Objective

More than half of all special educational needs (SEN) teachers in Sweden will retire within ten years. In addition, of all the school teachers who teach grades 10–12, approximately 33% will also retire during this time. This means that in total more than 45,000 teachers will end their employment within the next decade. According to Lärarförbundet (Swedish Teachers’ Union), a shortage of 60,000 teachers in special education is expected by 2019. To fulfill the need for special education, 1,200 teachers must graduate annually, but only 500–600 are examined each year. Anna Ekström, the Swedish Minister for Upper Secondary School and Adult Education and Training, states that this is an urgent and serious challenge for the country because the needs of fundamental Swedish education will not be met in both the near and distant future. And if these needs are not fulfilled in the distant future, it not only increases many students’ risk of failure in school and their consequent possible social exclusion in adulthood but also contributes to the social and economic decline of the county as a whole. Importantly, vulnerable groups such as those with neurodevelopmental disabilities are currently already disadvantaged in education, for example, children with dyslexia. For instance, Fouganthine (2012) explains that although many teachers recognize that students have reading and writing difficulties, they lack specific evidence-based knowledge to support learning and teach compensatory strategies.

To provide society with SEN teachers, the need for research-based knowledge must be met to further develop the field of special education. We strongly argue that there is an urgent need for teacher educators with a PhD in Special Education as a necessary condition to provide high quality education to SEN teachers and ensure successful inclusive school settings (Karlsudd, 2017). The Student Teachers’ Union in Sweden wrote an open letter to all teacher educators in Sweden pointing out three major fields in need of improvement. The first is in regard to special educational skills: “All children and students have the right to have their needs met and to ensure that teachers who are knowledgeable about the development of children and students are recruited. Today, newly examined teachers often show limitations in how they identify special educational needs and in knowing what the school’s obligations are. All teacher training courses need to provide students with basic, high-quality special educational competence” [Author’s translation].

Various stakeholders in society agree that this is an area in need of urgent action, and our proposed postgraduate school, Special Education for Teacher Educators (SET) addresses this. We will focus on hands-on classroom work, taking our departure from what we call ‘special didactics’ (didactica specialis) (Kansanen & Meri, 1999). Special didactics focus on different areas in the relation between teaching and learning and “may relate to problems of teaching in different types of school, to particular age levels of the students or to specific domains of content (subject disciplines)” (Kansanen & Meri, 1999, p.16). In this research school, special didactics will focus on different areas of SEN. One of the main areas in need of improvement
in particular is special didactics for students with neurodevelopmental disorders/conditions (NDD), which 10% of all students in Swedish schools are estimated to have (Boyle et al., 2011). We see an urgent need to provide society with research results regarding how to teach and understand the learning of this group of students as well as provide teacher education with educators who have deep knowledge of the field. The Swedish government has proposed new degree objectives for NDD that universities must orchestrate in future teacher training. Another area in need of research-based knowledge is education for students with intellectual disabilities. Due to existing United Nations conventions, we must also take into consideration how to help students with low intellectual abilities. To avoid stigmatizing students, we will emphasize a relational and functional environmental perspective as an approach in pedagogical practice to visualize, analyze and discuss the meaning of relations. We will also help draw attention to the relationship between the students as well as that of student and teacher to enhance inclusive learning (Aspelin, 2012; Aspelin & Persson, 2011).

It is worth noting that remedial education will not be in focus in this research school, as the defining trait of remedial education is a focus on students who have reached a point of under-preparedness regardless of why (e.g. new arrivals and immigrants from areas that do not provide schools or educational opportunities) (Chen & Yu, 2016). Students who suffer from under-preparedness because of a lack of educational opportunities usually do not need special arrangements but rather rich opportunities of general education in combination with language reinforcement. However, students with a combination of remedial education and special educational needs (Luit & Toll, 2015) will be especially addressed in this research program. Students with this combination are in urgent need of special didactics, which will be offered as one possible topic of study.

