the software in school operations can be developed. As an overarching goal, we want to discuss the identified factors as possibilities for and challenges to the implementation of innovative digital technologies in schools. Our research questions are as follows:

(1) Based on the TAM, what challenges and opportunities do teachers see in the use of the VSB tool at their school?

(2) What implications can be derived from these findings for the implementation of innovative digital technologies in (German) schools?

Methods

Sampling

After implementing the VSB for 2 school years, we interviewed a sample of users. The participants include 17 primary and special education teachers with various technical expertise and preconditions working in nine schools in North Rhine-Westphalia, Germany. In addition to Hövel et al. (2020), who aims to identify principals' perspectives, the current study focuses on technical acceptance of the VSB by teachers. The software was first implemented in July 2017. In July 2019, the software was evaluated by measuring its technical users' acceptance. All schools and teachers volunteered to participate in the use and evaluation.

Semi-structured interviews with experts

Semi-structured interviews can be used for a range of research activities and allow researchers to gather information and open responses conversationally and in the participants' own words (Longhurst, 2003) while ensuring that all interviews cover similar material (Crowe, Inder & Porter, 2015). Especially for this formative evaluation of the software, semi-structured interviews gather reliable information about technical, individual and social acceptance. Based on the research of Gläser and Laudel (2010), we hereby define our participants as experts and rely on the qualitative research method of semi-structured interviews to collect experts' knowledge.

Data collection and analyses

For the data collection project, collaborators were sent to nine schools to conduct the interviews. The average duration was 20 min. The interviews were recorded and subsequently transcribed word for word (Mayring, 2016, p. 89).

After data collection, we analysed the data using qualitative content analysis (QCA) (Mayring, 2014). In orientation to our interview guidelines, we defined a coding guideline table 1, which included seven main categories provided by TAM and additional subcategories, such as *beneficial* and *hindering factors* to *experience*.

As an addition to the categories provided by TAM, we have added the category *further development suggestions* to collect data about users' wishes for improvement within the software. Therefore, the coding strategy can be described as deductive using TAM categorisation and inductive according to the additional categories.

It appeared useful to define categories to answer the research question holistically (Mayring, 2015). The final guideline contained a definition, anchor examples and coding rules for each main and subcategory (compare table 2).

To ensure comprehensibility within the research team, including two independent coders, the coding guideline was discussed in various consensus sessions and pilot-tested in a first interview. After identifying a source of error in the common understanding of specific codes, which is likely to happen in qualitative research, we modified our scheme and continued the coding process with the open-access application QCAmap. Our final guideline provided seven main codes, some split up into subcodes, resulting in a total of 10 codes.

Within all the coded passages, the reliability defined by Holsti reached $r > 0.96$ in seven and $r = 0.81–0.90$ in the remaining three categories. Coefficients such as Holsti's r do not take into account the number of agreements expected by chance (compare table 3).

Therefore, Cohen's k ensures the intersubjectivity of the coding process and enhances the credibility of the research results. 'The (Cohens kappa) coefficient relates the number of concordant and discordant ratings while taking into account the number of the agreement of ratings that could be expected by chance' (Burla et al., 2008, p. 114). Cohen's k can range from a lower limit of zero and -1.00, depending on raters' distribution, and to an upper limit of +1.00 (Cohen, 1960). The overall coefficient was 0.92, which is an almost perfect strength of agreement (Landis & Koch, 1977).

Results

TAM reflects and theorises different processes that influence usage behaviour. In the following section, the results of our analysis are listed (compare table 4) and include social influence processes, users' experience and cognitive influence processes. Categories are

