Promoting Inclusion and Global Democratic Citizenship Through Digital Dialogic Collaborative Learning: Diversity Matters!

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Abstract. This paper addresses the problem of inclusive, creative and innovative learning quality of digital collaborative learning designs and their potential for amplifying digital democratic citizenship in learners - digital democratic citizenship with inclusive, empowering and teaching/learning processes at both a macro and micro level. The use of digital technologies for inclusion in processes of teaching and learning is illustrated through the findings from a Danish research project funded by the Ministry of Education. On the basis of these insights and the continuous development of new technologies, such as e.g. humanoid robotics, the paper concludes with a hypothetical theoretical exploration of a not-yet-utilized social-emotional meta-learning space and the tentative identification of its educational potential for inclusive learning and development, positioned in the interactive, communicative space between the learner and the robot. The paper finalizes with a possible conceptual, principled recommendation for digital learning designs that may be a step in the right direction towards sustaining global educational use of digital technologies for the purpose of digital democratic citizenship and social inclusion.

Keywords: Inclusion · Social robots · Digital technologies · Ict-based learning
Digital learning architecture · Democratic dialogue · Meta-learning
Computer Supported Collaborative Learning (CSCL)

1 Introduction

Our global society is marked by imbalance in a variety of ways [1–3]. By political differences, by inequality, by exclusion, by illiteracy, by exploitation of some for the benefit of others, and by cultural intolerance - just to mention a few. The leaders of the globe faces serious political and educational challenges in the striving for democracy and for cultivating the vision of "education for all" (EFA)[1] through our educational systems, through our political attitudes to inclusion, through the efforts made (or not

[1] The Education for All (EFA) movement is a global commitment to provide quality basic education for all children, youth and adults. At the World Education Forum (Dakar 2000), 164 governments pledged to achieve EFA and identified six goals to be met by 2015. Governments, development agencies, civil society and the private sector are working together to reach the EFA goals. http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-all/.

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made) towards supporting global citizenship, and the cultivating of learner empowerment in the educational system, etc. [4–9]. Nonetheless, while politics and politicians play their games, it is inevitable that a major responsibility for societal development and the direction it takes, is put on the field of education.

2 A Vision of Educational Change

The world society has taken up the challenge of equality in education. In the 1980's, the United Nations standard rules about *equal possibilities for people with handicaps* were agreed upon.

In 1994, the Salamanca Declaration[2] was agreed upon, - a dynamic new statement on the education of all disabled children that called for *inclusion to be the norm*. The Salamanca declaration was launched, stating that every child has a fundamental right to education and should be given the possibility to achieve and maintain an acceptable learning level; every child has unique characteristics, interests, abilities and needs of learning. Finally, the educational systems and processes should be tailored and initiated in a way that respects diversity in abilities and needs.

In 2006/2009, the United Nations Convention on the rights of persons with Disabilities[3] stated that persons with disabilities should be guaranteed the right to *inclusive education at all levels*, regardless of age, without discrimination and on the basis of equal opportunity. Children with disabilities should not be excluded from free and compulsory primary education, or from secondary education. Adults with disabilities should have access to general tertiary education, vocational training, adult education and lifelong learning. And, finally, persons with disabilities should receive the necessary support, within the general education system, to facilitate their effective education; and effective individualized support measures are put in place to maximize academic and social development.

The vision from 2015 is the Incheon Declaration: Education 2030[4], towards an inclusive and equitable quality education and lifelong learning for all. Its visions and principles for education 2030 that there should be equal opportunity and benefit for all, student's views are listened to and taken seriously, and diversity should be viewed as a resource instead of a problem.

> [Inclusion and equity in and through education is the cornerstone of a transformative education agenda, and we therefore commit to addressing all forms of exclusion and marginalization, disparities and inequalities in access, participation and learning outcomes. No education target should be considered met unless met by all. We therefore commit to making the necessary changes in education policies and focusing our efforts on the most disadvantaged, especially those with disabilities, to ensure that no one is left behind] (The Incheon Declaration: http://unesdoc.unesco.org/images/0012/001275/127583e.pdf).

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[2] The Salamanca Declaration (1994): http://www.unesco.org/education/pdf/SALAMA_E.PDF.

