Sub-Communities of Mutual Learners in the Classroom: The case of Interactive Groups

Subcomunidades de aprendices mutuos en el aula: el caso de grupos interactivos

Carmen Elboj* and Reko Niemelä**

*Universidad de Zaragoza, **Helsinki University*

Abstract: Jerome Bruner argued that classrooms should be organized into sub-communities of mutual learners, and Gordon Wells encouraged teachers to structure classrooms into communities of dialogic inquiry. Both theorists aimed to have students help each other to solve problems jointly, through dialogue. Interactive Groups (IG) are an example of such classroom organisation: small heterogeneous groups of students in which family and community members participate, stimulating communicative interaction and thus creating knowledge through dialogue. This article describes how IGs function as communities of mutual learners. As students interact with adult volunteers, they engage in deep and critical dialogues around their instrumental learning; as a result all members of the group learn more, and a supportive dynamic develops among the learners. The key to learning in the IG is the type of interactions created. The results of case studies within the INCLUD-ED project demonstrate these points.

Key words: Interactions, Interactive groups, Sub-communities of mutual learners, dialogic inquiry.

Resumen: Bruner ha señalado la necesidad de organizar las aulas en subcomunidades de aprendices mutuos, y Wells se refiere en una línea parecida a estructurar las aulas en comunidades de indagación dialógica. En ambos casos se persigue que las y los estudiantes se ayuden unos a otros para resolver problemas conjuntamente a través del diálogo. En las aulas organizadas en Grupos Interactivos se crean pequeños grupos heterogéneos de estudiantes en los que participan familiares y otros miembros de la comunidad, quienes dinamizan las interacciones comunicativas entre las y los estudiantes fomentando que se cree conocimiento conjuntamente a través del diálogo. Este artículo presenta los Grupos Interactivos como comunidades de aprendices mutuos donde la solidaridad de las interacciones entre estudiantes y entre estudiantes y personas adultas voluntarias produce diálogos profundos y críticos en torno al aprendizaje instrumental que aumentan los niveles de aprendizaje de todos los miembros del grupo. El artículo muestra que la clave del aprendizaje en los grupos reside en el tipo de interacciones que se producen. Para ello se van a exponer los resultados de varios estudios de caso llevados a cabo en INCLUD-ED. Los datos muestran que la implantación de formas dialógicas de organización del aula genera una mejora de los resultados académicos además de dinámicas solidarias entre el propio alumnado.

Palabras clave: Interacciones, Grupos Interactivos, subcomunidades de aprendices mutuos, indagación dialógica.

Correspondence: Carmen Elboj Saso. Departamento de Psicología y Sociología. Universidad de Zaragoza. Plaza Constitución s/n, 22001, Huesca. *(celboj@unizar.es)*

INTRODUCTION

In the *information society*, children's learning depends on all of their interactions: those in the classroom with their peers and the teaching staff, those at home with family members, and those with other adults from the community in various places. Children's learning processes cannot be separated from the social and cultural context in which they develop relationships with other people. Just as the individual and society cannot be separated, learning cannot be isolated from the learner's socio-cultural environment. That is, we cannot separate the education that takes place in the school from the children's social and cultural context, their families, the dialogues they have with them, and their interactions with their friends. From this perspective, educational communities now face a challenge: how to increase interactions that improve all students' academic results and the atmosphere at school, and meanwhile transform the other interactions that hinder this process within the school context.

Along these lines, the field of educational psychology has moved from studying learning and development from an individual position to a more interactionist position, looking now at how learning takes place in various social and cultural contexts and in interaction, and emphasising the impact of elements such as gender, social class, and ethnic group. Today, psychology places more emphasis on the inter-subjective and communicative dimensions of learning. Authors such as Bruner (1996) and Wells (1999) insist on placing all the contexts in which children learn and develop into communicative interaction with each other; doing so will lead to more and better learning and will acknowledge the richness that each cultural group contributes to the learning of all students. This richness becomes a factor that enhances learning when dialogic interaction between cultures occurs in schools.

In this article we describe Interactive Groups (IGs), a successful educational action based on interactionist and dialogic learning approaches. We focus specifically on the types of interaction that take place between students, and between students and adult volunteers, which can lead to all the group members learning more and also achieve greater solidarity.

