
AMPLIFYING THE PROCESS OF INCLUSION THROUGH A GENUINE MARRIAGE BETWEEN PEDAGOGY AND TECHNOLOGY

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Abstract

This study addresses the challenge of inclusion in mainstream schools of learners with developmental and attention deficits and examines the potential of a digital structuring tool, MobilizeMe, to scaffold this process, including the impact and implications associated with the implementation. The study focuses on the discrepancy arising from, on the one hand, the digital and pedagogical affordances for scaffolding the focus learners, and on the other hand, the lack of utilization of these affordances in the context of study. From a case study approach, the paper touches upon the digital functionality of the tool, the pedagogical practice of the teachers and, finally, the consequences of the implementation. Based on the analysis and its findings the study presents a generic model for understanding the elements of the construction of new technology supported pedagogical practices.

Introduction

Learners with developmental and attention deficits, such as e.g. Attention Deficit Hyperactive Disorder (ADHD), Attention Deficit Disorder (ADD), Autism Spectrum Disorders (ASD), constitute a broad group of learners with Special Education Needs (SEN). As noted among others by Almer and Sneum (2009), these learners are challenged in learning and are struggling with “problems such as lack of attention, selective and continuing attention and response inhibition as well as a lack of ability for planning, promoting, strategic thinking, change in attention, flexibility in working memory, self-regulation and self-monitoring” (Andersen, 2015).

Research shows that learners with e.g. ADHD have difficulty performing at the same level as their peers (Barkley, 1998; DuPaul & Stoner, 2003) and that inattentiveness impact their ability to follow directions negatively (Kendall, 2000). This further impacts their ability to remain on task and comply with instructions (Bos & Vaughn, 2002). Learners with ADHD are more likely to obtain poorer grades and lower scores on standardized tests, and they stand a higher risk of dropping out of school than their peers without ADHD (DuPaul et al., 2011). Research emphasize the need for SEN support and supportive structures that offer them an overview of the entire school day and help them keep on track during task solving:

The results of this study suggest that when students with ADHD are taught planning skills and strategies, and provided proper support and guidance, they can use a plan effectively and use strategies. This, in turn, can improve their academic performance. (Johnson, & Reid, 2011)

With respect to digital tools and environments, research throughout the last couple of decades has confirmed the general value of providing structure (sometimes named *virtual portfolios*) in virtual environments; in particular, providing structure for essential prerequisites of a learning process, such as Gutwin et al. (1995), Sorensen (1993) and Sorensen et al. (2002):

“The use of a virtual portfolio offers both learner and instructor a general overview and navigational orientation. By acting as a mirror during this evolution of past, present, and future learning, virtual portfolio enhances reflective activity and adds depth to learning” (Sorensen et al., 2002; p.288)

Such structure can provide:

- *overview and (self-)awareness* of space and status of the learning process, for both learners and teachers;
- *perception, reflection and direction* of a learning process;
- an individual/personal *home* in the digital world;
- a shared understanding between learner and teacher of *status* in the learning process;
- navigational support and future orientation.

Narrowing our focus to look more closely at experiences from using digital technology for inclusion of learners with developmental and attention deficits (the focus learners of this study), our on-going research project, *ididakt* (Andersen & Sorensen, 2015), documents that these focus learners in the mainstream educational system are still supported mainly by non-digital artefacts and structure solutions (e.g. hand-outs, handwritings at the blackboard, time schedules at the classroom walls, oral instructions).

This paper presents a study, in which a digital tool is used as a vehicle to establish a supporting structure in the classroom for learners with attention and developmental deficits. The study focuses on the discrepancy arising from, on the one hand, the digital and pedagogical affordances for scaffolding the focus learners, and on the other hand, the lack of utilization of these affordances in the context of study. We examine the digital structuring tool, including the impact and implications associated with the implementation in the classroom. The functionality, the pedagogical practice and the consequences of the implementation are given special focus. Section 2 presents the research design, including research method and data collection. While the analysis and findings are presented in section 3, section 4 forms the forum for discussion and presentation of a generic model for realising the power of technology for inducing new pedagogic practice. Section 5 concludes the study.

