Research Article

Assistive technology provision at mainstream schools—Experiences of Serbian resource centers

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Abstract

Background: Over the last 15 years, inclusive education has been formally established in Serbia as a mandatory approach for all students, ensuring equal rights and access to education without discrimination on any grounds. In addition to mainstream schools, Serbia also has special schools for students with developmental challenges and disabilities. Although some special schools in Serbia have been functioning as resource centers (RCs) for a long time now, 13 RCs have only recently been officially established, aiming to support inclusive education through assistive technology (AT) among other things.

Objective: The research reported in this study was conducted within a project that aims to address challenges in implementing and improving inclusive education in the Republic of Serbia, focusing on the existing capacities and difficulties in how RCs provide AT services to mainstream schools to offer a set of recommendations to inform the development of RCs in the country.

Method: A SWOT analysis involving 80 respondents was conducted. Fifty-three respondents completed a questionnaire online, while further 27 respondents participated in five focus groups. Groups involved experts working in the RCs, suppliers and manufacturers of AT, parents of persons with disabilities, and expert associates from mainstream schools. The data was analyzed using a SWOT framework.

Results: The respondents reported that human capacities (e.g., motivation and experience) were the main strength. Weaknesses included lack of specific and modern knowledge about working with children with different conditions, as well as specific knowledge about the AT itself. Intersectoral cooperation was pointed out as the main opportunity, while obstacles were recognized in almost all work segments (lack of finances, lack of staff, lack of adequate legal regulations and communication and cooperation).

Conclusion: Based on the results achieved, potential solutions for overcoming the existing obstacles in resource centers were proposed.

Keywords

inclusion, resource centers, SWOT analysis, assistive technology

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Introduction

Inclusive education is a fundamental component of "education for all" children, as it represents the process of involving students from diverse backgrounds, languages, cultures, and abilities. Inclusion is a process that embraces diversity and builds a sense of belonging based on the belief that every individual has potential and value that should be respected.[1] While there is general agreement on the importance of inclusive education, there are still debates surrounding the concept, as it is a very complex, broad, and unclear construct.[2] Education is considered a basic human right. Therefore, providing equal access to quality education and an inclusive educational environment to all people, with and without disabilities, is among the sustainable development goals to be achieved by 2030, although it is recognized that there are many obstacles to their achievement.[3] By fulfilling these goals, people with disabilities are provided with accessible and inclusive education that meets their individual needs, including assistive technology (AT) provision.[4]

Despite the belief that the expansion of digital technologies will have a positive impact on all areas of life, including education, it has been found that students with disabilities have reduced access to modern technologies compared to their typically developing peers.[5] The use of digital AT somewhat increases their accessibility to the digital world, thereby improving their communication, social participation, and opening up greater opportunities in education.[6] Integrating AT into the school environment may provide access to the mainstream curriculum for all students, including those with severe disabilities.[7] AT supports students with disabilities in achieving social interactions with peers and contributing to joint activities. Furthermore, AT has a significant role in planning different phases of teaching and learning.[8]

The latest Global Report on Assistive Technology of the World Health Organization (WHO) estimates that about 2.5 billion people worldwide need at least one AT product and that there are great discrepancies in their availability in different parts of the world.[9] The lack of knowledgeable experts and trained staff particularly stands out among numerous obstacles to AT provision. The WHO report,[9] based on data collected from 70 countries, states that only 10% of members claim to have trained human resources to provide all necessary AT services at all levels and for all functional domains. On the other hand, as many as 20 surveyed countries do not have trained staff that could provide adequate support in acquiring, maintaining, and using AT in any functional domain. The lack of trained staff is particularly pronounced in applying AT in cognition, communication, and self-care. It is clear that teachers will encounter students with developmental disabilities in their classes, many of whom are potential AT users. While this presents a challenge, teachers also highlight the importance of receiving appropriate training to effectively meet the needs of their students.