The data we discuss here were obtained by reviewing previous findings obtained within the framework of the INCLUD-ED project. We focused specifically on those findings that demonstrate how implementing dialogic methods of classroom organisation (such as IGs) improves academic results and also generates supportive dynamics between students.

In this article, we first review theories in which the key to learning in groups lies in the type of interaction: dialogic interaction. We then describe Interactive Groups as a dialogic method of classroom organisation and show how they contribute to an increase in instrumental learning and improved

solidarity in the classroom, and end with some conclusions that gather together the contributions of this article.

INTERACTIVE LEARNING ENVIRONMENTS

Within the social sciences, the way that education and learning are conceptualized is currently changing, as more emphasis is placed on the centrality of interaction. Authors from various disciplines, such as the psychologists Bruner (1996) and Wells (1999), have recognised that our society is communicative and dialogic, and have linked that phenomenon to our development and learning. These authors have recovered the tradition of socio-cultural psychology (Vygotsky, 1978) and symbolic interactionism (Mead, 1934), and have developed theories of learning grounded on the notions of dialogue, interaction and community.

Bruner (1996) said that social interaction (the social moment) occurs before internalisation (the individual moment). He argued that this process of internalisation depends on the interaction that a person maintains with other people in the various contexts where he or she spends time. In that sense, education and teaching methods are a dialogic process; through them, the child learns to find meaning in the world with the support of an adult.

Using intersubjectivity as his central axis, Bruner (1996) went a step further in terms of the organisation of the education and learning processes. He suggested organising classrooms into *subcommunities of mutual learners*. Such a sub-community would specialise in learning between its members: learners would help themselves, and learn from each other, each of them according to their own knowledge and abilities, thus creating a context where they can create and transmit jointly created knowledge. In these subcommunities of mutual learners, students take on the central role, learning through their mutual aid, and the teaching staff loses its monopoly on knowledge. From this it follows logically that the educational spaces throughout the school need to be reorganized, not only the classrooms, so as they become interactive learning spaces that create learning cultures in which children can express their own ideas to the rest of the group. Within those spaces, students solve problems together based on dialogue and consensus and are responsible for becoming educated and for educating each other. As Bruner stated, these *subcommunities* are a step forward in terms of learning, since they include the voices of all agents within the process of learning, drawing on an interactive frame for the relationships between teacher and students.

Bruner has always seen interactive contexts as playing a central role in learning processes; he sees them as especially important for helping students learn instrumental knowledge. He emphasises that coordination improves

and learning is facilitated when the interaction that occurs in those contexts and the teaching methods move along the same lines. In this process of internalising cultural knowledge, language functions as a tool that mediates between the learner and the people he or she relates to. Indeed, as we will see below, classrooms organised into IGs work as Bruner describes communities of mutual learners: the classroom is set up so that members of the peer group can create and transmit knowledge. But the IGs represent a step beyond Bruner's concept as they include family and community members working with small heterogeneous groups of students; the adults galvanise the communicative interaction between the students, ensuring that they create knowledge jointly through dialogue and that all the students learn.

This approach fits with the thinking of authors such as Beck (Beck, Giddens, & Lash, 1994), who discusses what he calls the de-monopolisation of expert knowledge in current society. He argues that the tendency toward dialogue in today's societies also has an impact on the way that scientific knowledge is created. Indeed in the current *information society* it is through dialogue with non-experts how the development of knowledge, as well as inclusive and scientific theories, is possible. Many people who are not experts still own all the social and cultural knowledge they need to make effective proposals for all people. Everyone is capable of providing arguments based on their various types of knowledge, experience, and cultural resources.

In the field of education, as experts lose their monopoly on knowledge, teachers are also losing their earlier status as the only people who hold knowledge that can help children learn. In the *information age*, information and knowledge are now public and easy to obtain, and students already take great amounts of knowledge into the classroom, as well as can do other adults apart from the teachers. Thus classrooms organised into IGs are not spaces that neglect the process of de-monopolisation of expert knowledge but on the contrary take advantage of it.

