

Research-Based Educational Support of Undergraduate Students with Autism Spectrum Disorders

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Abstract. The numbers of college and university students with autism spectrum disorders (ASD) are steadily rising, but research on their academic performance reports mixed results. The diversity of the population makes it necessary to target each student individually. This paper describes an ongoing study and experience with pedagogical intervention for ten undergraduate IT students at Oslo Metropolitan University (OsloMet) over several years. The intervention design is based on knowledge of research in the field and evidence-based practices, as well as professional skills. Data about student challenges and needs are collected from informal, open-ended interviews with students, in addition to conversations and observation. The goal is to ensure that the students achieve academical success. Plans are currently being made to develop a formal program that will target all students with autism spectrum disorders at OsloMet.

Keywords. Autism spectrum disorders, research-based intervention, pedagogical methods, evidence-based practices.

1. Introduction

Students with autism spectrum disorders (ASD) in higher education face significant challenges, both academically and socially. Although programs and services designed to meet the needs of these students are found in most institutions, several students drop out of studies or achieve poor results [1]. Scientific research has found that only some interventions are effective. In a longitudinal study, Sanford et al. reported that fewer than 40% of students with ASD completed postsecondary education (2011). In contrast, the graduation rate for neurotypical students is nearly 60% (U.S. Department of Education 2017).

ASD is a life-long developmental disorder that affects communication and behaviour. Difficulties with communication and social interaction, restricted interests and rigid and repetitive behaviours are common. Individuals with ASD may have difficulty using and interpreting nonverbal behaviours such as eye contact, facial expression, gestures and body postures. The word “spectrum” denotes that there is a wide variation in the type and severity of symptoms.

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Statistics show varying figures on the prevalence of ASD in the population, from 1 per cent to the latest figures from CDC; 16.8 per 10,000 which is 1.7 per cent of the global population (2018). There has been an increase over the past 10 years, probably due to diagnostic methods. The diagnosis covers a wide range of mild to severe developmental problems [2]. ASD is about 4 times more common in boys than in girls, although many girls (and some men) are misdiagnosed with ADHD, eating disorders and social anxiety.

Autism can be seen as a cognitive variety. Cognitive skills include the ability to think, remember, and process information. Cognitive skills are often uneven and independent of level of IQ. In autism, adaptive skills may not coincide with IQ. A high IQ is a strength, but it is wrong to assume that a high IQ in itself will help achieve academic results [3]. On the other hand, many individuals with ASD often have intellectual resources and an excellent memory.

Individuals with ASD differ from themselves more than the so-called neurotypical population, and the diversity of the population makes it difficult to find one educational approach that will work for all. There is therefore a general need for more work on identification of research-based knowledge and evidence-based educational practices and insight from professionals who work with these students on an every-day basis. This paper describes an approach to pedagogical intervention for this student group in general and contributes to the research literature in the field. Intervention developed specifically for IT students is described in [4].

2. Background Literature

There is an emerging research base that can be used to guide disability services offices and faculty to address the needs of students with ASD [5]. However, the current literature based on experience and programs for individuals with ASD in college and universities is fragmented. More research is necessary to understand how to best support this population [6]. Individuals with ASD face a number of challenges. Co-morbidity, for instance ADHD, anxiety and depression, aggression, poor social and interpersonal skills and cognitive deficits present problems that must be addressed by support programs and professional instructors. Wahlberg and Magliano have found that students with ASD have deficits in applying background knowledge, specifically in making global and abstract connections [7]. These problems must be addressed explicitly. According to Gelbar et al, many have problems with study technique and learning strategies, group work, examination situations in addition to psychological problems, depression and loneliness [6]. According to Knight et al. there is often a problem understanding written text [8]. There is no single approach that can meet all the needs of students with ASD, but the understanding of ASD helps the instructor to correctly identify learning needs and to design suitable intervention [9].