Table 1. Coding Guideline

Category *Subcategory*	Variable	Indicator	Guideline question
Subjective norm (d)	Perceived image of the VSB	The interviewee speaks about the perceived image of the VSB in his/her school	How do you/Please describe the opinions of the VSB in your school?
Image (d)	Personal impact of the VSB's image	The interviewee speaks about the influence of the image towards his/her own opinion	You have told us about a rather positive/negative opinion at your school. How did you personally perceive the VSB?
Voluntariness (d)	Terms of use	The interviewee speaks about the perceived terms of use	How was the VSB implemented? Did it appear voluntary or mandatory to you?
Experience (d)	Individual experience with the VSB	The interviewee speaks about their personal experience with the VSB	How do you describe your experience with the VSB?
			How often do you use the VSB?
			What was a hinderance/benefit for use?
Beneficial aspects (i)			
Hindering aspects (i)			
Job relevance (d)			
Task description (i)	Individual description of the tasks of the VSB	The interviewee described the tasks that the VSB should undertake	How do you describe the tasks, that the VSB shall undertake?
Adjustment (i)	Adjustment of how well the VSB matches teachers tasks	The interviewee describes the extent of adjustments between the VSB and his/her own tasks	Which tasks did the VSB actually undertake?
Output Quality (d)	Perceived quality of the VSB for teachers	The interviewee describes the actual output of using the VSB	Which tasks did the VSB actually undertake?
Further development suggestions (i)	Development suggestions	The interviewee speaks about ideas to improve the VSB	Do you have any further suggestions for the development of the VSB?

Note: d = deductive; i = inductive

Table 2. Examples for Definition, Anchor Examples and Coding Rules for Job Relevance

Subcategory	Definition	Anchor Examples	Coding Rules
Task description of the VSB	The individual description of tasks the VSB undertakes	'A platform to present pupils with various special needs, to upload documents and more' (GGS1–I3)	Code all statements referring to which tasks the VSB is supposed to undertake in the interviewees understanding
Adjustment of own tasks and the VSB	All statements containing information about the adjustment of teachers' tasks and the VSB	'Indeed I teach students, who are problematic and predestined for the platform or the platform is predestined for those students…' (GGS1–I5)	The interviewee speaks about the perceived adjustment of his/her own tasks and the supportive functions of the VSB

Table 3. Intercoder Reliability

Category *Subcategory*	Total of coded passages	Total: Coder A	Total: Coder B	Total: Common codings/ Holsti-r
Overall	1298	642	656	615
Image	226	109	117	0.96
Subjective norm	102	50	52	0.98
Voluntariness	67	33	34	0.99
Experience – frequency	128	66	62	0.91
Experience	291	145	146	0.98
Beneficial aspects	*84*	*42*	*42*	*0.98*
Hindering aspects	*207*	*103*	*104*	*0.98*
Job relevance	235	118	117	
Task description	*101*	*54*	*47*	*0.81*
Adjustment	*134*	*64*	*70*	*0.89*
Output quality	125	62	63	0.98
Further development suggestions	124	59	65	1,00

Table 4. Main Results

Categories Coding rule	Reduction	Fre-quency
Subjective norm *All statements that provide information about how the VSB is viewed at the school*	Enthusiastic, positive, positive in the first instance and thankful for its clarity	6
	Concerned, linked with negative emotions, shyness and frustration	10
	Additional barrier (especially in stressful times), an extra burden, additional work, a barrier, critical, negative, not sufficient and an overload	16
	Mostly veteran colleagues with little technical expertise struggle	1
Voluntariness *The interviewee describes the extent to which the usage decision was perceived as binding*	Using the VSB was perceived as voluntary	9
	Using the VSB was perceived as a commitment	5
	Using the VSB was perceived as mandatory	9
Image *The pedagogical specialist speaks about the influence of the VSB's image on her/his own opinion*	Positive attitude towards the VSB at first	10
	Decreasing positive attitude with increasing use results in confusion, frustration and little use	3
	Positive for its practicability, the overview and display of information, gaining time, companionship through SEN assessments and individual educational plan, interdisciplinary teamwork (e.g. with speech therapists), documentation and companionship for individual support especially in bigger school systems	25
	Despite current problematic issues teachers are confident about the future of the VSB. They verbalise a need for change and further training, vote for digitalisation and see opportunities	11
	Negative attitude towards the VSB. VSB as a barrier, time-consuming, additional workload, complicated, mysterious, non-self-explanatory and formulate concerns towards monitoring by their employers	46