Research design

The context, in which the study takes place, is a Danish municipality. A digital tool for structuring, visualisation and collaboration has been used for eight month for focus learners in classrooms at the primary school level (age 6-10) across three public schools. The schools have voluntarily enrolled in a pilot project and identified motivated learners and challenged teachers, who were interested in using MobilizeMe (MM) in a pilot study. MobilizeMe (MM) is a digital supporting tool intended for children, youth and adults with cognitive disorders (e.g. autism, aphasia, Downs' syndrome, ADHD, dementia and mental retardation). MM is able to visualise everyday structures by means of flexible time markers and pictures/icons and through these promote stable situations with less stress and more surplus energy for the learners. It is possible to share the visualised day plans with all stakeholders around the child and enhance collaboration among the supporting individuals (MobilizeMe, 2016)

Method

This paper is based on a three-month case study, which unfolds in a mainstream school context. The study is explorative (Thisted, 2012) and attempts to identify and clarify factors, which either harness or seem to ignore the structural potential of the digital tool in a supposedly including pedagogical practice (McKenney & Reeves, 2012). In the analysis, findings are produced and categorized in four main categories. Subsequently, these categories are used to produce a deeper and more coherent understanding, in order to consolidate and discuss findings in the light of other research.

Data

The case study involves four teachers and six focus learners, all of which have been using MM for between one and eight month. The data related to the learners are collected, using the teachers as instruments. In an overall perspective, the data consists of (a) observations from meetings and workshops, (b) classroom observations, and (c) interviews with teacher and school leader.

The authors participated as researchers in a Skype meeting with the case-initiator in the municipality. The meeting addressed purpose, aim and initiation of the pilot project. Subsequently, researchers acted as participating observers in a face-to-face meeting with school leaders, teachers, and consultants with the purpose of evaluating (a) to what extent the pilot appeared meaningful, (b) the functionality of the digital tool, and (c) the general implementation and its degree of success. In the meeting school leaders, teachers and consultants evaluated the first period of use/interventions with the digital tool. Digital sound recordings from the meeting were transcribed in order to capture and highlight the experienced MM potential through the lenses of the teachers in terms of its value for supporting focus learners as well as identifying advantages and obstacles associated with the implementation of the tool.

Observations took place at one of the three participating schools in a 3rd grade classroom with three focus learners, all of which were using MM for, respectively, one, three and six month. This was followed by an interview with the teacher in the classroom and with the school leader. Notes from observations and interviews were used in an attempt to assess how the tool was applied, not only in the local practice, but also in the school organisation. Finally, the researchers observed a workshop in the municipality in order to gain insight into how the teachers' were introduced to the digital tool. In the following section the respondents are cited as T1, T2, T3 (teachers) and L1, L2, L3 (leaders and consultants).

Analysis and findings

The digital tool (MM) through the looking glass of the teachers – MM as a tool for the learner

Positive experiences/interpretations

Five focus learners appear to have had positive experiences using MM:

- ability to enhance their understanding of the activities of the day;
- motivation to work through awareness of time and a view to later reward;
- worked more effectively, when timer and rewards are visible ahead;
- appeared more participating and concentrated around tasks;
- appeared less stressed and show less inappropriate autistic behaviour;
- appeared more calm and transmit less stress to peers;
- gained status through becoming a learner, who controlled time.

Although teachers assess that, in general, the learners like to use MM, the items above are not valid for all learners. The degree of satisfaction seems dependent on other situated organisational factors, such as form of the day, interest in relation to subject, etc.

Negative experiences/interpretations

For one learner MM did not seem to generate success, as it appeared that the learner was not at all interested in the digital tool: "It is simply not a success" (T1). However, the analysis suggested that this teacher did not at all understand the nature of the potential of MM.

The digital tool (MM) through the looking glass of the teachers – MM as a tool for the teacher

Positive experiences/interpretations

The teachers saw the learning potential in the tool. One teacher expressed great joy in using MM in collaboration with a focus learner and stated that the use of templates eased the job.

Negative experiences/interpretations

Viewed from a teacher perspective, MM lacked "user friendliness". It was difficult and laborious for the teachers (in terms of functionality) to put up the programme of the day for more than one learner at a time (i.e. to copy a plan), as one plan cannot be shared. This problem was further emphasized by the fact that only one of the teachers understood how to

re-use a template (such as e.g. a programme of the day). Similarly, the teachers did not possess the skills to edit templates on their own PCs and transfer them to the learner's iPad/MM. The photo gallery of MM got criticized; it takes time to find alternative photos, which did not necessarily function in MM. Another drawback was that the teachers had to wait far too long to gain access to MM. Some teachers' expressed a wish to be able, themselves, to create new user accesses via the national system (UniLogin). The teachers did not understand how to use the time features of MM, and thus, preferred to work with activities that did not have a time frame.

Use of MM in the pedagogical practice

At one school with three focus learners, the teacher created a week programme in MM on iPads for each of them. The programmes for the learners were identical, and it contained only the time schedule of the week. "It is only to stimulate overview" (T2). No activities are associated with the lessons in the plan. Activities were written on the shared whiteboard of the classroom at the beginning of each lesson.

