

## Stavovi, motivacija i kompetencije defektologa za upotrebu asistivne tehnologije

ANJA GAJIĆ<sup>1</sup>, BOJANA ARSIĆ<sup>2\*</sup>, ANA LUKIĆ<sup>3</sup>

<sup>1</sup> Univerzitet u Beogradu – Fakultet za specijalnu edukaciju i rehabilitaciju, Visokog Stevana 2, Beograd, Srbija, e-mail: [anjuskagajic@gmail.com](mailto:anjuskagajic@gmail.com)

<sup>2</sup> Univerzitet u Beogradu – Fakultet za specijalnu edukaciju i rehabilitaciju, Visokog Stevana 2, Beograd, Srbija, e-mail: [bojana.arsic57@gmail.com](mailto:bojana.arsic57@gmail.com)

<sup>3</sup> Univerzitet u Beogradu – Fakultet za specijalnu edukaciju i rehabilitaciju, Visokog Stevana 2, Beograd, Srbija, e-mail: [lukic0512@gmail.com](mailto:lukic0512@gmail.com)

\* Kontakt autor: [bojana.arsic57@gmail.com](mailto:bojana.arsic57@gmail.com)

**Sažetak** Osobe s intelektualnom ometenošću (IO) ispoljavaju teškoće u svim domenama svakodnevnog funkcioniranja i kao način savladavanja nekih od tih deficita može se koristiti asistivna tehnologija (AT). Cilj ovog rada je napraviti pregled istraživanja provedenih u cilju ispitivanja stavova i motivacije defektologa prema upotrebi AT, kao i onih usmjerenih na ispitivanje stupnja kompetentnosti defektologa u primjeni AT. Pregled dostupne literature izvršen je korištenjem pretraživača *Google Scholar*, *Scopus*, *Web of Science* i *ProQuest*, a u pregledni dio rada uključivani su oni radovi koji su preglednog i istraživačkog karaktera, koji su uzorkom obuhvatili defektologe, kao i nastavnike koji rade s osobama s IO, a koji su objavljeni u posljednjih deset godina. Defektolozi su motivirani da primjenjuju AT u nastavi, imaju pozitivne stavove prema njezinoj upotrebi, međutim i da nemaju u dovoljnoj mjeri razvijene kompetencije za korištenje AT. Od velikog je značaja provoditi obuke usmjerene na povećanje kompetencija defektologa u području AT-a, jer se na taj način posljedično mogu poboljšati njihovi stavovi i motivacija prema daljnjoj upotrebi.

**Ključne riječi:** 1. Asistivna tehnologija; 2. Defektolozi; 3. stavovi; 4. motivacija; 5. kompetencije

# Attitudes, motivation, and competencies of special education teachers for using assistive technology

ANJA GAJIĆ<sup>1</sup>, BOJANA ARSIĆ<sup>2\*</sup>, ANA LUKIĆ<sup>3</sup>

<sup>1</sup> University of Belgrade – Faculty for special education and rehabilitation, Visokog Stevana 2, Belgrade, Serbia, e-mail: [anjuskagajic@gmail.com](mailto:anjuskagajic@gmail.com)

<sup>2</sup> University of Belgrade – Faculty for special education and rehabilitation, Visokog Stevana 2, Belgrade, Serbia, e-mail: [bojana.arsic57@gmail.com](mailto:bojana.arsic57@gmail.com)

<sup>3</sup> University of Belgrade – Faculty for special education and rehabilitation, Visokog Stevana 2, Belgrade, Serbia, e-mail: [lukic0512@gmail.com](mailto:lukic0512@gmail.com)

\* CORRESPONDENCE: [BOJANA.ARSIC57@GMAIL.COM](mailto:BOJANA.ARSIC57@GMAIL.COM)