Research on people with intellectual disabilities shows that professionals should base their selection of intervention practices on scientific evidence of efficacy. Evidence-based strategies are recommended. Evidence-based practices (EBPs) are instructional approaches that have proven to be effective through rigorous research. Stoiber et al. state that the selection and implementation of evidence-based practices "...should focus on research-informed knowledge, and also on the skills, understandings, and decision

making of practitioners. Influences such as the teachers'/instructors' skills and values can affect how an intervention is derived, and moreover whether it is applied effectively" [10].

Students with ASD have overall difficulties with executive functioning and critical thinking. It is important to use a variety of instructional strategies and make plans to stay organized. Gobbo and Shmulsky recommend extended deadlines, extra time on exams, working alone instead of in group projects, taking a reduced work load and removing distracting stimuli [11]. Abstract language present problems because individuals with ASD interpret literally. Professors should use concrete language in lectures and avoid metaphors [12], [13].

Many people with ASD have specific routines or rituals that must be followed exactly. Changes in routine can be upsetting or frustrating and cause aggression, anxiety or depression. Van Hees et al. [14] interviewed 23 current and former college students from the Netherlands about their college experiences and identified several types of challenges: Struggling with new situations, exhausting but necessary social contacts, processing information, sensory overload, doubts about disclosure of the diagnosis, and mental health issues like anxiety and depression. Jansen et al. [15] interviewed 43 Belgian students with ASD. The most frequently reported difficulties were problems with verbal and non-verbal communication, difficulties handling change, and problems identifying important information in text.

3. Methods

In this ongoing study, four former and six current IT-students with ASD have been supervised by the author over several years. Information has been gathered about their needs, strengths and personal and academical development in order to determine how best to support each individual. Oral open-ended informal interviews were conducted with six students. Two students supplied written texts after the interviews. Two students could not be interviewed because of speech problems. They were observed. All the students supplied information through informal conversations during personal supervision. The author posed questions like: "Do you live with your family, do you have friends, what do you do in your spare time?" Because many individuals with ASD tire quickly due to sensory overload, the interviews (and conversations) were short, varying from 10 to 30 minutes.

Two in-depth open-ended interviews were conducted with post graduate students. They answered questions about their university experiences. The interviews lasted for one and a half hours. The main goal was to uncover what had worked best for them in their studies. In-depth interviews were also conducted with an adult with ASD. He has acted as an expert advisor on ASD, and was interviewed three times over a period of six years. Notes were taken during the interviews and conversations, because recording led to general stress. The supplementing written statements were two to four pages long. It is not uncommon for people with ASD to prefer writing to speaking. Three informants supplied additional information with questions and answers on Messenger.

4. Findings

There has been a significant increase of students with ASD in IT studies over the past years. Ten years ago, there was only one (known) student with ASD at Oslo Metropolitan University (at the time, Oslo University College) who was supervised by the author. Since then, three more students have graduated and six are currently in their first and second year of studies. One of the post-graduate students is completing a master's program, and one has graduated from a master's program. Two are employed in the IT-industry. Of the students currently on the program, four are following a regular study progression, and two have a lighter work load, taking one or two courses per semester (ten or twenty ECTS).

In this study, all the students reported an IQ over 130. But a high IQ alone is no guarantee for academic success. The findings show a general lack of effective learning strategies. For instance, copying the text book instead of doing the exercises is not uncommon. One student would skip long words she did not understand. A third would ignore unknown words or difficult text and guess the answers. A fourth student had a rigid approach to problem solving and could not perform task number two before task number one was finished. One of the main findings is problems with identifying information in texts, as was also found by Jansen et al. [15]. Two students in this study reported that they could spend hours brooding over the text, and not understand the content.