[3] United Nations Convention on the rights of persons with Disabilities (2006/2009): http://www.un.org/disabilities/documents/convention/convention_accessible_pdf.pdf.

[4] The Incheon Declaration (2015): http://en.unesco.org/world-education-forum-2015/incheon-declaration.

In other words, the situation envisioned is that of inclusive and equitable quality education and lifelong learning for all.

2.1 The Role of Digital Technologies?

In this unbalanced global context, educators and educational designers are offered the learning potential of the rapidly and continuously developing digital technologies, tools and their unique potential [1, 3, 10]. These technologies may help us to innovate and to create learning designs through playful experiments [11, 12] and *collaboratively*, through *dialogue and peer interactions* [13], while building *"educational bridges"* over a variety of gaps in the course of enabling people to connect in dialogue across power structures and hierarchies [14]. To build bridges over the vast variety of social gaps in our global society.

3 How to Design for Digital Inclusive Education?

As we have seen, inclusive education builds on societal learning and insights in the shape of declarations of intentions from the United Nations and Unesco. They form a beautiful political vision of a global society, in which everyone has the same access and possibilities of participating in the democratic processes of society, as well as equal access to the resources of society [2, 9]. In addition, its beauty also encompasses for all learners the right, individually and collaboratively, to engage and participate. The work for democracy and inclusive educational approaches is not a challenge only left for digital technology visions and insights of politicians [1]. Political decisions may have serious impact on how digital technologies are implemented in society. And as such these decisions may in many ways be "defining for the conceptual space" they leave for the "how" digital technology gets implemented broadly and, thus, for *the methodological freedom* and *liberating power* [9, 15], in terms of supporting the advancement of democratic education, of how digital technologies are put to work at the various levels of a society.

The pedagogical making of an aware *democratically oriented global citizen* takes its point of departure in the implementation in the digital space of the educational methodology. This plays a significant role in the education and self-understanding of the global citizen. As a result, part of the responsibility for the *"Bildung" of a democratic citizen* becomes a ball thrown in the turban of educators as well as educational designers [7, 15]. Desirable characteristics of educated, ethically aware, democratically oriented global citizens [6, 16]:

- Demonstrates tolerance and support towards fellow human beings
- Demonstrates will and ability to continuously learn anew
- Demonstrates the essential competency of modern life, the ability to continuously learn anew
- Demonstrates openness and responsiveness to ideas and alternative solutions of others, as well as a will and ability to listen to others and incorporate their views

- Demonstrates will and ability to dialogue, collaborate and share knowledge for the course of shared goals
- Demonstrates no wish to take initiatives to control others
- Demonstrates no will to succumb to authoritarian methodology/pedagogy in any area, but instead induce and promote a respect for the quality of the argument.

In essence, we need inclusive education of this kind in order to become decent responsible citizens that can advance our education ("Bildung") for the purpose of peaceful co-existence [16]. While working for democracy, we have an ethical obligation to take every player onboard and include the socially disadvantaged and the disabled, physically and psychologically, in our creative thinking about the challenge of using digital technologies for design of creative playful teaching and learning [9, 11].

To a large extent the key to unlocking these learning qualities lies in the hands of educators. Future inclusive designs of teaching and learning with digital technologies should evolve as a continuing process of practice – strengthening and sustaining the participation of all students, teachers, parents and community members in the work of the school. Restructuring the cultures, policies and practices in schools to respond to the diversity of learners within their localities, providing support for staff as well as learners.

4 The iDIDAKT Project

iDIDAKT was a 3-year research project funded by the Danish Ministry of Education [17]. The ambition of the project was to develop and test a toolbox of didactics, digital tools and learning methods, which can contribute to increased inclusion of students with developmental and attention problems in school. Assuming a potential in the technology as a tool for inclusion, we wanted to identify how this potential could be brought into play in the classroom by trying different technologies, and in collaboration with participating schools and teachers develop digital learning methods and interventions associated with them. This section describes and reports on the findings from the iDIDAKT project.