The main applicant of this proposal has also made an application for organizing an international postgraduate research school, Inclusive Special Didactics for students with Neurodevelopmental Disorders (SPEND 2017-03690) in cooperation with researchers from the Netherlands, Finland, Denmark, and Norway. The applied research schools would mutually benefit each other, as the doctoral students would come from different contexts (externally funded teachers from schools and teacher educators). This research school would also benefit from the international network that SPEND would offer. The Organization for Economic Co-operation and Development (OECD, 2015) and Hattie (2013) state that effective professional development should preferably be positioned as close to practice as possible and suggest that research questions should be raised and outcomes tested in teachers’ workplaces as a form of collaborative professional development. Therefore, teacher educators will benefit from studying with teachers who are partly in service and dealing with actual issues in their daily teaching. Both the postgraduate schools of the applications are situated within the field of special education and bring into focus the increased need for knowledge about how students in need of special didactics learn. This means the management team of both research schools would build a strong arena for research in special education and contribute toward strengthening the quality of the PhD students’ projects.

Professional development is needed to improve the skills of teacher educators who teach the teachers of students in need of special education. Findings from the OECD Teaching and Learning International Survey (TALIS, 2013) describe teachers’ and school leaders’ expressed experiences of learning environments in their schools (OECD, 2014), and the results show that “more than a third of teachers work in schools with significant staffing shortages of qualified teachers” (p.19), pointing out a lack of SEN teachers. When teachers do not have the necessary formal qualification for their tasks, feedback from school leaders and colleagues appears to be important (OECD, 2014). However, despite this, the results from TALIS 2013 point out that an average of 46% of teachers report that they have never received feedback on their teaching from their school leader, and 51% have never received feedback
from other members of the school management. In the postgraduate school, we will emphasize an academic culture, fostering how to give and receive feedback continuously during all four years of the program. Another theme of the courses and the live-in seminars will be introducing digital tools to help students with different types of learning difficulties (Fernández-López, Rodríguez-Fortiz, Rodríguez-Almendros & Martínez-Segura, 2013).

The purpose and aim
In response to the call, we focus on providing postgraduate education for teachers within teacher education to enhance research links in teacher education and the capacity to educate teachers in undersized areas. The postgraduate school has two goals. Firstly, it aims to develop skills and contribute with knowledge about three of the four educational tracks in Swedish special education teacher training along with the new focus on NDD. The track Deafness and hearing loss, will be introduced in the course, Didactics of language-, writing- and reading, as hearing impairment can be one of several reasons for language problems; it will be possible to study this field as an optional course. The doctoral students can choose their study object within a wide range of special educational challenges. Secondly, we intend to study how professional development can be developed so that it can give and gather feedback in special didactics during the program using various professional development models for teachers such as improvement science (Lewis, 2015), teaching research groups (Yang, 2009), and learning and lesson studies (Pang & Ling, 2012). By that, we strive to enhance the teacher educators’ readiness to educate teachers who are required to supervise and guide colleagues with the aim of improving the teaching and learning for students in SEN. In their role to teach students, we strive to foster a generic competence to regard the relationship between teachers and students as a powerful tool to create inclusive learning environments which take into consideration the students’ perspectives.

Program description and planned research activities
We hereby apply for a research school with nine doctoral students enrolled full time (100%) over a four-year period. The doctoral students will be accepted at the applying universities and will enter the preferred university which have graduate rights to examine at the doctoral level. The doctoral students must apply to the research school and undergo the same assessment process as other applicants at the universities. External experts will be used to review the applications, and interviews will be made with those who rank the highest. The positions (n=9) will be advertised nationally in professional journals for teacher trainers as well as on the websites of participating universities. Applicants can be employed at any Swedish university, but they must fulfill the requirements for special eligibility as an employed teacher at a teacher education program at a Swedish educational institution. Teacher educators not ranked among the nine highest still have the possibility to participate if funded by their universities and attested by a letter of commitment and an agreement between the universities. In any case, the applicant must fulfill the requirements for acceptance to study at the doctoral level. All the research applicants in the management team have experience of international research collaboration as well as managing research schools and/or supervising doctoral students. For consistency within the research school, a common core of syllabi for five courses, 7.5 credits/course (in total, 30 Credits, will be mandatory. Our intention is to maintain a strong focus on five areas to build upon a common base of knowledge needed for teacher educators in special education: 1) Theory of Special Education Research, 2) Special Didactics of Mathematics, 3) Special Didactics of Language-, Writing-, Reading and Hearing, 4) Special Didactics of Intellectual Disorders, and 5) Inclusive Education for Students with NDD.
Courses and time plan
For the doctoral degree, compulsory courses totaling 52.5 credits and elective courses totaling 22.5 credits are required. The theses will be compilation theses with four internationally published articles, preferably listed in Web of Science journals. The four mandatory courses which form part of PhD level contain two subject-specific courses on SEN: 1. Mathematics (7.5 credits), 2. Language-, Writing-, Reading and Hearing (7.5 credits). The other courses are: 3. Special Didactics of General Developmental Disorder (7.5 credits), 4. Special Didactics of Neurodevelopmental Disorders (7.5 credits), Theory of Special Education research (7.5 credits) and methodology courses (2 x 7.5 credits each). Research ethics will be introduced in all courses to ensure the projects will be carried out in line with current regulations.

