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Lena Lindenskov

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# Democracy and mathematics instruction for adults

## - three philosophical perspectives

Lena Lindenskov

Aarhus University, Danish School of Education, Copenhagen, Denmark; [lenali@edu.au.dk](mailto:lenali@edu.au.dk)

*Some might view mathematics education and democracy as two distinct arenas without mutual relations. Contrary to such an understanding, this paper presents part of a larger study on potential relations between the two. More specifically, I explore relations between democracy and mathematics teaching or instruction for adults. The paper seeks to identify philosophical underpinnings and inspirations for describing and understanding core relations between democracy and mathematics education. I present snapshots from the works of three prominent scholars: the Dane N.F.S. Grundtvig's philosophy of lifelong learning; the German Jürgen Habermas' theory of communicative action; and the German Hartmut Rosa's concepts of resonance and world relation. Highlighting how these theories might offer new perspectives of how mathematics education can support democracy? The perspectives differ in their depth and breadth but share certain similarities.*

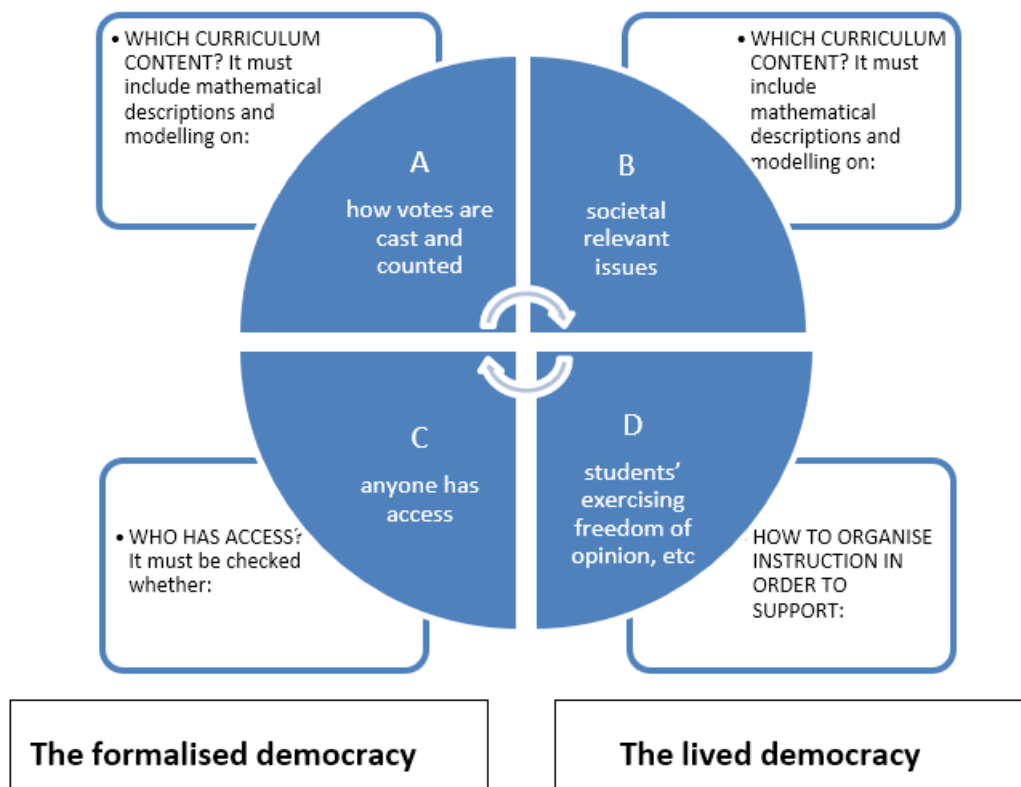
*Keywords: Mathematics instruction, democracy, educational environment, adult education.*

### **Setting the scene**

In my view, Nordic understandings of mathematics education for democracy that emerged around 1990 (Mellin-Olsen 1987, Niss 1994, Skovsmose 1990) remain relevant today. I believe it is time that these issues be placed high on the agenda when reflecting upon contemporary classrooms for adults and to revisit and more deeply examine the relationship between democracy and mathematics education, when exploring both contemporary research and current instructional practices in mathematics classrooms.

First, I will revisit and reiterate a double-sided view of what constitutes democracy. I argue that democracy understood in its formal sense and as a steering mechanism must be supplemented by lived democracy as comprised by people's participation and communicative interactions in and across the many levels and spheres of society. Back at ALM8, Paola Valero and I termed these two forms of democracy Democracy 1 and Democracy 2 (Lindenskov & Valero, 2002). Second, I wish to incorporate democratic reflections on the questions of what should be taught, who should be taught, and how it should be taught within mathematics education for adults?