4.1 Research Problem and Project

The overall research question of iDIDAKT was: How is it possible to use technology to support inclusion of children with developmental and attention deficits in mainstream schools? The project worked with general inclusive approaches on the one hand, targeting individual student needs, and, on the other, a special focus was given to challenged *children* with ADHD and ASD-like traits that had difficulties with (1) hyperactivity and frustrations, (2) attention and focus, (3) listening to and following oral instructions, (4) managing, organizing and completing tasks and activities, and (5) lacing social competencies.

Also the *teachers* had difficulties with the task of inclusion. They were struggling with (1) lacking competencies and tools, (2) resources structure and management of the

school, (3) behavioral problems of focus learners, (4) other learners' perspectives, and (5) lack of understanding from parents etc.

It was a very complex field of research. The project was developed within an Educational Design Research Approach where we in collaboration with the teachers developed new practices and – through Action Research – changed their practices. Many stakeholders were involved: 3 municipalities, 11 schools, 15 classes (grade 1–10), 46 teachers, and 500 learners (56 of which were focus learners[5]). Data were collected through (1) teacher statements at seminars, (2) teachers' written reflections in research blog, (3) interviews, (4) surveys and (5) observations.

4.2 Findings

Our analysis shows that focus learners gain a lot of help, support and opportunity from teachers' interventions with digital tools [18].

The findings demonstrate how digital technologies and interventions to a certain extent seem to provide focus learners with "handy" methods and tools for managing and participating in learning processes. It seems vital in *the process of becoming aware* to employ digital tools to *facilitate reifications* (visualization, organizations, etc.) in such a way that the focus learners get to see/realize what they themselves KNOW. Our investigation employed digital tools and interventions in learning situations with the aim of supporting, in particular (a) the facilitation of PROCESS, (b) the creation of PRODUCTS and, finally, (c) the ASSISTANCE with aspects of production and dissemination [21]. The author assert that important strategies are: (1) to *invite and support participation and dialogue* – also in the *planning of the learning process of the individual focus learner*; (2) *to* incorporate tools and *structures for construction* and *dissemination* of learners' knowledge (to demonstrate "I am able to" and "I know"); (3) to offer multimodal and assistive digital modes for communicating, collaborating and contributing – and *opportunities for reflection*.

It also became clear, that teachers not always perceive technologies as simple pedagogic tools [18]. In between we met with disillusioned statements from teachers who felt powerless in their use (or non-use) of digital tools: "I have downloaded the software, but it does not work, neither on my own iPad, nor on the iPad of the school" (teacher, School A). "I cannot come back again after an attempt to mail my text out of iVoice, and I cannot find an overview of the texts that I have recorded" (teacher, School C). "There is not enough time to teach learners how to use these technologies" (teacher, School B).

But technologies also caused disruptions: "A student by accident erases everything, it is difficult on iPads, on which there is no undo-bottom in apps" (teacher, School I, 2nd grade). It appeared very important that the teachers "master" the technology in a way that they are able to both help the learner with such unintended actions, and that they are able to exploit the affordances of the technologies in their pedagogical practice.

By far, *the most significant/worrying discovery* from the project was an identified clear tendency among teachers to latently accept digital technology to "take over" and

[5] "Focus learners" is the term used to denote children with developmental and attention deficits.

"park" the learner – done! This perception was very general amongst the teachers - mostly not accompanying this with elements from the pedagogical competencies of the teacher.

To be included is, in itself, a life value for the unique individual/learner. *To feel included*, a learner must feel safe and secure in the learning endeavor. The reversibility of learning actions in a digital learning environment makes it much safer for focus learners to navigate in a "safe" environment. Reducing risks in the processes of creating learning products and reifying processes of learning is important in order to ensure that focus learners will have a voice in the choir of change and the democratic advancement of society. More concretely, learning interventions with digital technologies: make focus learners thrive *with access to a more multimodal way* of expressing themselves through a repertoire of modalities in their academic tasks. *Images can support lacking memory*, and videos can expand written assignments and compensate for writing disabilities. While it invites and enables the learners to act in a new way, the digital technologies also empower them to take *collaborative and multimodal communicative initiatives* and, thus, express themselves more and better. Using digital technologies enables learners to observe, inspect and reflect upon their own learning (their level of knowledge and process of learning). Using digital technologies enables learners to *disseminate, demonstrate and make visible* – through reifications – their own learning.