There is no universally acceptable teacher training model for using AT in an inclusive context. Literature in the field of inclusive education argues for a paradigm shift in learning design, which entails close collaboration between special educators and other disability professionals with general education teachers, in the framework of a whole school and systemic approach.[9] This means that AT experts would visit classes, work closely with the teachers to empower understanding of how AT can be used in specific circumstances based on students' individualized needs, as well as for engaging learners with disabilities in classroom activities. Also, this collaboration focuses on providing support and sharing knowledge to ensure that the used technical devices become integral parts of an inclusive environment, and for the benefit of all learners in the classroom. Instead of acquiring knowledge in workshops and courses with no direct link to their own working experience, teachers with different knowledge and experience in using AT should interact regularly and learn from each other.[4]

The establishment of resource centers (RCs) as a "path to inclusive education"[6] has been introduced by UNESCO[7] and other initiatives mainly in an effort to transform the role of specialist professionals and special education settings (i.e., special schools) into teams that support inclusion of children with disabilities.[8] For instance, teachers who teach students who are blind in special schools may also serve as on-site support, trainers, and mentors for teachers in mainstream schools who may have students who are blind in their classrooms.[10] Evidence shows that, when properly applied, RCs can help develop coherent educational programs to support academic achievement, as well as social and emotional development for all students.[11] In addition, research on partnerships between special and mainstream schools has further highlighted that such partnerships may lead to positive changes in teachers' perspectives and perceptions of inclusion. For instance, in a study in which support was delivered by a team of staff from a special school and led by a support teacher at a mainstream school, it was found that the overall culture of inclusion within the school increased.[12]

A mapping exercise[13] has been recently conducted across 26 EU member countries to describe the types of services provided and profiles of professionals who are involved in specialist provision. It was revealed that most countries have external centers and institutions (i.e., RCs) as part of their specialist provision. The type of support services offered by RCs, however, depends on the context in which the RCs operate, and there are no standard indications about *what* specific support RCs should provide to mainstream schools' staff and *how*. Examples of support include co-teaching, support to modify curriculum, and provision of behavioral supports.[13]

Among the support services provided by RCs to mainstream schools, providing AT may be considered key to

promoting the adoption of inclusive pedagogies in mainstream educational settings.[14] With the increased uptake of technology and the rapid digitalization of various life contexts, schools are now required to prepare learners for life within digitized societies, while also utilizing the potential of technology to enhance their own teaching practices.[15] Alongside the use of mainstream technology, a mandate to make AT available to students is clearly stated within the Convention on the Rights of Persons with Disability (CRPD) to promote inclusive education. RCs, in this context, can be considered a specific type of specialized AT service provider, usually known as "specialized AT centers." According to WHO,[16] specialized AT centers/RCs are usually established at secondary level (district, county, provincial, and regional). Their main function is to evaluate, together with the child/student and the other stakeholders (e.g., parents, teachers, and health professionals), which AT best fits their specific needs and help guide toward informed decisions on the appropriateness of the technology. Furthermore, specialized AT centers/RCs have the important function of assisting users throughout usage and evaluating the effects of AT.

Transitioning from special education to RC, however, may pose some challenges. The example of several countries, especially in the Eastern European Region, indicates that a design thinking action plan can be an effective approach for successful RCs.[17] Change management is traditionally driven by a conception of balance between existing internal resources and external opportunities, which is mostly reflected in a strengths, weaknesses, opportunities, and threats (SWOT) analysis frame. This approach has been adapted in the situation analysis presented in this paper to facilitate an understanding of how the qualifications and existing resources can be matched with opportunities contextualized in Serbia and the current situation in relation to the support of children with disabilities. As Florian and Sretenov[17] highlight, transition activities and times require the acknowledgment of professionals' reactions, especially in more complex institutional changes.

Local context

Special and general education were two almost independent systems in Serbia over several decades. As a rule, children with disabilities attended special schools where specially trained experts, that is, special educators, worked. The first pro-inclusive attempts happened at the very beginning of the 21st century when certain non-government organizations started promoting inclusion, or rather integration, with the support of state and international donations.[18] In 2004, special schools started cooperating more frequently with the general school system, mainly through project activities. However, after project funding cessation, new difficulties arose in maintaining the newly established role of special schools as RCs.

The Law on the Foundations of the Education System[19] was passed in 2009, formally establishing inclusion as the mandatory form of education for all students. This law promotes equal rights and access to education without discrimination on any basis, including disabilities. In addition to the curriculum, students in need of additional support are provided with the removal of physical and communication barriers and the development of Individualized Education Plans (IEP). In the same year, the Serbian government launched the DILS project (DILS: Delivery of Improved Local Services). The project was funded by a loan from the International Bank for Reconstruction and Development. Within the project, special schools obtained resources to function as RCs that support inclusive education in their local communities. The work of RCs was not legally defined until 2017 Amendments to the new Law on the Foundations of the Education System, adopted in 2017,[19] allowed institutions to acquire the status of RCs. Article 54, which also exists in the current version of the Law, says that a "RC also provides expert support in the selection, implementation, and procurement of AT in education and upbringing and follows new trends in supporting children, students, and adults with disabilities and impairments." The Rulebook on Resource Centre[20] was adopted at the end of August 2021, which rounded off the legislation in this domain.