Two of the mandatory courses (1–4) as well as Theory of Special Education Research will be given and examined at each of the participating universities (e.g., Mathematics at MaU, NDD at KI, Language at HKr, Intellectual Disorders at LnU, etc.), while the methodology and ethical courses at the doctoral level can be conducted at all universities. The theory and subject-specific courses (1–4) will be given both during regular workshops and via digital learning platforms (e.g. Adobe Connect). The management team of the postgraduate school (Holmqvist, Bölte, Aspelin, and Karlsudd) are responsible for the mandatory courses. Optional courses are chosen in consultation between the doctoral student and the principal supervisor. The research school offers many optional courses, for example, Communicating Research (5 credits), Theory of Science (6 credits), Academic Writing and Publishing (5 credits), Supporting the Learning of Others (5 credits), and Research Ethics and Responsible Conduct in Research (4 credits). To develop a coherent research school, live-in seminars in which all students and the board of the research school participate will be organized each term. For certain live-in seminars, all the supervisors will be invited, and when the doctoral students’ theses are to be discussed (terms 6 and 7), external discussants will also be invited.

Table 1. Activities SET 2018–2021

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses PhD/Evaluation</th>
<th>Live-in seminars and conferences</th>
<th>Thesis</th>
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<tbody>
<tr>
<td>1</td>
<td>Theory of Special Education Research, 7.5 credits</td>
<td>Introduction and course start</td>
<td>Planning seminar</td>
</tr>
<tr>
<td></td>
<td>Methodology I, 7.5 credits</td>
<td>Literature reviews, research ethics 3 days</td>
<td>Literature review for the study</td>
</tr>
<tr>
<td></td>
<td>Examination of theory course</td>
<td>Design of the study</td>
<td>Examination of course 1</td>
</tr>
<tr>
<td>2</td>
<td>1) Special Didactics of Mathematics, 7.5 credits</td>
<td>Introduction of course 1</td>
<td>Design of the study</td>
</tr>
<tr>
<td></td>
<td>2) Special Didactics of Language-, Writing-, Reading and Hearing, 7.5 credits</td>
<td>Design of the study 3 days</td>
<td>Examination of course 1</td>
</tr>
<tr>
<td></td>
<td>Examination of course 2</td>
<td>Introduction of course 2</td>
<td>Workshop: Data collection 3 days</td>
</tr>
<tr>
<td>3</td>
<td>3) Special Didactics of Intellectual Disorders, 7.5 credits</td>
<td>Examination of course 2</td>
<td>Data collection</td>
</tr>
<tr>
<td></td>
<td>4) Inclusive Education for Students with Neurodevelopmental Disorders, 7.5 credits</td>
<td>Introduction of course 3 Workshop: Data collection 3 days</td>
<td>Examination of course 3</td>
</tr>
<tr>
<td></td>
<td>Examination of course 3 Introduction of course 4</td>
<td>Workshop: Data collection 3 days</td>
<td>Data analysis</td>
</tr>
<tr>
<td>4</td>
<td>Methodology II, 7.5 credits</td>
<td>Examination of course 4</td>
<td>Half-time seminars</td>
</tr>
<tr>
<td></td>
<td>Optional course, 7.5 credits</td>
<td>Workshop: Data analysis</td>
<td>Data analysis</td>
</tr>
</tbody>
</table>
Overview of research based knowledge of the specialized mandatory courses