I have combined these questions in a two-dimensional matrix model (see Figure 1) that I first presented at ALM28 (Lindenskov, 2021). The first dimension concerns formal representative democracy as a form of rule contra informal democracy in the form of everyday participation and communication. The second dimension highlights the questions of what mathematics to teach, to whom, and how. I developed the model as part of a collective effort with colleagues at the Department of Educational Theory and Curriculum Studies at the Danish School of Education. At our annual working seminar in 2017, we decided to write an anthology on democracy and 'subject didactics' [German: Fachdidaktik] (Lindenskov, 2020).



**Figure 1: Matrix model for mathematics/numeracy instruction and democracy**

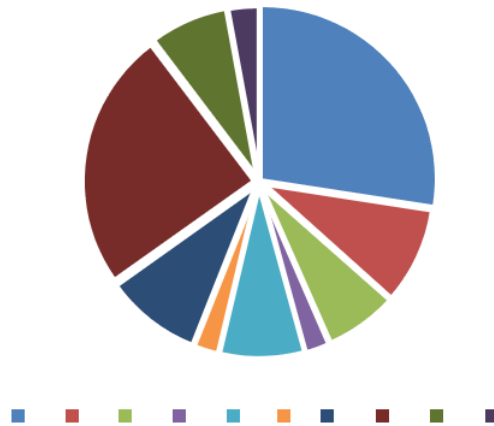
Besides revisiting the previously mentioned Nordic understandings of mathematics education for democracy from around 1990, I re-examined my own recent analyses of Danish mathematics curricula and related public debate (Lindenskov 2018, 2019). I became convinced that the previous focus on democracy within critical studies of mathematics education has currently been replaced by other themes. This change of focus is clear in Yasukawa et al. (2018), where the thirteen contributions on numeracy as social practice make little mention of democracy. I noted that democracy is only addressed as a theme in two of the contributions – one from South Africa and one from India – but is otherwise absent. Nevertheless, the publication distils several issues contributing to what I term ‘lived democracy’. In addition, democracy is a theme in the ‘social injustice’ framework developed by Berry III et al. (2020), exemplified by activities concerning the use of algorithms in formal voting systems.

The bottom left-hand corner of Figure 1 includes reflections on who has the right to receive high-quality mathematical education. It is essential in democracy that anyone has rights and access to acquire appropriate mathematic expertise and authority. However, history – and the present day – provides many examples of unequal access to education and unequal learning opportunities. On the right-hand side, the model presents democracy as a ‘way of life’ rather than a form of rule (Jakobsen, 2010). At the top right-hand corner, you see how democracy ‘is done’ daily in the mass media (newspapers, Radio, TV), via social media or direct person-to-person dialogues (written or oral). Much of the background information supporting political decisions at the local, national, and international levels includes numerical measures and the results of mathematical problem-solving and modelling.

The bottom right-hand corner of Figure 1 focuses on the questions of whether and how mathematics lessons constitute lived democracy. What characterizes the educational environment for mathematics and numeracy learning? Are mathematics classrooms a site for lived democracy, where students and teachers exercise freedom of opinion, discuss openly, demonstrate critical faculties, and adhere to principles of tolerance, trust, and justice? And do all students have the right to expect to be valued equally and to experience mathematics as meaningful?

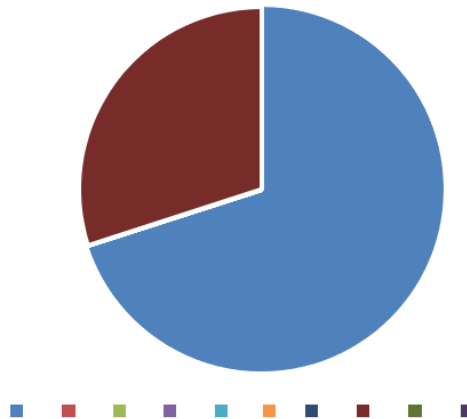
One example of a mathematical activity relating to formalised democracy illustrates part A in Figure 1 and how votes are cast and counted in different democratic voting systems. Figure 2 and 3 allow learners to compare the effects of different electoral algorithms. While figure 2 shows the representation of the various political parties in the Danish Parliament applying the algorithm used in Danish parliamentary elections, figure 3 illustrates how things would look applying a first-past-the-post algorithm such as those found in Great Britain and the USA.