The teachers were aware of the need for further scaffolding of the focus learners. "We have pictograms displayed further upwards. But they do not appear detailed enough" (T3). "The times when I have been successful in programming something else than just the topic, those times I see more and bigger initiatives, as he knows what he is supposed to do. But the problem is that it appears to be very few lessons where it is actually possible" (T2)

Without indications of activity MM was only used to maintain overview of the hours of the day and of the remaining part of the lesson. The learners were supposed to seek info on both iPad and the whiteboard - and according to the teachers, this was hard for the focus learners. They were not participating in the construction of the week or day programme. Their task with MM was to start the watch at the beginning of the lesson. There was no walk-through of the day's programme: "He is not interested to have me showing him the programme, he prefers to sit alone and watch" (T3). The teachers had introduced the focus learners to MM by inviting/motivating them to do something new and smart on an iPad, which could help predict how the day was planned to progress.

MM was utilized isolated from the general practice in the class. It was the extra supporting teacher, who put up MM for the focus learners. MM was not used outside school hours, neither in after-school care (SFO) in the afternoon, nor by parents at home. Parents were not participating in supporting/simulating the focus learners to use MM. For the other learners in the classroom, "Skole-Intra" was used as a digital structuring tool. The teachers were not able to imagine MM "stretched" to be used for all the learners of the class. "That is similar to handing out crutches to all learners. They don't need that." (T2)

The teachers comment that for focus learners it was actually possible "to go in and change things in MM, perhaps out of curiosity or to exert influence on their own schedule" (L1). At the workshop the teachers spoke about how to "close" the iPads, so focus learners would not be able to use them for anything else than MM. Teachers are of the opinion that it would

stimulate increased focus and prevent focus learner from playing digital games. But it would, of course, create a barrier for using the iPad for other constructive learning activities.

Organizational contextual factors: Implementing MM among teachers as a tool for promoting inclusion

As mentioned earlier, the teachers were not familiar with the functions of MM. Some of the teachers had started by themselves – or with help from colleagues – without having participated in the introductory workshop. “I don’t know anything about that, for that I have not learned (T3). “We have just started to use this or that” (L1), “we have just started explorative” (L1), and he offered a workshop: “Then we will set aside an hour” (L1).

The workshop contained a technical walk-through of the functionality of MM: create activity, administration of time, paste images, notes, colour codes, templates, etc. The participants were not familiar with MM, they did not necessarily have codes and did not work with MM during the introduction. After the workshop, they were supposed to continue working with MM. It was expected that the teachers disseminated their experience with MM in the organisation, but there was no concrete plan for this. They had not succeeded in making the video tutorials on the homepage of MM work, nor had they had the time to look at them. They would have preferred a hands-on introduction, where they worked in MM simultaneously, so “they would have time to get to know MM together with an expert user” (T2).

The four teachers were alone facing the challenge of using MM: “It is not our primary focus of development at the school – and neither is it the focus of the class teachers or the teams. There are plenty of other issues” (L2), the leader said, while pointing to other issues and actual initiatives of development.

Organizational contextual factors: The time factor

It became clear that the time-factor permeated everything and was central in relation to:

1. instruction on how to use MM (as the teachers did not have time to familiarize themselves with the tool, and watch videos. What they knew, they had learned through trial-error and general experimentation).
2. daily management, where it appeared a heavy burden to construct individual plans for the focus learners – without being given extra time for preparation.

Consistent in the data of this study the researchers found words and expressions, like e.g.: easier, quicker, re-use, save time, effective, etc., indicating a strong need for offering a module for teachers focusing on MM functionality and how to utilize the pedagogical potential of the functionality of MM.

Summing up from the analysis it is fair to conclude that the digital tool seemed able to provide focus learners with a supporting structure for promoting attention and engagement. In sharp contrast, it was evident that the teachers did not find time and opportunity for utilizing the structure in terms of (co-)construct individual activities for/with the individual learners. Thus, as a consequence, the structuring and collaborative potential of the tool did not get utilized in the practice observed by the authors. Finally, the organisational frames for the implementation did not seem to offer the teachers sufficient time/space in their work process to become pedagogically competent to identify and appropriately utilize the full potential of the digital tool.