**Special Didactics of Mathematics**
In Mathematics, the focus will be on the early identification and early intervention of mathematics difficulties in a relational perspective. Heyd-Metzuyanim (2013) cites a reflective study on her own teaching which points out how she as a teacher constructed learning difficulties. Her findings resulted in “a new look at the construction of an identity of failure in mathematics as it occurs through teaching–learning interactions” (p.341). The relational perspective can be used to unveil implicit, taken-for-granted assumptions about students’ learning of mathematics, as assumptions about students’ difficulties may hinder the development of students’ knowledge. The attitude about mathematics as a difficult subject also plays an important role for students’ learning and is thus important to map (Tapia & Marsh, 2004). Equally important is to identify mathematics difficulties and how to best help students to overcome them. Although the relationship between teacher and student may change and the attitudes of the students may change, of all students, there still remains about 6% who suffer from developmental dyscalculia (Wong, Ho & Tang, 2017). Wong et al. (2017) followed three different groups of students: students with dyscalculia, low-achieving students, and normally achieving students. They found that children with dyscalculia had deficits in nonsymbolic numerosity processing as well as magnitude mapping, which supports the number sense deficit hypothesis. This was not the case for the other groups; the low-achieving students showed deficits in number-magnitude mapping. The focus of this mandatory course will be how to identify challenges for the students and make use of research results about student learning when designing instruction.

**Special Didactics of Language-, Writing-, Reading and Hearing**
A special focus will be put on different means of vulnerability in language, writing and reading development, regardless of its supposed causes. This is in line with a new concept called “linguistic vulnerability” which refers to moments when the linguistic requirements and demands at school exceed the linguistic resources of the child/children (Bruce, Ivarsson, Svensson & Sventelius, 2016). The implications of this interpretation of medical diagnoses such as language impairment highlight the importance of the pedagogy and the pedagogical relation rather than focus on the deficits and problems of the individual child/children. Such a shift of paradigm opens up for more proactive special didactics to be integrated in the classroom. Language-related development related to hearing difficulties will also be addressed to enhance early identification of difficulties that have be taken into account (Lederberg, Schick & Spencer, 2013), and in addition, dyslexia is also an area of importance in this course (Lyon, Shaywitz & Shaywitz, 2003; Holmqvist Olander, Wennäs Brante, Nyström, 2017).
Special Didactics of Intellectual Disabilities
Teaching and learning for students in compulsory school for learning disabilities is in focus in this course. About 1.5% of all students in Sweden suffer from intellectual disabilities and an IQ score under 70, which allows them to follow the syllabus of the compulsory school for learning disabilities. Knowledge about this school form and the didactics for students with intellectual disabilities is an important area for future teachers in special education. The field of Information and Communication Technology (ICT) for enhancing inclusion of students with intellectual disabilities is also addressed in this course (Istenic Starcic & Bagon, 2014).

Special Didactics of Neurodevelopmental Disorders (NDD)
In this mandatory course, students with NDD are studied. With this NDD group, which is comprised of about 10% of all students, a lack of knowledge to improve practice and create powerful inclusive teaching settings has been identified. An international overview of research on educational interventions for NDD students points out a lack of empirical evidence to inform practice and policy (Parsons et al., 2011). They claim that “more quality research is needed across all stages and contexts of provision and a debate on which outcomes are important in the short and longer term for individuals on the autism spectrum” (p.61). The proposed doctoral program aims to fill the gap in this field by focusing on special pedagogies for the inclusion of students with NDD. Several studies point out difficulties for students with NDD to cope with their school situation as well as teachers’ experienced shortcomings to meet the students’ needs for adjustments. Jennet, Harris, and Mesibov (2003) highlight the risk of burnout for teachers teaching students with autism, which would result in emotional exhaustion. Their findings confirm a significant relationship between adequate teacher training and self-efficacy. Increased professional self-efficacy decreases the risk of experiencing burnout (Lauermann & König, 2016; Malinen & Savolainen, 2016). From the students’ point of view, recent evaluations (e.g., those by the National Autism and Asperger Association in Sweden) show that students have extensive problems in coping with their school placements. However, despite this strained situation for students as well as teachers, there is a lack of research aimed at helping understand and enhance the development of fruitful inclusive settings for students with NDD. Previously, students with autism-spectrum disorders (McPartland, Reichow & Volkmar, 2012) were frequently placed in special schools or special solutions that were created out of reduced abilities to understand an implicit social school context (Callenmark, Kjellin, Rönnqvist & Bölte, 2014) and to fulfill the requirements stated in the curriculum. Because of new directives and policies in Sweden (Swedish Schools Inspectorate, 2012), only students with intellectual disabilities may be placed in special schools. This means that many students with normal intellectual ability are expected to achieve the learning goals under the same conditions as students without the NDD diagnosis, which puts great pressure on students with autism and challenges both teachers and students.