Categories Coding rule	Reduction	Fre-quency
Experience *Code all passages, providing information on how often the VSB was used*	weekly, 3h/week, weekly to monthly for the documentation of discussions with parents, support of students, for research aims or as a support for SEN-assessment	16
	Continuous in the first 1-2 months, but decrease the use a short time after. They report rare use, often too rare to develop any sort of routine	11
	Teachers never used the VSB, only for a single instance, but never as a whole	11
Experience - beneficial aspects *All statements on the beneficial aspects of the overall conception of the VSB*	Teachers perceive the overview a beneficial	11
	Teachers liked the connection of diagnostic instruments and the options given for evaluation in a step-by-step education process	8
	Teachers liked the use of the VSB as a platform for an interactive exchange with their colleagues	13
Experience - hindering aspects *All statements on hindering aspects of the overall conception of the VSB*	Teachers experience hardware and technical problems. Missing scanner, notebooks and computer and no reliable connection hinder usage	8
	The identified hindering aspects such as technical obstacles lead to frustration, stress, disillusionment and require a great deal of time and additional workload	26
	Functionality (e.g. when uploading differing file formats), user-friendliness, complicated mapping, user interface, little intuitive handling, focus on competences, inflexibility, the evaluation of set goals, no option to sign documents, data protection	57
	Missing letters of agreement by student parents, technical problems at the introductory event, little collegial support, missing routine and workspaces, exchange with school administration and the distance to get help	4
Job relevance - task description *All statements are coded to describe the function of the VSB in school in general language*	Give an overview and summary of teachers, pupils and their support, the evaluation of diagnostic instruments, provide guidance within the process of diagnostic instruments, enhance multi-professional teamwork, provide a platform to display information, offer an interface for multidisciplinary interaction (including professions outside the school systems), guide and support teachers, point out errors, administer data and facilitate SEN initiations, digitisation and the reachability of data as tasks	53
Job relevance – adjustment of teachers' tasks and VSB performance *All statements are codes that describe the adjustment of teachers' tasks and VSB performance*	Matched teachers' task when analysing diagnostic instruments for conscientious procedures when supporting students. Relevant for documentation, multi-professional teamwork, conscientious evaluation and creating small-step educational plans for students. Supportive and accompaniment when SEN initiatives were conducted	21
	Limited in matching teachers tasks. Speech disorders and competencies missing, difficulties with specific terms, missed opportunities for continuous documentation and struggled in collaborating with other schools when hiring diagnostic instruments. Documents provided were not sufficient for SEN assessments and took too much time	13
	Did not fit the teacher's tasks. Additional work and time with no clear usage. No assurance for privacy; not enough flexibility to work from home. Analogue work or other software and communication systems are preferred. Did not fit with the technical equipment of the school or their technical expertise	26
Output quality *All statements focussed on the specific fulfilment of tasks of the VSB*	Evaluation of diagnostic material, availability of diagnostic material, accompaniment and support, advancement of inclusion, possibility to document discussions with parents, continuous documentation, easing school change, output for digitisation and new types of educational plans, collection of data and the outcome for individual students and students with emotional and behavior disorder and learning difficulties	18
	Limited, because they are currently familiarising themselves, continuity is missing, technical hurdles limit its use, they face problems with the software, they spent a lot of time searching for buttons and use the VSB only as a shelf, agreements and collaboration continue to run analogously and analogue work is preferred	11
	No benefit because analogue work is rated as more effective, technical hurdles are too great, perceived as a burden/extra work/challenge/complicated, they have not used the hiring platform, there were no pupils matching or their educational plans differed Some teachers believe that future output is realistic	30
Further development suggestions *Code all passages for further development suggestions for the VSB*	Improved design and user interface, print options, cloud functions for home office, extension of speech disabilities, library function, specific areas for educational plan, customisation, hints, links to other software, apps and tablets, tutorials, handbooks, dummy students, fixed VSB work times, extensive schoolwide use, step-by-step training of experts and later colleagues, training days	56

listed by the number of coded passages. In addition to categories provided by TAM, passages in the category of further development suggestions are listed last.