Discussion

From a general perspective, MM was used fairly rudimentary: as a digital version of a school timetable with a timer incorporated at each lesson. It was not by any means an integrated part of the teachers pedagogical practice. It seems that the teachers used MM hoping that it would bring them a “quick-fix“. There are indications that the majority of them shared a perception of MM as a kind of “stand alone solution”, in which utilization is viewed as a relation/matter only between the system (MM) and the learner, and they do not perceive this relation as a pedagogically job/task requesting the specific competency. The learner is left alone to communicate/interact directly with the system. The teacher was only monitoring if the learner used the technology, but we do not meet any indications that she/he understands herself/himself as an active and responsible player in the challenge of utilizing the digital tool in a pedagogical course of the learner taking advantage of the digital tool in his/her learning process. Only a few examples explored the potential of MM, where the teacher had created detailed activity plans carefully linked to the academically topics and the tasks in the lesson in question. In such cases the teacher detected more engagement and initiative by focus learners.

Neither did we detect any collaboration teacher-learner or learner-learner when using MM. The teacher “brought” the learner a program for the week, instead of developing it in collaboration with the learner. There is likely to remain a large non-utilized potential at a meta learning level, since learners and teachers did not foster a meta learning process through e.g. being in dialogue, when creating content in MM; a dialogue which most likely would have fostered meaning, empowerment and identity for the focus learner (Sorensen et al., 2002; Sorensen, Andersen, & Grum, 2013)

An extra teacher, affiliated with the class, created a general week program for all lessons. She ensured that it was available at the learners’ iPads. The other teachers of the classes were not involved in this process and they did not interact/collaborate with each other or with the learners in the classroom in relation to their use of MM. Such a delegated responsibility for implementation of the technology did not invite recognition of an in-built potential for collaboration among an entire team of teachers, in order to obtain a shared and focused initiative for each learner. Therefore, the development of a shared understanding and shared knowledge construction of the teachers was inhibited.

It is most likely, that MM could have worked as a much more including and less stigmatising tool, if the teachers had been collaborating on the creation of a week program and used this as a structuring tool for all learners at the interactive whiteboard in the classroom. In such case, it would only be necessary to individualise the program on a learner's personal digital platform regarding their individual special educational needs. It would require, though, that the teacher module in MM be modified in a way that allowed teachers with the same contribution to communicate and support more learners. Such modification would probably make the tool much more attractive and tangible in a mainstream school context.

A real genuine inclusion would require that the schools develop a shared understanding of inclusion and gives priority to diversity (McPhail & Freemann, 2005). It would also require that the schools implement tools to facilitate learning for ALL learners. But most off all, it would require schools, municipalities and politicians to be responsible, not only for development of the teachers digital and SEN pedagogical competencies, but also for allocating the necessary settings for this. The teachers would need more than information about possible useful tools. They would need (a) time and support to learn to use the tools, (b) pedagogical support to enrol the tools in the classroom practice, (c) time and space for collaboration with colleagues on a shared initiative, and (d) time for the continuous weekly task to prepare and create individual structures for the SEN learners.

As outlined by Fjuk and Sorensen (1997) it is not possible to establish digital learning practices from fragmented initiatives. Such practices must arise from an understanding of the "triadic entities, technology, organization and pedagogy, as one holistic phenomenon" (Fjuk & Sorensen, 1997). Inspired by this thinking, the authors of the present paper finally present an analytical model (Figure 1) aimed at clarifying, how a certain technology's ability to interfere with, innovate and develop new practices will depend on several simultaneous factors: the functionality of the technology, the pedagogical visions by the teachers (Skovsmose & Borba, 2004) and the organisational settings, in which the technology is to be implemented (Fjuk & Sorensen, 1997).

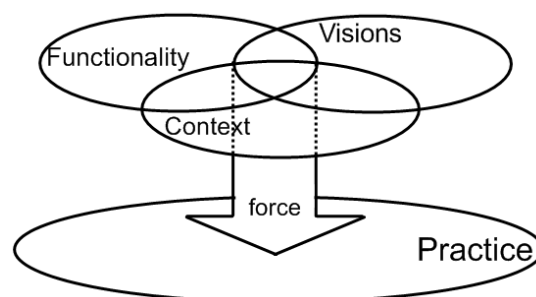


Figure 1 Analytic Model for a technology's ability to interfere with, innovate and develop new practices

Conclusion

There seems to be an abundance of technologies, which in various ways possess a potential for supporting learning processes. This paper has explored, how one of them, a digital structuring tool (MM), could be implemented and involved in an including pedagogical practice to support learners with developmental and attention deficits to cope with their daily school life. The case study has revealed that, potentially, MM is able to offer focus learners an overview or their tasks at hand, lead them through their task solving, and provide them with an guiding enhance into their learning processes. However, there is no doubt that success will depend on the teacher's capability to utilize (a) the functionality of the technology, and (b) their pedagogical visions and pedagogical imaginations in terms of employing the tool in the organizational context in question, in a way that supports these pedagogical and technological visions.