4.1. *Determining Individual Needs*

Since all the students have different needs, a check list and a short introductory talk are conducted during the first meeting with the author/supervisor in order to identify individual challenges. On the basis of the collected information, intervention is designed to fit each individual. Students are supervised regularly by the author and by a peer mentor. Two students have weekly sessions with the author lasting for one hour where author and student work on assignments together. Some meet at irregular intervals for a talk about practical things like exams, deadlines, otherwise, they work on their own and in groups. Although these students have strong intellectual abilities and may give the impression of coping well, this can be deceptive. Copying social behaviour is a well-documented self-management strategy. Statements from the students confirm this: "I copy the behaviour of others. Nobody knows I have ASD, only my family." A former student said: "I have taught myself social skills the way other people learn mathematics." Another stated that "I ask my friends what their face expressions mean. They explain, and I try to copy them." Adult informant said: "When I was younger I observed my surroundings and copied behaviour. As I grew older, the copying became more structured and conscious. I use my cognitive abilities to copy and adjust. It makes life easier."

For some, group work presents challenges, for other not. A second year student stated: "I work in groups, I have no trouble with that. The others know that I have ASD." One first year student was explicit about group work: "If I am in a group, there cannot be any other strange people like me." Another student said: "I prefer working alone. I become very quiet and passive in a group." Some students like to talk, others do not. One student reported: "I do not say very much. I tell the others that I talk very little, they accept that." Some students experience exams as extremely stressful, whereas one student reported that "I love exams! I like testing my skills."

The post-graduate students were asked what they considered to be the most helpful aspect of the supervision. Former student (1): “The best thing was having you as my supervisor and weekly sessions with you.” Former student (2): “You know a lot about Asperger’s. That helped a lot. You understood me”.

5. Designing the Intervention

The intervention described in this paper builds on the experience and pedagogical skills of the author combined with knowledge on research-based and evidence-based practices. The literature on evidence-based practices for individuals with ASD describes the importance of self-management strategies. Self-management intervention can also be used for developing learning strategies. The goal is for the students to become independent. This study shows that making the students aware of their difficulties and showing them learning techniques can change their approach to problem solving. One student said: “I need to learn study technique, I know. I really don’t have any technique at all. I just start doing the task. I don’t even understand the text properly, I just guess.” This example is typical and illustrates that students with ASD require directive, explicit guidance and counselling to become aware of their learning problems.

5.1. Practical Supervision

Students with ASD differ more among themselves than neurotypical students, and an intervention program must be designed to target the specific individual. However, many things are common, and the same techniques and intervention can be applied when instructing different students. For instance, written texts often present problems. The educator/supervisor must make sure the students understand the texts and what is expected of them. How to look up a difficult word and search the Internet for topics must be explained and practiced. In order to uncover problems with understanding text, it is also important to ask direct questions. The following technique has proven effective:

Supervisor: “Do you understand this text? Do you understand what this sentence means?”

Student: “Yes”. Or “I think so”.

Supervisor: “Do you understand this word?” (Points at a difficult word).

Student: “No”.

Supervisor: “How do you find out what the word means?”

Student: “I don’t know.”

Supervisor: “Are you still sure you understand what this sentence means?”

Student: “No.”

Van Bergejk et al. state that because the students may have difficulties making inferences, drawing conclusions and making connections, tasks must be broken down and analyzed [16]. Each task and subtask must be clearly stated and explained. One student in the study was solving a large programming task with extensive textual

descriptions. The student commented: “All this text makes me feel dizzy. I see some of the code in my head, but I do not see the whole picture. It is so confusing. I don’t know how to begin.”

Rigidity in thought and obsession with order can present obstacles to solving tasks with several subtasks. Sometimes a student can have trouble moving on to task number two before number one is finished. Lengthy oral explanations will have little effect. Visualisation in the form of a small sketch or cartoons can help to explain how to overcome the rigid approach to order.

When giving instruction on how to approach longer assignments, the author splits the task into smaller tasks as recommended by Van Bergejk [16], and illustrates the task structure on a sheet of paper. Written instructions are also sent to the student by email, for instance: “Do task No 1, subtasks a) b) and c). Work for 30 minutes. Then take a break. Work for another 30 minutes. Take a new break. If you do not understand what to do, ask me.” Usually the task is completed before the next session, when instructions for the next task with subtasks are given in the same manner. After a while, it suffices to say: “Do task no. 1 and all the subtasks. Do you know how to do it? Can you reuse the instructions I gave you?” If not, the instructions are written down. In time, the students learn how to work on assignments and finish without getting restless and despondent.