2019 election in DK - actual algorithm



**Figure 2. Actual party representatives in the Danish Parliament following the 2019 election**

2019 election in DK - alternative algorithm



**Figure 3: Hypothetical party representatives in the Danish Parliament following the 2019 election if applying a first-past-the-post algorithm**

In the following, I explore possible philosophical underpinnings to help clarify the model from Figure 1 and develop tools for analysing curriculum materials, classroom activities and classroom life in relation to democracy.

## **N.F.S. Grundtvig – Lifelong learning**

Focusing on adult education implies a concern for lifelong learning. For me as a Dane, the scholar N.F.S. Grundtvig (1783-1872) is unavoidable when considering such matters as one of the founders of adult education institutions in Denmark, termed 'folk high schools' (Broadbridge et al, 2011). Grundtvig is also considered an important figure in other countries. Many American scholars acknowledge the inspiration that Malcolm Knowles(1913-1997), who is widely considered the father of adult learning theory in the US, drew from Grundtvig (Warren, 1989). Furthermore, a European Union programme 2000 – 2013 to support adult learning was former named after Grundtvig, forming a branch of the Socrates programmes.

In addition, a branch of the Danish Lutheran Church is named after Grundtvig, standing in opposition to Pietistic Lutheranism. As a priest, Grundtvig wrote more than 1500 hymns. For this presentation on education and democracy, the most important thing to note is, firstly, Grundtvig's educational philosophy with its goal of making education accessible to all adults. Secondly, it is notable that Grundtvig influenced the shift from autocracy to formal democracy in Denmark, with the first democratic constitution of 1849 giving approximately 15% of the population the right to vote (Korsgaard, 2014).

All legislation governing adult education in Denmark have included the aim of empowering adults and encouraging them to participate in democracy and of offering instruction that supports participants' active involvement. Nevertheless, as the Danish scholar Gunhild Nissen has pointed out, Grundtvig viewed mathematics with scepticism. Grundtvig used wordings as mathematics 'neither cared for life nor for death'. The 'folk high schools', he argued, should be 'schools for life' and should offer courses that would empower ordinary people. Grundtvig refused to give mathematics teaching a place in his folk high schools. Grundtvig likewise advocated to deny giving mathematics teaching a place in primary education, convinced that mathematics with his wording would give children 'ink in their veins instead of blood' (Nissen, 1991). Taking a more optimistic view, Nissen drew on Habermas' concepts of the system and lifeworld to support her hope that, in the future, mathematics would not only be a tool of the system and part of its structural foundation but could be integrated within the communicative contexts that build and expand the lifeworld (Nissen, 1992). To summarize, Grundtvig espoused everyone's right to education (part C in Figure 1) and the importance of making lived democracy part of education (parts B and D in Figure 1). Even today, his scepticism as to whether mathematics can contribute positively to the lives of ordinary people should be taken seriously as a topic for discussion and reflection.

## **Jürgen Habermas – Communicative actions**

Jürgen Habermas, born 1929, is a German philosopher and sociologist who has played a highly influential role in the development of critical theory. In the book *The Theory of Communicative Action* (1984, 1987), he outlines the elements constituting what he called 'communicative actions' as opposed to 'strategic actions'. While strategic action can be considered successful when those involved achieve their individual goals, successful communicative action is when a consensus is freely reached on reasonable goals that can be achieved through cooperation. Communicative action involves a shared effort to reach a rationally motivated consensus through the medium of language. But in which ways can such consensus be achieved? Habermas has analysed the conditions for successful speech acts leading to mutual understanding. Sometimes, the listeners may immediately be able to sense whether they consider the speech act acceptable and their reasons for accepting or rejecting the proposed goal.

In other cases, there may be a need for explicit reasoning supported by empirical claims, appeals to a sense of moral or ethical good, assertions of authenticity, personal sincerity, or aesthetic value.

I find it interesting that Habermas' communicative actions are used by Jenny Cramer and Christine Knipping in their analyses of student-teacher interactions in determining whether particular mathematical results are correct (Cramer & Klipping, 2018): How do communicative actions and strategic actions between teacher and students and among students play out? Which communicative actions for reaching a consensus includes that students express and interpret mathematical claims and other types of claims? Which strategic actions are convincing other students? Cramer and Knipping focused on discourse ethics, and language, included in students' claims and discussions in mathematics classrooms. Especially Habermas' rules of discourse ethics were found to offer a range of explanations for obstacles that may hinder student participation in discussion. To summarize, Habermas' specific focus on different kinds of communicative acts provides us with analytical tools for acknowledging distinct democratic facets when organizing mathematics instruction (as in part D of Figure 1). In my view, Cramer and Knipping's use of Habermas' concepts has rich potential for studying and supporting democratic learning processes in mathematics instruction for adults.