Organization
Malmö University will assume the chief responsibility for this research school. The coordinator is Mona Holmqvist, Professor of Educational Sciences at the Department of Education and Society. Professor Jonas Aspelin, Kristianstad University, Professor Sven Bölte, Karolinska Institutet, and Professor Peter Karlsudd, Linnaeus University, will manage the postgraduate school together with Holmqvist. A Board will be elected with a Chair from Malmö University, Department of Education and Society, the management team (researchers from the participating universities), and a student representative. The participating doctoral students will be included in each participating university’s organization for postgraduate studies, as well as the support given by SET. We plan to start the postgraduate school in
National and international collaboration

At the national level, researchers in the field of special education research will be recruited as supervisors. As we are a rather small group in Sweden, therefore international collaboration in the research school is necessary to create a sufficiently critical environment. As we involve international researchers in the research school, we will contribute to new knowledge from other parts of the world with experience and findings valuable for the development of special educational research in Sweden. The Board of the research school will be comprised of four researchers, presented below.

Professor Mona Holmqvist, PhD, Malmö University, Sweden
Mona Holmqvist’s background is that of a teacher, and she is now Professor of Educational Sciences, Associate Professor of Education and Chair in Education and Special Education at Malmö University. Her doctoral thesis from 1995 was about education for students with autism (Holmqvist, 1995), and it suggests that learning difficulties in conjunction with autism are due to the inability to integrate information, which is also one of the symptoms stated in the new diagnostic manual (APA DSM-5). Her continued work in this research field is exemplified by studies based on the variation theory of understanding how students with NDD learn (Holmqvist, 2004; Holmqvist, 2009; Holmqvist & Burman, 2013). Holmqvist’s last research project was funded by the Swedish Research Council; it focused on the learning of adults with dyslexia in higher education using eye-tracking as one method (Holmqvist, Wennås Brante & Nyström, 2017). She is currently a board member of the Swedish Autism and Asperger Association and council member of World Association for Lesson Studies (WALS). Holmqvist has been on the board of two research schools in Sweden: the National Research School for Educational Work (NAPA) and the Learning Study Research School for Teachers.

Professor Jonas Aspelin, PhD, Kristianstad University, Sweden
Jonas Aspelin is a professor of pedagogy at Kristianstad University (HKR). He is Chair in Education and Special Education and Head of the research environment, FoRP,1 the largest group at HKR. Aspelin also leads the Nordic network for relational pedagogy (NORP). His background is as an upper-secondary school teacher. Having received his PhD in social psychology from Lund University in 1999, his research mainly concerns the teacher–student relationship and relational professionalism. He has conducted empirical and theoretical research on the social psychology of education, for instance, on classroom communication, pedagogical attitude, participation, pedagogical care, and the emotional aspects of educational practice. In addition, he is one of the lead researchers in Sweden regarding relational pedagogy and has published extensively in the field, mainly nationally, but internationally as well. He is currently working on a research project on teacher–students’ relational competence (with Prof. Anders Jönsson, HKR), and he also leads research circles on relational competence in cooperation with practicing teachers.