This leads us to the conclusion that the functionality of the technology at hand, the pedagogical visions and the wider organisational context must be understood as a holistic phenomenon as a basis for assessing the potential of a digital tool for innovating practice. It is evidently necessary for the teachers to receive more pedagogical and technological competence development in order to be able to evolve and generate a pedagogical concept based on a true holistic marriage between pedagogy and technology.

References

1. Almer, G. M., & Sneum, M. M. (2009). *ADHD – Fra barndom til voksenalder* (1. udgave, 2. oplag). København: Frydenlund.
2. Andersen, H. V. (2015). Supporting Inclusion of Learners with Attention-Deficit/Hyperactivity Disorder in Sound-Field-Amplification-Systems. *Proceedings of the 1st D4Learning International Conference Innovations in Digital Learning for Inclusion, Aalborg*, 1–8. Aalborg: Aalborg University Press.
3. Andersen, H. V., & Sorensen, E. K. (2015). Technology as a Vehicle for Inclusion of Learners with Attention Deificits in Mainstream Schools. *Proceedings of the European Distance and E-Learning Network 2015 Annual Conference Barcelona, 9-12 June, 2015*, 720–730. Barcelona: EDEN.
4. Barkley, R. A. (1998). *Attention deficit hyperactivity disorder: A handbook for diagnosis and treatment* (2nd ed.). New York: Guilford.
5. Bos, C. S., & Vaughn, S. (2002). *Strategies for teaching students with learning and behavior problems* (5th ed.). Boston: Allyn & Bacon.
6. DuPaul, G. J., & Stoner, G. (2003). *ADHD in the schools: assessment and intervention strategies* (2nd ed.). New York: Guilford Press.
7. DuPaul, G. J., Weyandt, L. L., & Janusis, G. M. (2011). ADHD in the Classroom: Effective Intervention Strategies. *Theory into Practice*, 50(1), 35–42.
<http://doi.org/10.1080/00405841.2011.534935>

8. Fjuk, A., & Sorensen, E. K. (1997). Drama as a metaphor for the design of situated collaborative, distributed learning. *EURODL, 1997*. Retrieved from <http://www.eurodl.org/?p=archives&year=1997&article=14>
9. Gutwin, C., Stark, G., & Greenberg, S. (1995). Support for Workspace Awareness in Educational Groupware. In J. L. Schnase & E. L. Cunnius (Eds.), *Computer Support for Collaborative Learning* (pp. 147–156). Mahwah, NJ: Lawrence Erlbaum Associates Inc.
10. Johnson, J., & Reid, R. (2011). Overcoming Executive Function Deficits with Students with ADHD. *Theory into Practice, 50*(1), 61–67.
11. Kendall, P. C. (2000). *Childhood disorders*. East Sussex: Psychology Press.
12. McKenney, S. E., & Reeves, T. C. (2012). *Conducting educational design research*. New York: Routledge.
13. McPhail, J. C., & Freemann, J. G. (2005). Beyond Prejudice: Thinking Toward Genuine Inclusion. *Learning Disabilities Practice, 20*(4), 254–267.
14. MobilizeMe.com (2016). MobilizeMe. Retrieved from <http://www.mobilize-me.com/>
15. Skovsmose, O., & Borba, B. (2004). Research Methodology and Critical Mathematics Education. In P. Valero & R. Zevenbergen (Eds.), *Researching the social-political dimensions of mathematical education: issues of power in theory and methodology* (pp. 207–226). Kluwer Academic Publishers.
16. Sorensen, E. K. (1993). Dialogues in networks. In P. B. Andersen, B. Holmqvist, & J. F. Jensen (Eds.), *The Computer as Medium* (pp. 389–421). Cambridge: Cambridge University Press.
17. Sorensen, E. K., Andersen, H. V., & Grum, H. (2013). Intercultural Dialogic eLearning: A Tool for Fostering Shared Understanding and Sustainable Competence Development in Practices of Inclusion. *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2013*, 389–397. Victoria, Vancouver Island: AACE.
18. Sorensen, E. K., Takle, E. S., Taber, M. R., & Fils, D. (2002). CSCL: Structuring the Past, Present and Future through Virtual Portfolios. In L. Dirckinck-Holmfeld & B. Fibiger (Eds.), *Learning in virtual environments*. Frederiksberg: Samfundslitteratur. Retrieved from <http://public.ebib.com/choice/publicfullrecord.aspx?p=3400822>
19. Thisted, J. (2012). *Forskningsmetode i praksis: projektorienteret videnskabsteori og forskningsmetodik*. Kbh.: Munksgaard Danmark.