The first more significant AT procurement for RCs was completed in 2013 through the DILS project. In collaboration between the Ministry of Education, Science, and Technological Development of the Republic of Serbia and UNICEF, the Catalog of Assistive Technology[21] was published, making the information about AT widely available to the local public. Despite innovative legal solutions and improved public awareness about RCs, there is still a significant discrepancy in the possibility of exercising the right to AT due to the great disparity between local communities in available resources.

The findings reported in this paper draw from data collected for the purposes of a SWOT analysis used as the basis for designing and implementing a plan for supporting RCs in Serbia with the provision of AT services in mainstream schools in the context of "Enhanced Equal Access to and Completion of Pre-University Education for Children in Need of Additional Support in Education – We Learn Together" project, implemented by the Ministry of Education (MoE) and UNICEF, and supported by the European Union.

The scope of the present study is to report on the results of the SWOT analysis with a view to elaborate on a set of recommendations to inform the development of RCs' capacities toward AT provision in the Serbian mainstream educational system.

Methodology

Data for the SWOT analysis was collected via a guided protocol based on the four aspects of the SWOT analysis.

Each element of the SWOT (i.e., strengths, weaknesses, opportunities, and threats) was broken down into relevant questions reflecting each element in relation to skills and knowledge, attitudes, resources, policy framework, organization, and structure, for both the RC service providers and of the feedback they received from the population they serve. The questions used were open-ended (e.g., What important skills and knowledge do you possess that give you advantages in the work you do, e.g., counseling, collaboration with children and families, instructional support to teachers, IEP development, psychology services, etc.) (full set of questions available in the Supplemental Material). The aim of the protocol was to help participants cover as many areas of SWOT in an RC as possible. SWOT analysis questions were determined through several iterations, based on a previous literature and national/local resources review, in collaboration with all partner organizations on the project, as well as with UNICEF and the MoE. The data collected were anonymous and analyzed using descriptive statistics. The same questions were used in focus groups. Data collection was carried out in keeping with the ethical principles outlined in the Declaration of Helsinki (1964) and later amendments. Informed consent was obtained from all involved participants.

Overall, a total of 80 participants were recruited with the help of the MoE of the Republic of Serbia, which addressed the directors of all RCs in Serbia, asking them to forward the link with the questionnaire to their employees engaged in various positions in the RCs, with the request to respond to this as representatives of their teams, and thus as a more collective and consensus view. Nevertheless, for the purposes of expediting the participant recruitment process, the SWOT analysis elaborated protocol was administered in two ways. First, in order to reach a greater number of participants, it was delivered online as an open-ended questionnaire (written form of interview), receiving in total 53 responses, as representative of all RCs in Serbia. In a second phase, additional responses were collected via online focus group interview sessions using the exact same tool as a guide. Focus groups involved a total of 27 participants. The list of potential focus group participants was formed by the MoE in cooperation with UNICEF, so that the principal or assistant principal of the RC, RC employees, RC expert associates, and parents of children with disabilities were included. Five focus groups were formed: two groups consisted of experts working in the RC, one group consisted of suppliers and manufacturers of AT, one group consisted of parents of children with disabilities, and the last, fifth group, consisted of expert associates from mainstream schools. Each group, in addition to the moderator and facilitator, had between four and six participants. The focus groups were conducted online and lasted, on average, about 2 hours each. The moderator and facilitator in each focus group were the authors of this paper, whose mother tongue is Serbian and who have decades of experience in university teaching and working with people with disabilities. The focus groups were recorded and transcribed.

For the analysis of the data collected a thematic analysis framework was followed, based on the sub-themes used for the structure of the SWOT analysis tool. Thus, for each aspect (i.e., strengths, weaknesses, opportunities, and threats) the following themes coming from a service mapping experience framework[22] have been identified: Skills, knowledge and attitude (competences), resources (financial, physical, human, regulatory framework, organizational), policy and regulatory framework (including organizational aspects), and service recipients' feedback.