Starting from the premise of the dialogic nature of learning, Wells (1999) has contributed significantly to developing theory and teaching approaches based on dialogue and interaction. Wells argues, building upon Vygotsky (1978), that curriculum and teaching methodology should adopt a direction to investigation because there is a predisposition of students to take an interest in learning and understanding things in collaboration with others. Wells' educational approach of *dialogic inquiry* recognises the dialectic relationship that exists between the individual and society, as well as an attitude towards learning that takes place through communicative interaction.

Wells (1999) affirms, however, that learning depends on the context, on how it creates appropriate conditions that let all children engage in dialogic inquiry. That is, dialogic inquiry results from the interactions that take place in the learning context and not from the individual abilities of students. If the

environment and interaction foster an interest in knowledge and asking questions, all students will be more predisposed to discovering new knowledge. Thus, Wells emphasises the need to reorganise school spaces and include all the community's resources, in order to make this attitude of inquiry possible for all students. He urges us to create *communities of dialogic inquiry*. In such communities, learners cooperate in order to understand and achieve the desired objective and to resolve the problems that are displayed within the *spiral of knowledge*. In this spiral, knowledge starts with personal experience; as students gain information they extend their experience and transform it into understanding by constructing knowledge. They interpret this understanding as knowledge and use it to continuously enrich the frame of reference that they are building so they can understand future experiences.

Wells (1999) argues that context plays an important role in either facilitating or hindering students as they develop an attitude of inquiry. He says that the environment for academic learning must be an *environment of collaborative action and interaction*. Within this environment, as Bruner (1996) also points out, teachers must rethink their traditional roles and collaborate with students, through dialogue. In Interactive Groups it is not only teachers but many adults from the community who play fundamental roles in motivating students to learn together. The participation of various adults, including family members and volunteers from the community, promotes further interaction that enhances peer support and mutual learning. The inclusion of more adults and their role in the IGs makes for richer and more diverse learning interactions.

Therefore as the teaching team chooses its teaching methods, it must consider not only appropriate content but also ways to organise classrooms and schools that increase the spaces for interaction and learning between the students and between the students and community people; this is what happens when classrooms are organised into IGs.

INTERACTIVE GROUPS: IMPROVED EDUCATIONAL RESULTS AND INTERPERSONAL RELATIONS

Interactive Groups are a specific approach to organising classrooms; they promote interaction and dialogue between students so they learn more, and more quickly, especially about instrumental material. This approach supports students in creating knowledge through dialogue and peer support, as occurs when classrooms are organised into sub-communities of mutual learners and communities of dialogic inquiry, as described above. This type of organisation generates dialogic interactions in the learning activities that reinforce the idea that children learn along with their classmates. In other words, children

absorb the idea that they can learn, and that they can also help their class-mates and be helped. This type of interaction helps students develop a more positive image of themselves, and thus provides a new start for children who had not been able to learn or to earn good grades.

But the contribution that IGs make to classroom organisation goes be-yond this. The implementation of GIs requires, first, adults from the com-munity being present in the classroom, where they motivate the dialogue and inquiry described above. Second, the groups must be heterogeneous and di-verse, as this helps all the children to learn more. A female head of studies in a primary school studied in INCLUD-ED, said she believes the best way for students to succeed academically is to work in the most heterogeneous pos-sible groups within the classroom. When asked if the groups at each table should be heterogeneous or divided according to learning levels, she said:

> Completely heterogeneous... [containing students] of all types, male-female, in terms of learning level, in terms of race even if there was one [a group] containing non-Roma and Roma people, [a bit of] everything, I think so yes, completely.

The dialogic learning that takes place in such groups results from an in-teractive process in which the people in the classroom share their different methods for completing the school activities. The teaching staff represents only one social actor within the classroom; they are responsible to both share their knowledge and to validate students' responses when they are based on sound argumentation.

Organising the classroom into such groups involves dividing the stu-dents into small groups of four to five students each; they are heterogeneous in terms of children's knowledge in each area, and their gender, culture, lan-guage, motivations, etc. The children engage in various activities, each last-ing approximately 20 minutes. These activities are organised by an adult, ei-ther a teacher or a volunteer from the community: perhaps a child's family member, a former student at the school, a neighbour, or a member of another organization. That person is in charge of promoting interaction between the students so that they all help each other and succeed in completing the pro-posed activities. While each group completes the activities, the teaching staff manages the classroom. Thus this approach re-assigns the existing human resources in the educational community within the classroom, reducing the proportion of students per teacher and increasing the amount of time avail-able to help each child learn. In an interview, an educational administration officer described how students pay more attention when they are working in small groups with an adult role model, which has a positive impact on their ability to acquire more knowledge and skills:

> The fact that you are working in a more individualised way on a certain skill or on specific material in a small group means that you can be attended in a better way, if you have any kind of [need] and for that reason it is positive…

In a classroom using IGs, the students rotate dynamically between the various instrumental learning activities, as they are all carried out at the same time, in a single session, and involve all the students. The rich interaction in the classroom promotes solidarity between students, as well as self-esteem and high expectations, and it helps all students improve their academic results (INCLUD-ED Consortium, 2009). Learning is naturally promoted when children have the opportunity to work in small groups with various helpful adults, even when these people are not educational professionals. The reason it works so well is that the learning in IGs occurs in dialog. That is, the approach fosters dialogic interaction based on egalitarian dialogue between children and adults (INCLUD-ED Consortium, 2009). One mother who participates as a volunteer in such a classroom explained how they organize themselves and how the process increases the children's learning:

> Because there are more people in the classroom, the teacher does not have to be with all 25 of them. When smaller groups are created you can spend more time with them; when you are doing reading or when you are doing [multiplication] tables or whatever, there are always more people, and for teachers of course it is not the same to have a group of 6 or 7 as it is to have a group of 25.

Each group's activities are monitored by an adult, a volunteer from the community. These volunteers are often relatives of the schoolchildren. Having so many adults present in the classroom allows them to attentively monitor the children's work. This lets them identify difficulties quickly, and children can complete the activities because they have help from the adults and each other. The involvement of volunteers also ensures that the activities are more creative, and the volunteers cooperate with the teaching staff in a constant search for ways to teach better. This direct contact between education professionals and the community enriches the interactions and facilitates and accelerates learning. The children can perform at their best because of three factors: volunteers are available to attend to them, the volunteers collaborate with the teaching staff, and the children try hard to help each other.

On the other hand, the more varied the group of volunteers is, the richer the interaction is, the more experiences it includes, and the more the students learn. In other words, the participation of relatives and other community members allows for a greater variety of teaching and learning styles and strategies, and for more types of relationships to be formed. The volunteers

are people with different levels of education and experience who facilitate more varied contributions than the teaching staff can provide. In addition, the entire approach leads to high expectations for students, especially for those who find learning difficult; they also experience an extra spirit of solidarity and enthusiasm, typical of people who participate in something voluntarily. This type of participation offers unlimited possibilities but it must be systematic and the volunteers must make a commitment.

The INCLUD-ED project has gathered a great deal of evidence about the positive results of organising the classroom into Interactive Groups: it increases both instrumental learning and student motivation, and promotes relationships involving solidarity and tolerance for diversity. These results are possible because the interaction is so diverse and has so much potential to accelerate the learning of all students, and also to improve the relationships between them.

First, instrumental learning increases in IGs. Dividing the classroom into groups led by adult role models, each with a different learning activity, increases the amount of time that students can spend learning because they can all complete the activities in the time set out for them, and more attention is available for each of them. In other words, within approximately an hour and a half all of them at least manage to complete all the programmed learning activities for the groups, compared to one single activity with one teacher for the whole classroom. In her daily life story, an Ecuadorian girl in the fourth year of primary school described how she works with her classmates in IGs:

> For example, when it's time to do English, and there are also volunteers …we have three tables, … one [table] learns things about fruit in English, others do a sheet, and another one does… another does… well learns things in English… Well, when each group has finished…for example [if] I have finished in ten minutes… the one who finishes first then volunteers [in the other groups].

Since the work is interactive, different skills are developed, including academic, practical, and communicative skills, and children are able to complete many problems they would not have been able to solve on their own. They also produce more complex and detailed answers. All the children, at whatever levels, benefit from this approach to learning, especially because they can take advantage of transformative interactions with their peers: the other students. Children who find a given activity easier explain what they know to their classmates, thus reinforcing what they have already learned, and imbuing it with more meaning and significance. In addition, the verbal reasoning they use to explain material to others, which can be conceptual or procedural, may be very complex. In order to make sure that they share their

understanding of the activity, they use certain abilities linked to metacognition; both in dialogue with themselves and with the other person «inside oneself», they anticipate, plan, and select information and communication strategies based on the specific nature of the interaction. One student described how the learning dynamics develop between peers in IGs:

> Some of them learn how to wait [be patient], some of them maybe go a bit faster, some know how to help each other, others learn that they can help, others find out they are good at something, others see that they are good at something else but are not good at this, but they are good at that, I think more heterogeneity is better.