Professor Sven Bölte, MD., Karolinska institutet, Sweden
Sven Bölte is a distinguished researcher with several international publications in prestigious journals and the Head of the Centre of Neurodevelopmental Disorders at Karolinska Institutet (KIND). KIND includes a clinical unit (BUP-KIND) at the division of child and adolescent

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1 http://www.hkr.se/forskning/forskningsmiljoer/forskning-relationell-pedagogik-forp/
psychiatry in Stockholm County (www.bup.se), where novel, promising, but not fully evidence-based techniques are offered and evaluated in natural settings. KIND is a competence node for research, education, development, and clinical work established in 2010 as a joint effort between the Stockholm County Council and Karolinska Institutet (KI) with the mission to generate new and high-end evidence in NDD and bridge gaps between clinical services and academia in NDD regionally, nationally and beyond. The unit is intended to serve as an incubator for translating basic and applied research into clinical and educational practices. KIND employs 45 individuals (70% women, 12 nationalities, 10 professions), including 25 researchers (4 research group leaders, 3 Associate professors, 11 PhDs, 7 PhD students), 15 clinicians (at BUP-KIND), and administrative support staff. Between 2010 and 2016, KIND published 160 original peer-reviewed articles (e.g., in JAMA, New England Journal of Medicine, Nature Communication, Nature Drug Discovery, Behavioral Brain Research, and British Journal of Psychiatry) and generated > SEK 125 million (> $13,5 million) in research grants. KIND conducts a complex mix of research, education, and development activities on NDDs with a variety of paradigms ranging from genetics and environment, neurobiology, (dis-)ability/psychopathology assessment and epidemiology to diagnostic tools, intervention methods, implementation, and related societal/service issues.

Professor Peter Karlsudd, PhD, Linnaeus University, Sweden

Peter Karlsudd is a doctor and professor of pedagogy and Doctor of Industrial Economy. Peter has almost twenty-six years’ experience as a university lecturer teaching degree programs in education and special needs education. His research interests have centred around the fields of special needs education, and in particular, inclusive teaching methods. Peter received his doctorate in Education at Lund University in 1999 with his thesis, “Children with Intellectual Disability in the Integrated School-Age Care System.” He has carried out several projects in this field and is often engaged as guest speaker at seminars and conferences around the theme, A school for all. He has also developed a web applications CIDS – a system for coordinated habilitation. Karsudd contributes with his specific competence in the field of special education and his ability to construct inclusive tools to promote belonging. In addition, he has the main responsibility for a municipality funded research school for preschool teachers at Linnaeus University.

Ethical considerations

The studies conducted at this research school are required to undergo an ethical review at the local ethical review board in the region where the university is located. If the doctoral projects include participating students, they and their legal guardians will be asked to take part and give their written permission to participate in addition to the teachers and the other students in the classes where the participants are included. We will, in all aspects, follow the intentions in the Swedish Research Council’s book, God forskningssed (Hemerén, 2011). Participants can decline participation at any time during the project.

Societal relevance and knowledge utilization

We believe this project has a sound societal relevance. Given the lack of teachers for students in need of special education, the societal relevance of a postgraduate school for teacher educators will fill a knowledge gap in urgent need. The Swedish Agency for Participation (2014) has reported a socioeconomic analysis of school failure and employment for students with autism spectrum disorders. The results show that students with ASD also struggle to complete secondary school which in turn leads to further difficulties in gaining employment.
later in life. The report states that school is a significant variable for predicting later exclusion from the labor market. A reduction of late employment by three years results in a gain of 1,300 euros. If a school establishes special initiatives for students with disabilities and reduces the number of students excluded from labor market by 50, the social profit will amount to 50 million euros (The Swedish Agency for Participation, 2014). To strengthen teachers’ capabilities to prevent the exclusion of students in the early school years, we need to create new knowledge based on research findings. Professional development aimed at developing teachers’ knowledge of how to create inclusive settings has not only an impact on the student as an individual but also a socioeconomic impact on society in general. The results of the project will be not only disseminated as scientific articles in prestigious research journals but also given to the teachers and school management to share important knowledge of how they can use the results to create powerful inclusive school settings. More knowledge is needed of how to prevent learners from dropping out of school early on in life and school failure for students in need of special education. This postgraduate school for teacher educators will also share research results with pre-service teachers, as they doctoral students also teach at the teacher training school during and after their PhD studies.

References