Results

The responses to the SWOT focus groups and the SWOT online tool were summarized by the three moderators. Each moderator reviewed all responses and validated their summaries with each other. Since the questions in the online tool and the focus groups were the same and the participants' responses were similar, we did not analyze the data from the mentioned sources separately. In addition, we took into consideration that when the online tool was disseminated to the RCs, the request was to respond to this as representative of their teams, and hence the result of a more collective view, similar to a focus group. Results are presented in the themes identified in the methodology section above. It is noted that not all themes were essentially identified in each SWOT element.

Overall, the participants most often mentioned the generally well-trained and motivated experts for working with students with disabilities, adequate location of the RCs, and the support they receive from the governmental and non-governmental sectors as positive aspects of the existing RCs. Although the RC employees are trained to teach and implement individual treatment with students with disabilities, their knowledge and experience in using AT was seen as inadequate and was mentioned as the main drawback of the existing system. In addition, participants mentioned a lack of clear work procedures and protocols in special schools that also function as RCs, and the presence of numerous financing ambiguities. As a general rule, participants were much more willing to discuss weaknesses and obstacles rather than existing strengths and potential. The following subsections present in detail the main strengths, weaknesses, opportunities, and threats regarding the provision of AT by RCs in Serbia as identified by the participants themselves. The numbers in brackets indicate the number of responses (rather than participants), since some participants gave more possible answers.

Strengths

Overall, participants provided little information on the strengths of existing RCs. Little was obtained in the section

on determining the strengths of the existing RCs using SWOT analysis. Participants' answers were mostly the same, especially in focus groups, where they mainly responded to questions by mentioning weaknesses and obstacles. The moderator's attempts to steer the discussion toward identifying existing capacities and strengths were mostly ignored. There were also few answers to questions specifically related to AT, mainly because the respondents did not have enough knowledge and experience in this field.

Nevertheless, as positive elements in the work of the RC, respondents most often emphasized the diversity of the staff who have general knowledge and skills for working with children in need of support, as well as some specialized knowledge (such as sign language, the use of AT for children with visual disabilities, etc.); the high level of motivation among employees for improving their skills; extensive experience in individualizing and differentiating teaching and developing IEP; and networking practice with preschools, other schools, local government, intersectoral committees developmental counseling, etc. ($N = 63$). It is noted, however, that in one focus group, the lack of networking was mentioned as a major flaw in the work of the RC, indicating different experiences in different regions.

A smaller number of answers ($N = 50$) relates to strengths in using AT in relation to employees' positive attitudes and awareness of the need for AT; their knowledge, experience, and skills, mainly gained through seminars and personal investment; availability of AT for mainstream schools (very few responses).

The respondents had a high level of self-confidence in their skills and knowledge acquired for working in RC when it comes to global competencies such as communication skills, teamwork, and collaboration with parents and members of the intersectoral committees; knowledge of all phases of IEP development; the creation of didactic materials and knowledge of teaching methodology; and their ability to identify an individual child's strengths.

However, when asked directly about the use of AT, the participants could not identify many different strengths, which is to be expected as there is not much experience in this field. They usually emphasized the recognition of the need for AT as a strength. In far fewer cases, assessment, provision, and implementation were also mentioned as strengths. These strengths often refer only to a specific type of disability, device type, or low-tech devices.

The respondents pointed out awareness of the benefits of using AT for improving communication, reading, and writing; stimulating the general functioning of the child, improving the quality of life of AT users and their families, enabling them to live and work more independently, and raising their self-confidence; and helping mainstream school teachers with individualized work ($N = 51$).

The respondents also identified some resources as strengths. The most commonly identified resource in relation to financial support was the MoE, followed by the Ministry of Justice, as certain schools are equipped from the traffic fines funds, local self-governments in some cities, as well as other occasional funding sources such as UN donations, embassies, charitable foundations, and revenue from sold products ($N = 37$). In terms of physical resources and equipment, the RCs mentioned usually being conveniently located, having access to ramps, handrails, adapted playgrounds, lifts, sensory rooms, specialized offices, adapted keyboards, readers, magnifiers, braille machines, printers, etc. ($N = 34$). Participants also identified the presence of highly motivated staff of various profiles, experienced in working with children with disabilities, and the small number of AT experienced specialists who could train other coworkers as a resource the RCs could draw on ($N = 37$). In relation to the regulatory framework, participants noted the Rulebook on RC, namely, laws that clearly define the role of personal companions and pedagogic assistants, as well as the Strategy for the Development of Education and Upbringing in the Republic of Serbia until 2030, as another important resource ($N = 33$). Finally, the frequent meetings and communication within support teams; the cooperation with early intervention teams and other participants within the community; and the clearly defined goals and tasks of work were indicated as a resource in terms of the organization structure ($N = 38$).