### **Hartmut Rosa – Resonance and being in the world**

Hartmut Rosa, born 1965, is a German sociologist who contributed to the further development of critical theory by adding a concept of resonance (Rosa, 2019). Rosa sees resonance as a way of encountering the world – people, things, matter, history, nature, and life as such. He highlights four crucial qualities of resonance. The first of these qualities is affection, which is a feeling of being truly touched or moved by someone or something. A second quality is emotion and an experience of self-efficacy. Third, by being touched and affected and by reacting and answering, transformations occur. The fourth quality characterizing resonance is that you never can be sure whether you will experience resonance. This elusiveness makes it impossible to predict or control what happens. Nevertheless, Rosa sees such attempts to get in touch with the world in the sense of resonance as inherent to human nature.

Rosa's ideas are grounded in Habermas' theory of communicative action, but Rosa goes a step further, arguing that Habermas gave too much respect to rationalism. In addition, he puts more emphasis on education, studying what resonance and being in the world might mean in an educational context. He has developed what he refers to as the triangle of resonance. This triangle consists of teacher, students and material, and he adds what he terms the axis of resonance between the students. Rosa gives an example of the role played by materials – also in mathematics, while also underlining the importance of the teacher (2019, p. 244):

Education as a process of disclosing the world begins with the excitement of the teacher, who in a way functions as the first tuning fork, preparing her students for resonance so that in the resonance event between them the material (whether classical drama, a mathematical formula, the rules of grammar of a foreign language, or a political party platform) comes alive and begins to speak. Thought it might sound overly poetic expressed this way, it is basically an almost everyday occurrence, playing out hundreds of times in hundreds of different ways in every school on every school day.

Rosa points to four preconditions for establishing a triangle of resonance between teacher, students and material and for establishing an axis of resonance between the students. The first concerns students' freedom from fear and anxiety, expectations of self-efficacy, and mutual trust between teacher and students and among students. The second is a teacher who believes that she has something to say about the material, i.e., the material appeals to her

and is important to her. The third is that students must approach the material openly, with a willingness to engage with and be moved by it, and a belief that they can ‘make it speak.’ Finally, it is a precondition for establishing an axis of resonance between the students that there is an atmosphere in the classroom that facilitates students’ openness to resonance—where students do not risk mockery, disparagement, malicious remarks, bullying, etc.

I fully agree with Rosa’s claim that recent debates in the field of education and pedagogy assign too reductive a role to the teacher. Regarding teachers solely as professional moderators and mediators, helping students and sharing their know-how, underestimates the real importance and potentials of teachers. Rosa refers to Hattie’s findings of the teachers’ influence on students’ learning (Hattie, 2012), and Rosa suggests that it might be teachers’ influence of what he terms the web of resonance in the classroom that is the most important for students’ learning. Rosa also suggests that this web of resonance might be one of the core mechanisms behind school’s reproduction of sociostructural differences. He refers to Maaz et al. (2014), who state that these differences are reproduced and even exacerbated within German education (Rosa, 2019, p.246). To summarize, Rosa extends the perspective offered by Habermas’ concept of communicative acts between people (as in part D in Figure 1) to include a strong focus on the relationship between materials, teachers and students in educational contexts and on peoples’ relations to the world (as in part A and part B in Figure 1).

### **Concluding remarks**

The three scholars whose ideas are at the centre of this paper share an interest in ensuring everyone has access to education and that this education supports and strengthens democratic processes within society. Meanwhile, Grundtvig’s scepticism regarding whether mathematics can contribute positively to the lives of ordinary people is a warning we ought to seriously discuss and reflect upon – for instance, by using the model presented in Figure 1 to continuously ask how high-quality mathematics instruction for adults can contribute to formal and lived democracy. It is my assertion that the three scholars provide several possible underpinnings that can help clarify the model in Figure 1.

Grundtvig shows that part C in Figure 1 is underpinned by everyone’s right to education and parts B and D by letting lived democracy be part of education. Habermas shows that part D is underpinned by different kinds of communicative acts that offer analytical tools for acknowledging distinct democratic facets when organizing mathematics instruction. As mentioned, Cramer and Knipping’s use of Habermas’ concepts has rich potential for studying and supporting democratic learning processes in mathematics instruction for adults. Rosa shows that part D is underpinned by his extended perspective on communicative acts between people, while parts A and B are underpinned by his focus on the material and the teacher and on people’s relations to the world.

However, none of these scholars show any great interest in numeracy and mathematics. As such, it is up to those of us conducting research on and developing mathematics education to build on and concretize their insights. The model in Figure 1 is my modest contribution.

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