Thus, Ict-based interventions seem to *act as a vehicle for enabling inclusion* of focus learners through (1) making visible what focus learners are actually able to do and what they know; this transparency can, positively, impact, their self-esteem ("see what I – as a learner – can do"); (2) provide teachers with precious insight for evaluating the special educational support ("what else must we – as teachers – do"?).

5 The Emerging Potential of Robots for Socio-Emotional Difficulties?

An emerging recent special trend of technological development, which appears to hold great promises for groups of socially disadvantaged learners, is the initiatives happening within socially interactive robotics (SIR) [19]. Robots applied in teaching and learning situations are becoming increasingly more recognized. Bertel [19] emphasizes the assistive including aspects of the robot technology. Especially, since social-emotional and interactive skills in many cases are considered prerequisites for the establishment of interaction between humans, and between humans and technologies.

In addition, to many learners digital technologies in general, but perhaps robots in particular, possess an inherent fascination and invitation to play. The added value of the digital humanoid robotics is that they offer the social emphatic role of a friend to do things with – to learn with.

This section take a look at two examples of humanoid robots, used for children with developmental and attention deficits. In addition, the nature of the potential of the social space between learners with attention deficits (or special education learners) is elucidated.

5.1 NAO

The NAO robot[6] is a humanoid robot (i.e. a humanoid technological interface) that has been used for challenges in special education, in particular in contexts of autistic children. NAO has an attractive effect on children. Among other things he raises the quality of communication and interaction through creating communication bridges between an autistic child (children with ASF) and the people around him/her. For the course of education, NAO contributes to reducing the anxiety of the children. For education, and for teaching and learning, NAO offers a lot of help. He is engaging, predictable, tireless, and patient.

NAO contributes to creating trust and reducing fears. He offers patient encouragement, and he never gets tired of repeating instructions. Whether through Via touch, voice or vision, NAO offers interactions in a variety of ways.

5.2 Buddy

The BUDDY robot[7], another humanoid robot (i.e. a humanoid technological interface), is created for companionship, like in the case of NAO, for children with ASD. It has been used for a variety of situations in special education - again, in particular in contexts of autistic children. Children with autism spectrum disorder (ASD) are often disturbed by anxiety. They often have no interest and ability to interact, no interest to communicate, and they often show repetitive behaviors and distress – especially in situations of change. It is difficult to imagine not to be able to understand paralinguistic communication (facial expressions, gestures, body language, etc.). It has been demonstrated that the learning of interaction skills and reading of feelings are enhanced and improved, when robots have been implemented in the role-playing game. Again, the "patience" and "tolerance" of the Buddy robot get emphasized, and it is noted that the results observed in the context of autistic children have been strikingly positive.

6 Unexplored Socio-Emotional Space – Learner(s) and Robot

It is the hypothesis of the author that there exists an unexplored socio-emotional and socio-pedagogic space – a reflective meta learning space for the consolidation of learner identities - that opens itself up for exploration, a potential pedagogic action in the interactive process between learner(s) and robot. This reflective and interactive meta-space, potentially knitted together with emotions (as e.g. in case of a feeling of friendship with the robot) may, as an element of the interaction itself, be acting as a kind of reflective identity-stimulating mirror[8] and make room for the self-development

[6] The NAO robot: http://www.robotlab.com/store/ask-nao-autism-solution-for-kids.

[7] The Buddy robot: http://www.roboticstrends.com/article/how_buddy_is_helping_autistic_children/persona.

[8] "Self-phychology", Heinz Kohut (1913–1981) https://da.wikipedia.org/wiki/Heinz_Kohut.

of learners with socio-emotional difficulties [20, 21]. The mirror gets established by the interacting robot in the unexplored communicative/interactive meta-learning space, and the learner's (predicted/programmed) interaction within the unexplored space between the learner and the robot. But perhaps this insight and benefit of using humanoid robots could be transferred to more general areas of school education. Many children outside special education could benefit from the sustained aspects of his "character" (engaging, predictable, tireless, patient, etc.) (Fig. 1).