"*We cooperate well with all intersectoral committees and institutions that provide additional support. Everything is easier with good cooperation, including acquiring equipment and providing space. Our strength is the innovation in the work of colleagues who provide support*" (a special educator from RC).

According to the respondents' opinion, existing strengths can be improved by: clearer division of responsibilities within the RC; wider coverage of children and students; promotion of RC's activities in the local community and at professional gatherings; connecting with other RCs, organizing joint workshops and seminars; cooperation with educational, health, and social welfare institutions; increasing the number of employees; adequate financing; clearer definition of laws; improving cooperation with mainstream schools; continuous education and specific training in the field of AT.

Weaknesses

Regarding the elements that need to be improved in the RC, respondents most often stated the following: lack of specific and modern knowledge for working with children with different conditions, as well as specific knowledge about the AT itself. They also pointed to a lack of application skills in IT, lack of clear division of tasks, the disregard of procedures, and the lack of adequate support as exemplified in the words of a special educator from an RC: "*We need to have protocols based on evidence and experiences, and clear steps and procedures on how we work. If we do not have AT*

procedures, how can we comply with the rulebook?". The focus only on providing additional support and not other RC possibilities and the ever-present issue of inadequate financial resources to meet the needs of the community and a limited budget were also mentioned.

On the other hand, employees in mainstream schools indicated that "*special education teachers understand their job in a narrower sense, that they often consider 1:1 work as the most adequate, and that they have not put their specific knowledge into supporting educators and teachers*" (a psychologist with years of experience). The knowledge and skills special education teachers lack are related to AT, such as assessing the user's (child/student) needs, defining the child's needs in the domain of AT, using AT, and implementing AT in all aspects of the child's and family's functioning. It has been emphasized that they need comprehensive training related to AT, that is, clear professional instructions and guidelines. RC employees see weaknesses in almost all examined areas, as noted by a special educator below:

"*Sometimes members of intersectoral committees lack information. We ask them to get an AT tool for a specific child and they claim that what we are looking for is not AT. Furthermore, the regulations about obtaining and lending AT are insufficient. There was a situation when expensive AT was obtained for one student who failed to adapt to it, and the parents refused to return it. How can we explain to parents that it is not their property? We lack the knowledge to assess which type of device would suit a specific clinical entity and a child's individual needs. Obtaining a device the child cannot use means we failed as professionals*" (a special educator from RC, assistant manager).

Weaknesses or barriers directly related to AT, aside from the shortcomings of AT itself and the inadequate knowledge and training of professional workers, certainly included insufficient collaboration with kindergartens/schools and members of the intersectoral committees. Respondents stated that there is insufficient interest among all relevant institutions. Furthermore, there is no expert responsible for maintaining AT (technical support). They pointed out that the negative attitudes of families and teachers toward the use of modern AT and the belief that the use of AT in education will interfere with other students' work can affect future services. RC employees often have equipment that they do not use because they do not have users who need that particular AT, some AT has become outdated, or they have AT that they do not use. Teachers in mainstream schools point out that AT is only available to students who attend schools for children with disabilities or when they are in the RC itself. Parents are not informed about how to obtain AT or how to integrate (use) it into their daily functioning.

Opportunities

There was no online response to the question about items participants see as opportunities. The main point highlighted in the focus groups was that successful inclusion can be achieved through intersectoral cooperation.

When considering the possibilities related to AT, RC employees emphasized the organization of seminars and education in which only parents of children who use additional support would be invited to become familiar with the possibilities and potential choice of AT, as well as the introduction of the obligation of an annual report and audit of the use of AT. When addressing professional training, our respondents (special educators from RC) stated that it has been insufficient so far (e.g., "*Our knowledge is limited and gained at one to two-day seminars that usually cover already available applications and means*") and that future training should be planned so that it is practical, comprehensive, and illustrative of foreign practices (e.g., "*We have limited knowledge, we all know what AT is and we can open a catalog and see the equipment, but we know nothing about assessment or further steps*," "*It would be good to hear colleagues from abroad, e.g., France or Italy, through training*," "*Training should be practical and not informative*"). Also, when discussing preferred types of training, a psychologist in a mainstream school and member of an intersectoral committee said: "*Training contents should reach all interested parties through videos, tutorials, and leaflets*."