**Abstract** People with intellectual disabilities (ID) experience difficulties in all domains of daily functioning, and assistive technology (AT) can be used as a way to overcome some of these deficits. The objective of this paper is to review the research conducted to examine the attitudes and motivation of special education teachers towards the use of AT, as well as those aimed at examining the level of competence of special education teachers in the application of AT. A review of the available literature was conducted using the *Google Scholar*, *Scopus*, *Web of Science*, and *ProQuest* search engines, and the review included those articles that are of a review and research nature, which sampled special education teachers, as well as teachers who work with people with ID, and which were published in the last ten years. Special education teachers are motivated to use AT in teaching, and they have positive attitudes toward its use, however, they do not have sufficiently developed competencies for using AT. Due to all of the above, it is of great importance to conduct training aimed at increasing the competencies of special education teachers in the field of AT, because in this way their attitudes and motivation towards further use can be improved.

**Keywords:** 1. Assistive technology; 2. Special education teachers; 3. attitudes; 4. motivation; 5. competencies

## 1 Introduction

People with intellectual disability (ID) show difficulties in all domains of daily functioning (Cooper et al., 2015; Fletcher et al., 2018) and assistive technology (AT) can be used as a way to overcome some of these deficits (MacLachlan et al., 2018). AT refers to any technological system or device that, through its use, enables the improvement of the functional ability of persons with ID and consequently leads to the improvement of their quality of life (Stanković, 2015; Zapf et al., 2016).

AT can be in the form of a device specifically intended for people with ID. Still, it can also be an application or a device that is used by people in the typical population, and people with ID can use that (Aronson, 2014) to reduce or eliminate some deficits (Mechling, 2007).

The application of AT enables the compensation of functional limitations and improves the ability to learn, or mobility (Maćešić-Petrović and Đurić-Zdravković, 2009; Vuković, 2010). Apart from the above, the application of AT by people with ID can result in improvement in many skills (Lancioni & Singh, 2014; Sze, 2009), such as communication (Caligari et al., 2013; Rispoli et al., 2010) and socialization (Carver et al., 2016; Faucett et al., 2017; Owuor et al., 2017). In addition, people with ID can use AT to increase daily independence (Bennett et al., 2018; Stephenson & Limbrick, 2015), spatial orientation (Morash-Macneil et al., 2018; Sorgini et al., 2018) or independent preparation of meals (Pinard et al., 2021), as well as to increase work productivity (Collins & Collet-Klingenberg, 2018) or better spending of free time and recreation (Lersilp et al., 2018; Zilz & Pang, 2021).

It is of great importance to know special education teachers' attitudes towards the use of AT in teaching (Ahmed, 2018) because people with ID are taught by them (Kirby, 2017; Zigmond & Kloof, 2017). Research shows that the attitudes of special education teachers, as well as the degree to which they apply AT in their daily work with people with ID, are influenced by the level of competence in the application of certain types of AT (Nordström et al., 2018; Zapf et al., 2016). Apart from the insufficiently developed competencies of special education teachers on the application of certain types of AT in teaching, the lack of frequency of application of AT in teaching by special education teachers is also influenced by their motivation to increase their competence in that area, which is manifested through their intrinsic motivation for various technological achievements (Nordstrom et al., 2018; Sharma & Srivastava, 2020).

This review paper aimed to make an overview of research carried out to examine the attitudes of special education teachers towards the use of AT in teaching, then research that examined the degree of competence of special education teachers in the application of AT, as well as an overview of research that studied the motivation of special education teachers to use AT.

## 2 Methodology

A review of the available literature was performed using *Google Scholar*, *Scopus*, *Web of Science*, and *ProQuest* search engines. The search was performed using keywords that are crossed with each other, and which refer to the following words and phrases: assistive technology, technology, special education teachers, attitudes, competencies, and motivation. The review part included those articles that are of a review and research nature, whose sample included special education teachers, as well as teachers who work with people with ID, and which were published in the last ten years (2013-2023).