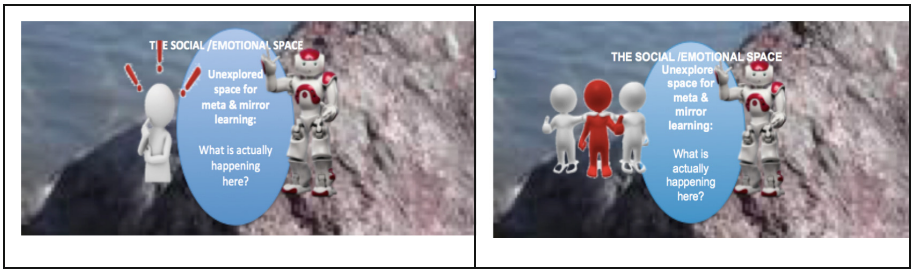

Fig. 1. The unexplored socio-emotional dialogic space between learners/peers and a humanoid robot

Empathy is essential for human development and change [20, 22]. It is developed throughout early childhood. The idea is that the emphatic attitude of a therapist will promote a learner's self-perception and ability to perform (i.e. a healthy kind of narcissism, which strengthens the effort of an individual to realize personal abilities and possibilities).

Attempts to generally apply social robots to the educational arenas are relatively scares, but experiments are happening within the field of special education, such as e.g. therapeutic-educational initiatives in relation to autistic children.

From the recent research reported on (the iDIDAKT project), addressing the general potential of digital technologies within contexts of children with developmental and attention deficits [17], the project confirmed the problematic areas related to social skills, such as communication and interaction. Bertel [19] presents a taxonomy for socially interactive robots (Table 1):

This framework may form a fruitful optic for further research directed towards exploration of the identified socio-emotional interactive space in an attempt to, pedagogically in learning design situations, make use of the socio-emotional and socio-pedagogic space that opens itself up in the intersection of learner and robot.

Table 1. Bertel [19] presents a taxonomy for socially interactive robots

Socially interactive robots		
Properties	Description	Example
Morphology	Establishes social expectations of the interaction and provides information about the intended use of the robot	Anthropomorphic Zoomorphic Caricatured Functional
Emotions	Facilitate credibility in HRI and serve as feedback to the user about the robot's internal state	Anger, fear, sadness, joy, surprise, neutral and combinations
Dialogue	Exchange and interpretation of symbols and information about the context of the interaction	Synthetic language Natural language Non-verbal cues
Personality	A set of qualities particularly significant for a specific robot	Tool (reliable), Pet (lovable), Character, Supernatural, Human-like
Perception	Perceptual abilities for engaging in social interaction with humans	Face/gaze tracking Speech/gesture recognition Tone of voice
User modeling	The ability to adapt to and shape the interaction in relation to specific user characteristics	Technological literacy Experience Cognitive abilities
Situated learning	Transferring information, skills and tasks between robots and humans	Imitation Machine learning
Intentionality	For people to be able to assess and predict a robot's behavior, expressions of intention are necessary	Targeted movement and behavior Theory of mind Joint attention

7 Conclusion and Future Perspectives

The general primary goal of educational inclusion is that a learner - through a life-long process of developing identity through reflection and meta learning processes in the meeting with in the educational system - obtains digitized learning-to-learn competences (L2L) on his/her learning trajectory and, hopefully, becomes an active, empowered, independent, participating citizen in societal, democratic processes of life.

In essence, the lifelong learning arena coupled with digital technologies offers an overwhelming potential for the advancement of inclusion, both at micro-level in terms of including the disadvantaged learner or the learner "at risk", but also in a global perspective concerned with the further advancement of an inclusive global society. A society which in principle offers possibilities for educators - using digital technologies - for remaining focused on creating and designing fruitful lifelong learning processes that advance the collaborative, innovative, creative, inclusive, dialogic and democratic learning aspects of life and learning. Processes, which are the ones that preserve the meta-qualities of democratic dialogic negotiation – processes, which are likely to advance the inter-human ethical qualities of global intercultural co-existence.

A last important sustainable insight and priority for future designs of inclusive learning – for design challenges at both the macro and micro level - should be put forward: The importance of designing digital democratic learning architectures that incorporate diversity and that allow for the cultivation of digital democratic dialogue for the purpose of negotiating and advancing inclusion for all.

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