The main possibilities identified in the area of providing AT services were: knowledge, networking, and information for all employees in the RC team, as well as mainstream schools; equipment, education, and involvement of relevant organizations, and simplification of procedures.

Additional financial possibilities that the respondents mentioned included: changing the method of financing and the amount of money available for the equipment itself. Participants indicated that both professionals and families must be informed about established and other financing methods. The physical resources they saw as possibilities were a separate part of the RC space designated only for the assessment, selection, and training for the use of AT. Additional possibilities in the area of human resources were readiness for work and changes, more involvement of employees in exchanging experiences with the local community and NGOs, as well as psychological support for parents and families whose children are RC users, but also for all RC employees due to professional burnout and the weight of the job.

The respondents saw more possibilities for support to empower all services, including AT. These include collaborations and knowledge that can be offered by peers, satisfied parents through media appearances, experienced professionals working in the RC, as well as governmental and non-governmental organizations (MoE, developmental counseling centers, UNICEF, associations and alliances of persons with disabilities or associations of parents of children and/or adults with disabilities, specialized companies and organizations that deal with the procurement and distribution of AT, as well as AT manufacturers).

When asked about what improvements could be made regarding the organizational structure and communication within the center or RCs in general, the respondents suggested the holding of annual conferences on the topic of AT; adapting capacity or services to families; a horizontal exchange—analysis of good and less good practices; the creation of a database of experts who can support coworkers from all RCs; separating service/support from the educational part of the RC; employing special education teachers in mainstream schools; regulating cooperation with user families (rights and obligations of both parties); and providing logistic support in organizing some activities (transportation, location for providing additional support/services from the RC, etc.). In terms of staff, they suggested the provision of training and introduction to all ATs that have arrived at the RC, increasing the number of team members involved, and holding periodic professional meetings of all RCs in the area on exchanging experiences and overcoming initial obstacles and uncertainties.

When asked about the changes that can positively impact the work of the RC, the RC employees mentioned positive experiences in some local communities with family-oriented early intervention programs, as well as the need to introduce similar approaches for AT and the use of these tools in working within early child education settings.

Threats

RC employees recognized obstacles in almost all areas of work. The most common responses relate to the lack of funding as respondents point to the existence of an economic crisis; the insufficient financial resources for carrying out activities; the unclear financial structure and distribution of money; the lack of clear definition of sources and methods of financing; and the poor financial position of employees. They also pointed to staff shortage mentioning insufficient staffing; inadequate staff structure as there are no staff members who deal only with RC tasks; work overload; the lack of adequate training which results in employees not having adequate knowledge and experience; and finally, the lack of adequate guidelines and protocols for work. Obstacles were also indicated in relation to equipment and space and particularly due to lack of adequate individual equipment; inadequate equipment of classrooms; and the lack of adequate space. Finally, inadequate legal regulations and communication and cooperation with teachers, educators, parents, and associations were also cited as expressed in the words of a special educator from an RC and member of an intersectoral committee:

"*Neither parents nor teachers from mainstream schools are informed about the role of RCs. Some think that we should be working individually with children, while some even believe that our role is to return them from a mainstream to a special school. Also, we, as experts, need to understand our roles and functions in RCs. When that is clear to us, we will be able to present what we do to others within the community*" (a special educator from an RC and member of an intersectoral committee).

Apart from special educators in special schools that function as RCs, employees in mainstream schools also emphasized that the role of RCs is not very clear to them as "*I am not sure what RCs should be doing, and I am well informed…the question is how others see and understand it; nothing has changed in seven years, I still have questions – who will decide which child will and which will not get AT; who will assess that; how will waiting lists be regulated*" (a psychologist in a mainstream school and member of an intersectoral committee).

On the other hand, parents saw threats in the unavailability of continuous support over time, its limitation to the elementary school period, unavailability of user services in every municipality, and complicated procedures to obtain the support they are entitled to. As put by a mother of a student with a multiple disabilities: "*The law limits providing services to a child's specific age; also, I see danger in the complex procedure of obtaining AT devices*," a parent of a girl with visual disability "*RCs could be limited to mainstream schools in the environment, and disregard schools in the region*." In addition to the mentioned obstacles, AT suppliers and manufacturers also recognized dangers in the poorly organized RCs (believing that RCs should be institutes with their organization, staff, technology, and training, serving as a model for all others), as well as rivalry between mainstream schools and RCs noting, for example, that "*RCs are more institutes than schools that treat children. RCs should analyze and pass on knowledge to those who gravitate toward them. RCs should be practical institutes with organization, staff, and technology, which will conduct training and be models for others"; RCs often consist only of teachers from some schools, and then those professionals have a double job that they cannot perform adequately.*"