The introduction and use of the VSB in the Mettmann district shows a rather heterogeneous picture. Based on TAM, we can outline the first research question regarding the challenges and opportunities of using a digital tool such as the VSB as follows. Within most coded passages in the 'experience' category, it becomes evident that the usage behaviour of the sample is low. 'At the moment, I do not use it as much as I would like to. I would like to use it on a daily basis, but at the moment it is more like—at most once a month' (MGS1-I2). Although the 'image' of the VSB and its possibilities, such as multi-professional collaboration, diagnostics, access to data and the structuring of the individual support process, is rated innovative and useful (25 codings), teachers have unpleasant emotions, such as stress and frustration, while using the VSB. 'It was frustrating and so I didn't use it anymore' (GGS1-I5). In line with Fergens, Pilawka, Broholm and Magnussen's study (2020) into users' experience, VSB users perceive the time spent within the software as 'a lot of work and additional work' (GS2-I) and have a negative perception of the VSB. (46 codings). Next to these barriers, users reported the most 'hindering aspects', such as difficulties with the interface. 'I was facing a lot of problems with the interface and spent a lot of time searching for the right files' (GGS4-I3). With a total of 95 coded passages referring to 'hindering aspects', users face a lot of challenges showing a wide variety: Concerns about data protection, technical obstacles and a lack of hardware (12 codings) were reported. 'We have one computer for 30 teachers' (GGS4-I2). More coded passages with 'hindering aspects' demonstrate software barriers (57 codings), for example its low perceived user-friendliness and the lack of a signing option. The category 'job relevance' shows the extent to which the VSB matched teachers' tasks (21 codings). 'Yes, it was useful to record parental conversations' (GGS2-I1). Upon review of the results in the perceived 'output quality', it becomes clear that most of the participants rate the fulfilment of the VSB tasks as limited or non-existent (41 codings). In conclusion, the implementation of the VSB faces a large variety of challenges, which gives it a rather negative image.

We identified two main reasons for this: (1) Job relevance: There is a contradiction between the actual and the theoretically intended educational use of the VSB. This is due to the fact that the rules of the technical system do not coincide with pedagogical practice. This leads to frustration among users, weakened job relevance and subsequently to a negative subjective norm and image. (2) Output quality: The user interface

and the operation of the VSB are perceived as non-intuitive. In addition, there are equipment problems that also contribute to an experience of stress. Concerning the second research question, the implications arising from both aspects in the context of previous research will be discussed below.

Discussion

Contradiction between actual and theoretically intended educational use of the VSB

Many aspects of experience and job relevance expressed by the interview participants address a way of working that aims to categorise students or administratively assign a label to SEN. 'It facilitates the initiation of special education assessment; it is a data pool that can be requested easily by the school administration' (GGS2-I1). 'Basically, that's now, um (¼) the focus should be that all the data is already available for a special educational initiation' (GGS4-I2). However, the multilevel educational support model (MLESM) technically modelled in the VSB pursues opposing objectives. The principles can be summarised in the aspects of preventive activities, data-based decision-making and problem-solving, as presented in the introduction. Owing to the technical implementation of these attributes, they cannot simply be omitted and skipped in the VSB. This way of using the VSB, which differs from its intention, leads to the stated obstacles and ultimately to low or no usage at all.

This discrepancy can be determined with the theory of recontextualisation (Fend, 2008), which is particularly relevant in the context of the inclusive German school system (Amrhein, 2016). Recontextualisation describes a process in which the actors, when starting to implement the mandate for inclusion in their practice, discover a discrepancy between the requirements and the existing institutional routines, regulations and resources of their system. This leads to individual interpretations and resistance, which in turn leads to a recontextualisation (i.e. to reshaping and adapting the requirements to the existing system and thus reversing the mandate). The goal of the VSB is to promote multilevel support of students, in contrast some users see the function of the VSB as being captured student failure time saving to accelerate the determination of SEN. This application is in contrast to the theoretically intended function of the VSB.

In addition to the challenges identified so far in the implementation of MLESM, according to Amrhein (2016), these challenges are particularly exposed to

the risk of recontextualisation. At first glance, they can be easily integrated into the system logic of a school system that relies on categorisation and the allocation of SEN. Due to the technical implementation of the routines and rules of MLESM in the VSB, these routines and rules cannot be reinterpreted by the teachers and adapted to the 'old system'. There were reports such as: 'It was always a little complicated (¼) we had to upload specific documents and they told us we should just upload any kind of document. So I uploaded an empty document, which isn't really meaningful' (GGS1–I3), indicating a misunderstanding of MLESM within the VSB and constituting a recontextualisation of its use.