The dynamics generated in the group ensure that all the children feel they are responsible for their own learning, as well as that of their classmates. As mentioned above, Wells (1999) talks about a generalised attitude in all children to inquire and pursue knowledge through dialogue. All children want to learn, but this disposition can be stunted by factors external to the child, factors often linked to the school, the classroom organisation, cultural stereotypes, or the distance between academic culture and that of some students.

In response, IGs encourage everyone to change roles: students can teach and at other times can learn from their classmates. In short, not only do children ponder and reason aloud about how they have solved a problem; they also have to think about how to ensure that their classmates can understand the information they already know, and this objective also influences their reasoning. That is, students must explain their new knowledge so that other people can also understand it. This forces them to put themselves in the place of the other person, to think about what he or she already understands, what he or she does not know yet, and which words would connect most appropriately with their experience—and then select those words to use in the explanation. Thus children have to select what to explain and how, based on the characteristics of the listener, the characteristics of the knowledge the other person needs, and the characteristics of the socio-cultural context in which they are interacting. Moreover, this approach eliminates the «dead time» that causes some students to lose interest because they have completed the activity more quickly than their classmates. IGs eliminate that ineffective practice; as a result all the students pay attention to their activities all of the time. One student described, very simply, the benefits of the interaction between peers so that all the classmates learn:

> One day, with something that was very easy, the other classmates didn't know how to do it, so I helped Peter. And another day I helped Mary...

In addition, this task of making themselves understood also leads them to develop stronger communicative abilities. In this approach, verbal language skills improve a great deal in both form and content. For example, children improve both the intonation and the structure of their speech, and the way this process occurs can be observed as the meaning behind the communication increases. Explanations like these also have a clear supportive objective: to ensure that the other classmates are also able to learn. It is important to emphasise that the most capable student gets just as much benefit from resolving an issue as does the less capable student. Peer learning has often been rejected out of fear that it will keep the more capable student from learning as much, but this is not a fear with IGs.

In addition to the improved learning for all students in IGs, a second, important benefit is improved solidarity, and an improved atmosphere in the classroom and the school. INCLUD-ED has collected evidence that regularly implementing IGs leads to new dynamics and positive interactions between students such as the mutual aid and solidarity we have just described—and a reduction of conflict in classrooms. Children with behavioural problems who do not pay attention or do not participate much in the classroom often change their attitude when they are involved in IGs. Since they are very motivated both to learn and to see their classmates learn, they engage in the activities in each group, and the level of conflict drops considerably. Some teachers perceive working in peer groups as a threat to their ability to control the class (Cohen, 1994; Creemers & Kyriakides, 2008; Kyriakides, 2006), but our studies have shown that in Interactive Groups the increase in individual academic achievement benefits all students and reduces the conflict that could otherwise occur. The coordinator in one school that has implemented IGs described how the relationships between the children have improved because of the group work they now do and how this has created solidarity between them:

> If we are working with volunteers and we are working in small groups in the classroom one of the things we work on a lot are values. We are working on being able to relate to each other, respect for those next to you, tolerance, knowing that if you finish first you are not finished, it is not you, you, you, but rather it is us, you think of the whole group.

Finally, working in IGs turns the students' diversity into an opportunity for all students to succeed academically. One result of this process is an increase in social cohesion. In other words, the approach helps to overcome prejudices about students from cultural minorities (Flecha, 1999) and also helps to include students with special educational needs. When students work together like this, they overcome their ignorance about who is differ-

ent and thus let go of stereotypes; at the same time these minority students are not hidden away or separated. Two other elements that contribute to these students' learning are seeing the diversity in these groups as an advantage that will promote learning and also holding high expectations for all the students. One teacher explained this belief:

> There is not one class in which there are more children of one level or another, but quite the opposite, they are more evenly distributed, such as when students, who come from another country, well they are not all put into the same class but quite the opposite... and the same in the case of children with students with special educational needs. These children are all over the place, because it is enriching for those with special educational needs and also for the other students, I think it is enriching for everyone.