Fewer responses (less than 10) related to barriers to the use of AT and pertained to the existence of prejudices, inadequate equipment; insufficient knowledge and awareness of AT and working methods among employees (e.g., assessment and use); insufficient number of employees (as well as the absence of special staff in the field of AT); inappropriate use of AT (e.g., its excessive use), as well as unnecessary hardware purchases and accumulation of rapidly outdated AT; and the absence of special regulations concerning the procurement of assistive equipment. For example, the respondents stated that the public procurement law is not applicable and that the procedures are very complicated.

Discussion

This research aimed to determine the strengths, weaknesses, opportunities, and threats in how RCs in Serbia provide AT

services to mainstream schools so that recommendations could be made for further development and improvement of RCs.

The respondents recognized human capacities (e.g., experts have different competencies, they are motivated and experienced in working with people with disabilities) as the main strengths. This finding was not unexpected since the educational institutions (nine out of 10) functioned exclusively as schools for students with disabilities before becoming RCs and, thus, employed special educators with different job profiles. In addition, the respondents pointed out their awareness of not having vast knowledge about the possibilities of AT implementation. However, they believe that AT contributes to students' functioning and, at the same time, facilitates teachers' work. Awareness of AT strengths was also recognized in other research studies conducted in Serbia.[23–25] Furthermore, parents and educators of four European countries (Belgium, Cyprus, Italy, and North Macedonia) in research conducted elsewhere agree that AT can contribute to the improvement of motor and communication skills, as well as to the educational potentials of children with disabilities and their peers.[26] A study conducted in the United Arab Emirates[27] with six mainstream school teachers recognized some additional advantages of using AT apart from saving time for teachers and students (e.g., their diversity, equal access, and accessibility). Mainstream school teachers in one American research study[28] emphasized accessibility and quick responses of colleagues specializing in disabilities as significant AT strengths (e.g., when giving advice, sharing strategies and techniques, providing support in the classroom, and organizing group workshops). These strengths were not found in our research. We can explain this by the fact that RCs are still being established in Serbia and that many teachers still do not know whom to turn to for support when using AT in working with students with disabilities.[23] Although even before the adoption of *The Rulebook on Resource Center* there were by-laws regulating the cooperation of special and mainstream schools, the practical experiences were very different. In some districts, there was almost no cooperation between mainstream and special schools. In others, the support of special educators was mainly about individual work with students. Financial compensation for cooperation with the mainstream school system also varied in different local communities. We believe that due to all of the above, the support of specialized experts was not perceived as a strength in our research.

With regard to weaknesses, the respondents from RCs pointed out the unclear funding system, inadequate regulatory framework, teachers' resistance, and lack of equipment, knowledge, and training in AT. Although two subordinate pieces of legislation have been defined in the last few years, *the Rulebook on RC*[20] and *the Rulebook on additional educational, health and social support for a child, a student and an adult*,[29] the respondents believe that those are just starting points and that it is necessary to create other documents that would clearly specify the forms of work, roles, procurement, and funding within RCs. Other Serbian research studies, where the respondents were mainstream and special school teachers, state that the main reasons for insufficient AT implementation include the lack of material resources and professionals' practical knowledge.[30,31] Similar weaknesses are also found in foreign studies.[32,33] Some recommendations for overcoming the observed weaknesses refer to providing continued professional development and college course training in AT for all teachers[34] and including the topics and courses that proved to be significant for professionals in other countries (e.g., implementation of AT, coordinating AT services, evaluating AT service delivery, integrating AT into the curriculum, and funding AT).[35] Discussing the lessons learned from the American National Assistive Technology Research Institute about the implementation of AT in schools, Bausch et al.[35] point out that countries need to develop AT policies and procedures (including AT-specific policies about IEPs) that will be a comprehensive guide for using AT. Also, countries need to ensure that these regulations are implemented adequately and that teachers are informed about all policies and procedures, that they understand them, and know how to apply them.