Challenges to the implementation of the VSB tool can also be found in previous research results that investigated the introduction of MLESM. Thomas, Conoyer and Lembke (2020) identified the successes and challenges of the implementation of response to intervention (RTI), that the staff's understanding of MLESM and the screening and use of screening data are the most demanding challenges.

In the study by Barrio et al. (2019), half of the participating teachers said they were insufficiently familiar with RTI or that there was confusion about the definition and implementation of the RTI model and its components. This issue can still be seen in other studies on the implementation of RTI systems. For example, the study by Dykes (2009) shows that although a majority of teachers assess central RTI elements, such as continuous progression, to be very useful and significant, a large proportion of teachers indicate that they are not carried out or only carried out irregularly. The study by March, Castillo, Batsche and Kincaid (2016) showed that accompanying coaching significantly improves the implementation quality of RTI. The greatest development took place in the first year of implementation of RTI. In contrast, there were only moderate increases in implementation fidelity for years two and three.

Another attempt to recontextualise the VSB can be seen from the fact that the VSB was not used as intended for small-step promotion planning but primarily as a documentation system for the basis of an SEN document. There is, therefore, a risk that the tool will be used primarily as a means of selection and less as a means of promotion. This is a fundamental problem in the promotion planning process, especially in Germany, as individual support is often linked to the category of SEN due to the country's history (Neumann & Lütje-Klose, 2020). In Germany, this problem is discussed as the 'labelling resource dilemma' (Füssel & Kretschmann, 1993), and in the international discourse, it is known as the 'dilemma of difference' (Norwich, 2009).

Practical implications

To improve the implementation of a digital tool that uses MLESM, this research enhances a different understanding of educational support by teachers.

The aim must be to understand pupils better, promote their potential, break down barriers and increase opportunities for participation (Veber et al., 2022). Forms of diagnostics that serve only the purpose of selection or pressure to perform are not suitable in the context of an inclusive educational system. Categories may only be used when students are in need of individual support. School must include pupils and their individual development in and with society (Hoyer, 2012). As a further development of the demand for decategorisation (Boger, 2019, p. 71), a directed, responsible handling of categories ('recategorisation') (Boger & Textor, 2016) is required, understood as indefinite working hypotheses based on which small-step individual support can be planned, preferably in discussion with different professions (Pollmeier, 2019).

Here, the VSB acts as a tool with which this goal can be achieved; however, it requires necessary skills on the part of teachers to use the tool for inclusion. The digital tool cannot do this work on its own. It requires an informed user. For this purpose, teachers must be trained accordingly in the future.

To face the challenge of recontextualisation, it seems necessary to implement ICT carefully. Using the TAM, Teeroovengadum, Heeraman and Bhavish (2017) examined how the introduction of ICT in schools can be positively influenced. In line with older studies (including Bullock, 2004), they identified the support of cooperating teachers and technical staff as a significant factor positively influencing the introduction of ICT. The main content of the support was organisational support, teaching support and adequate training programmes. Teeroovengadum et al. (2017) also emphasised the central role of principal, which advocates for the value of integrating ICT to facilitate and improve the promotion of pupils.

For the future introduction of an ICT-supported MLESM, existing routines and rules must be considered. It is necessary to challenge and overcome existing beliefs and practices regarding individual support. The VSB offers possibilities at different levels to face those challenges in an innovative, digital and MLESM-based way. For this, the VSB must be understood, accepted and practised by all school staff.

Technical implications

VSB users deal with technical equipment that hardly enables them to work continuously with a digital tool such as the VSB platform '(¼) also because we do not have the requirements. This computer is the only one that has a valid web connection and our WiFi more or less does not work at all' (GGS4-I1). These preconditions describe a common problematic situation in German

schools. Even during a pandemic situation at German schools, where technical equipment was highly required due to distance learning, 40% of all schools stated that they had no adequate technical capacity for the use of web-based systems (Huber et al., 2020). To support the full implementation of a browser-based platform, such as the VSB, technical equipment for all users must be ensured.