6. Discussion

The philosophy of Universal design for learning is to create inclusive learning environments that meet the needs of all students, and to provide multiple support strategies. But education programs designed to fit students with disabilities in general are not suited for students on the autism spectrum. The author of this paper is a computer science professional, has no formal training in special pedagogy, but acts as instructor and supervisor for students with ASD out of a strong personal interest in the subject. Acquiring knowledge on ASD and how to design effective intervention has taken several years. The aim is to develop methods and practices, learning from the work of others, from own experience and from an expert on ASD. Research literature provides the source for identifying pedagogical methods that generate positive outcomes for people with ASD. The main focus is on teaching efficient study technique so that students learn to structure their own work and become confident in their academic abilities.

Teachers who encounter students with ASD in lectures and classrooms must to some extent facilitate learning, often with little or no guidance. Using evidence-based practices can help eliminate many of the frustrations and guesswork that instructors experience. However, it is impractical to perform a search of the literature or conduct studies when designing intervention. Guidelines and recommendations are therefore valuable, some which are given below. However, not all teachers have the vocation, skills or time to assist students with ASD. Individual supervision of these students is resource intensive, and support can only be given effectively when the supervisor/teacher has acquired the appropriate knowledge and skills.

A limitation in this ongoing study is the small sample size, but in qualitative research, small samples are not uncommon [17]. Though relatively limited, the findings are valuable and the sample will increase with the increasing numbers of students who graduate and achieve academic and vocational success.

7. Recommendations for Educators

Some general recommendations for educators are given here. The recommendations are based on experience, literature and the findings in this study:

- a) Many people with ASD have trouble understanding every-day conversation, with its digressions, metaphors, vague communication, facial expressions and body language. Clear and unambiguous speech and written texts (instructions and assignments) can help all students, not only those with ASD. Instructors and supporters are therefore recommended to use straight-forward speech and direct communication.
- b) Supervision should be conducted in a quiet space and calm atmosphere. Sounds, light and visual noise can be upsetting.
- c) Visualization is recommended when explaining tasks and solutions to problems, for instance assignments or order of work.
- d) Small talk should be avoided. Small-talk is the often preferred social interaction form between colleagues and strangers. It is best to be direct in interaction with students with ASD who interpret statements literally. Ask “Are you feeling alright?”, not “how are you feeling?”.
- e) Young people with ASD often report thoughts about suicide. The educator should be aware of mental difficulties and check on students who withdraw. They can be contacted by email or telephone.
- f) Educating peer mentors and colleagues is important. A mentor should in addition to academic skills have the necessary personal skills. For some students a peer mentor is not a solution either because there is no funding, or because of social problems, anxiety or difficulties finding the right mentor. The personal contact with a skilled teacher/supervisor is therefore especially valuable.

8. Conclusion and Future Work

The effectiveness of individual supervision and support for students with ASD like peer mentoring, extra time on exams, extended deadlines and a slower study progression has been well documented, but many students with ASD in higher education do not receive the appropriate support. Academic performance is often poor, quite a few drop out of studies. However, in this study, nearly all the students succeed. Evidence-based practices, information on research in the field as well as knowledge about ASD have been used to design pedagogical intervention for IT students with ASD. The findings indicate that the intervention is successful: four students have completed their bachelor studies, of these, two are in full time jobs, one has graduated from master studies and one is on a master programme. The six students that are currently in their first and second year of bachelor studies are doing well. The students report that the second year is easier. Having acquired better learning strategies, they become more independent, and become used to being students in a for them often challenging environment. The program is now expanding to

include all students with ASD at OsloMet. Workshops with participants from all departments are being planned with the goal to develop better intervention.

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