In addition, our research determined that school teachers and RC professionals have certain difficulties with cooperation. Thus, special educators in our sample report that their mainstream school colleagues and parents often have negative attitudes toward implementing AT. On the other hand, mainstream school teachers believe that RC special educators have a very narrow understanding of their work and that the equipment from RCs is often unavailable to their students in mainstream schools. Establishing professional team cooperation between mainstream schools and RCs is recognized in other studies as one of the inclusive education challenges.[36,37] Therefore, strengthening the collaboration between teachers, special educators, and parents is often recommended to improve inclusive practice in Serbia.[38,39] McLaren et al.[40] believe that cooperation between teachers and special educators can be improved by attending joint professional development sessions where they will discuss and exchange experiences about AT implementation. In this way, these two groups of professionals may start to speak the same language, understand their roles better, share knowledge, and eliminate the feeling of alienation between them. In addition to joint training sessions, McLaren et al.[40] also suggest planning team meetings, for example, by defining the days the meetings will take place, including early release days into monthly timetables to allow for collaborative planning time, employing substitute teachers who will take on teaching duties for one part of the day, using planners to structure team discussions, etc.

Additional opportunities are recognized in organized training. This finding is in accordance with the

recommendations from the Global Report on Assistive Technology,[41] which points out that trained professionals are the key to success and that the training should include knowledge, skills, motivation, and attitudes. Desideri et al.[42] discuss the need to exchange experiences, pointing out that providing AT services is not uniform in different European countries, that is, that there is no perfect or universal model, but that sharing experiences and good practices between countries is important. WHO[16,41] also sees international exchange as having significant potential to support national efforts in implementing AT services (e.g., in research, developing policies and practices, procurement and distribution, etc.). Our respondents also believed that better networking between RCs and other institutions would be beneficial. In addition, it is believed that informing all parties would also contribute to better RC functioning. Furthermore, Desideri et al.[43] point out that integrating various expertise and services through the partnership of all interested parties is a significant segment of efficient AT services provision.

Considering that RCs are still being established and that their way of work and funding are still insufficiently specified, it is not surprising that different groups of respondents recognized threats in all areas—staff, funding, equipment, legal regulations, and availability of support. Similar obstacles are also found in other developing countries, where the absence of systematic solutions with regard to funding, staff, and service coordination affects the accessibility and implementation of AT in the school context.[31,44,45]

Conclusions and recommendations

The results of this research can help us understand the experiences of all relevant parties within the education system of the Republic of Serbia regarding AT services and recognize the possibilities for changing and adapting the way RCs work in Serbia. The results of this analysis indicate that, although recently officially established, RCs have certain capacities for providing services prescribed by the current regulations. The biggest advantages of RCs are the competencies of employees for working with people who need support, their specific knowledge, and motivation for further development. Additionally, it is highlighted that RCs mostly have adequate space and location, as well as good organization and communication. RCs also have good communication with the Ministry of Education, school administrations, schools and preschool institutions, families, and intersectoral committees. Additional opportunities for improving RC work are seen in cooperation with non-governmental organizations and parent associations, universities, and students, developmental counseling centers (within health institutions), as well as institutions from abroad with years of experience in providing additional support services and AT services.

The results of the SWOT presented here (from the perspective of all interested parties) can help overcome identified challenges that exist in RCs in the Republic of Serbia. Some key actions that can be undertaken to improve the current AT system might be relatively simple and can be implemented quickly, such as raising public awareness about RC services, conducting training, and organizing mentoring support that would improve the provision of all RC services, including AT services, and creating a network linking between all participants within the local community who provide or receive RC services. Other actions might be more long-term and structural and may require more planning and investment as, for example, the definition of legal regulations regarding the work and funding of RCs; and the provision of funds for the procurement of adequate equipment for all RCs, as well as for the costs of its maintenance.

Since the research reported in this paper is part of a more comprehensive project, the results have been used as a basis for planning and implementing the following steps: (1) creating the Capacity building framework that includes a thorough overview of the competencies RC staff members would need to develop in order to improve AT provision services; (2) developing basic and advanced training for RC staff members so that they could improve their knowledge about the basic principles of inclusive education and AT and become independent in providing AT service and support; (3) creating the Mentoring framework to improve the competencies of RC staff members and their networking; (4) developing training for members of intersectoral committees to improve their abilities to recognize an opportunity or need to provide an AT solution to a child/student who needs support and/or use other RC services; and (5) developing protocols and procedures to guide RCs' member staff along the AT service delivery process (i.e., instructing stakeholders on how access the service, assessing the student's needs and selecting the most adequate AT, providing the selected AT, and reporting the outcomes of the AT provided).

Taking all the mentioned steps will improve the process of transforming special schools into RCs, inclusive education, integrating AT into the school context, and collaboration between special educators and teachers.

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Supplemental Material

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