The users also reported difficulties when handling the tool. 'This is why we didn't use it anymore, because we usually got stuck at specific steps' (GGS4-I2). Codings within the category of 'further development suggestions' show that VSB users made suggestions to improve a common understanding. 'It would be helpful to have working teams or fixed time slots for working with the tool' (GGS1-I3). International studies have shown that the performance of training courses can ensure a common understanding of ICTs (Okumus, Lewis, Wiebe & Hollebrands, 2016). Lessons to train technical expertise can support teachers in their use of the VSB. In addition to training, the support of fellow teachers within the same school or partner schools can increase a deeper understanding of ICT (Okumus et al., 2016). Aside from a common understanding among teachers, the principal's support is the most important determinant of ICT adoption in education (Teeroovengadum et al., 2017). Regarding our second research question and the results of an earlier principle-focussed study (Hövel et al., 2020), we can derive the inference that principals' support for teachers plays a major role in the technical acceptance of ICTs in educational settings. Teeroovengadum et al. (2017)'s results underline this derivation as being even more influential than the users' perceived usefulness. Consequently, when starting to use ICTs, such as the VSB tool, we find the collaborative work of all school staff and permanent reflection to be reasons to improve the technical acceptance of ICT in schools.

Moreover, results according to the VSB interface and user-friendliness from our sample indicate a relevant influence on its technical acceptance. 'It (the VSB) should be designed in orientation to other well-known websites (¼) that would make the orientation easier for users. I think it would be easier for us if the VSB would use an interface that is designed like open access and a well-known website. In my opinion, teachers would be able to use it more easily' (GGS4-I1). Teachers do not find the VSB tool useful for professional collaboration.

'No, for now we do not perceive any output since it is too complicated. Because it isn't intuitive enough yet' (GGS4-I). Teachers' lack of understanding of the VSB also occurs when analysing the stated task performance, as it was often used superficially (e.g. for documentation only). As a result, users are likely to perceive the tool as a burden and state dissatisfaction. Fergencs, Pilawka, Broholm and Magnussen (2020) also identified challenges to teachers' utilisation of digital tools in beneficial ways. Given the results of our study, it is clear that a user-friendly interface is required for the VSB. Reluctance, which occurs whenever users feel frustrated and cannot identify task performance, influences technical acceptance. Previous studies have shown that a superficial way of using ICT results in job dissatisfaction as a consequence of such reluctance (Motta et al., 2014) and emphasise the need for collaborative work that includes a constant exchange of users and service providers.

Conclusion

To conclude, the evaluation of the VSB against the framework of the TAM has provided information about the acceptance of ICT in schools that supports the revision of the VSB tool and lends credence to the view that this tool merits transfer to the realm of further research activities connected with the use of digital tools in schools.

While an insufficiency in the level of technological sophistication of, or simply the quantum of, technical equipment available at a school might pose the primary hindrance to the effective usage of ICTs, such as the VSB tool, it is also true that the number of barriers influencing usage behaviour from a pedagogical perspective is greater. Phenomena, such as recontextualisation, categorisation and the behaviour of the principals, represent an equally important aspect. A key factor for future projects can therefore be to look at possible mechanisms of action for efforts to adapt MLESM to the categorical processes existing in school practice. To enhance digital rather than analogue, we identify the need for a joint understanding within schools. We assume that close, constant and collaborative work by users, including teachers and principals, service providers and IT experts, can improve the technical acceptance of ICT so that analogue systems may be completely abandoned.

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Supplement

Category	Guideline questions
Image	You have told us about a rather positive/negative impression of the VSB at your school. How did you personally perceive the VSB? To what extent do you comprehend (alternatively understand) or disagree with your colleagues' opinions?
Subjective norm	How would you describe the opinion of the VSB at your school? What did you perceive?
Voluntariness	How was the VSB introduced to your school? How do you feel about the decision regarding usage? Mandatory or voluntary?
Experience	How would you describe your personal experiences using the VSB? How often do you use the VSB?
Job relevance	Can you describe what the VSB is supposed to offer teachers? Which tasks does the VSB undertake and which does it not undertake?
Output quality	Which tasks in school does the VSB take on and which does it not undertake? How well did the system work?
Further development suggestions	Which other aspects are important to you? Are there other issues on which you would like to report or focus?