DISCUSSION

Based on our arguments from an interactionist and dialogic perspective on learning, we have demonstrated how interactive contexts can play a valuable role in student learning, in the form of Interactive Groups. Bruner (1996) suggested turning classrooms into *subcommunities of mutual learners* in which the teaching staff does not hold a monopoly on knowledge and students help each other. Similarly, Wells (1999) discussed the idea of communities of dialogic inquiry and stated that schools must provide *environments of collaborative action and interaction* in which the group creates results that none of its members would have been able to achieve separately. These proposals are based on heterogeneous and dialogic interaction in the peer group as the key to learning and to academic success. More knowledge is generated through this type of interaction than can be created individually—whatever the type of students involved. Children are motivated by approaches that challenge them to learn and that allow them to imagine themselves knowing, and this experience helps them become more active in the learning process.

Interactive Groups lead children to succeed academically because of the dialogic interactions not only amongst the children, but also between the peer group and heterogeneous adults. Furthermore, the students learn and develop in a variety of interacting contexts.

Considering these points, we reach two general conclusions about the results of organising classrooms dialogically into IGs: we observed an increase in instrumental learning and also in the solidarity between students.

All children increase their instrumental learning when they work in IGs for at least three reasons. First, when the classroom is organised into small groups that engage in different activities with adults who drive the commu-

nicative interaction between students, they develop knowledge mutually, through dialogue. Second, since more adults participate in various groups with different activities, a higher level of learning activity occurs, so children are involved in academic activities for greater amounts of time. Third, the approach takes advantage of the diversity that each group brings to the learning of all students, and thus diversity becomes an advantage, an opportunity for everyone to succeed academically.

The approach also improves the sense of solidarity. Working in Interactive Groups generates new dynamics amongst the students such as mutual support. As a result, conflict in classrooms is reduced, and participation and good relationships between peers are promoted. Dynamic and supportive interactions between students increase because they all feel they are in charge of both their own learning and that of all their other classmates. All this leads to better relationships between everyone involved: in the classroom, the school, and also the family.

REFERENCES

Beck, U., Giddens, A., & Lash, S. (1994). *Reflexive modernisation: Politics, tradition and aesthetics in the modern social order*. Cambridge: Polity Press.

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

CREA. (2008). *Case study: Primary school. Spain*. INCLUD-ED Project. Strategies for inclusion and social cohesion in Europe from education, 2006-2011. 6th Framework Programme. Directorate-General for Research, European Commission.

Cohen, E. G. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research, 64*(1), 1-35. Retrieved from *http://search. ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ484375&site=ehost-live &scope=site*

Creemers, B. P. M., & Kyriakides, L. (2008). *The dynamics of educational effectiveness: A contribution to policy, practice and theory in contemporary schools*. London: Routledge.

Flecha, R. (1999). Modern and Postmodern racism in Europe: Dialogic approach and anti-racist pedagogies. *Harvard Educational Review, 69*(2), 150-171.

INCLUD-ED Consortium. (2009). *Actions for success in schools in Europe*. Brussels: European Commission.

Kyriakides, L. (2006). Using international comparative studies to develop the theoretical framework of educational effectiveness research: A secondary analysis of TIMSS 1999 data. *Educational Research and Evaluation, 12*(6), 513-534.

Mead, G. H. (1934). *Mind, self and society*. Chicago: University of Chicago Press.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Wells, G. (1999). *Dialogic inquiry: Towards a sociocultural practice and theory of education*. New York: Cambridge University Press.

Dr. Carmen Elboj is a Senior Lecturer in the Department of Psychology and Sociology at the University of Zaragoza. She has participated in various EU FP5 and FP6 research projects on successful schools and overcoming social inequalities, and on socialization to prevent gender violence. Her publications focus on inclusive education and Learning Communities.

Reko Niemelä is a doctoral student and researcher at the University of Helsinki. A 1995 graduate of the University of Helsinki as a teacher and a 2000 graduate of the University of Jyväskylä as a special education teacher, he has participated in several European research projects such as TIMSS (2003-2007). He has also studied special education and immigrant students in Helsinki.