## 3 Literature review

### 3.1 *Attitudes of special education teachers towards the use of assistive technology in teaching*

Attitude implies a mental state of readiness of the organism, which is based on the individual's experience, and which has a direct and dynamic influence on the individual's relations with all the objects and situations he encounters (Nakić, 2014). Attitude is a relatively permanent and stable organization of positive or negative emotions, evaluations, and reactions towards an object, group of people, or situations, and as such an attitude towards a phenomenon determines what behavior an individual will have and it affects the behavior of the individual (Jonjić, 2017).

Research shows that special education teachers have very positive attitudes (Atanga et al., 2020; Onivehu et al., 2017; Siyam, 2019) or moderately positive attitudes towards the application of AT in teaching and working with children with ID, but also that they do not use AT sufficiently (Ahmed, 2018; Arulsamy & Murugaiyan, 2013).

In the research (Alanazi, 2019) in which 424 special education teachers participated, it was found that the most positive attitudes about the application of AT in teaching children with ID have those special education teachers who teach in primary schools, than those with more years of work experience, as well as those with a higher degree of education. Findings related to education were also found in the results of the research conducted in our region. Milojević (2020) in his research comes to the data that the most important predictor of positive attitudes towards the use of AT in teaching is the education degree. Special education teachers can work in the Republic of Serbia after they finish their bachelor's degree in special education. However, they can also finish a master's degree, which is something the majority does. Also, special education teachers have more positive attitudes towards the use of AT in working with children with ID than regular teachers (Milojević, 2020).

Some of the significant predictors of the positive attitudes of special education teachers toward the use of AT in teaching are a greater degree of knowledge about different types of AT, as well as ways of using them in teaching (Alkahtani, 2013; Yeşilyurt et al., 2016), then the self-efficacy of special education teachers and the degree of digital literacy (Yeşilyurt et al., 2016). In addition to the above, the perceived ease of use of a certain device, the complexity of a certain AT device, as well as the perception of special education teachers about the usefulness of a certain device with the population of children they work with stand out as significant predictors (Teo et al., 2016).

However, some studies did not find a connection between the positive attitudes of special education teachers about the use of AT in working with children with ID concerning the gender of the special education teacher, years of working, the type of disability of the population of children they work with, as well as the age of the children they work with (Onivehu et al., 2017; Song et al., 2019).

### *3.2 Competencies of special education teachers in the application of assistive technology*

Competence includes a set of behaviors, knowledge, and attitudes that reflect on the adequate performance of work, and the achievement of work goals (Hercigonja, 2018).

A large number of foreign studies indicate that special education teachers have insufficiently developed competencies in the field of application of different types of AT (Alkahtani, 2013; Atanga et al., 2020; Onivehu et al., 2017). However, domestic research shows that special education teachers consider themselves competent in the application of AT in teaching and working with people with ID (Arsenić et al., 2022; Daničić, 2021; Jankelin and Slavković,

2020), even though that is not sometimes true due to the rapid development of AT.

Research (Gustafson, 2006; Lahm & Niekels, 1999) that directly assessed the competence of special education teachers on the application of AT in teaching indicates that they have a low level of competence in the application of various types of AT and that over 90% of special education teachers believe that it is necessary to increase them (Alsolami, 2022). Such findings may indicate that special education teachers from our region do not adequately assess the degree of development of their competencies in the application of AT.

The fact that the implementation of interventions aimed at increasing the knowledge of special education teachers on the application of AT in working with people with ID leads to a real increase in competence is also evidenced by research in which the authors conducted training in special education teachers on the application of different types of AT in working with children with ID. The results showed that the implementation of the training led to an increase in competencies, and consequently to an improvement in the attitudes of special education teachers about the application of AT in teaching (Khalil & Hantira, 2022).

The biggest predictor of a higher degree of competence was the frequent use of AT in working with people with ID and the younger calendar age of the special education teachers (Jones et al., 2019; Svensson et al., 2021). Adopting new technologies and devices may be more difficult for older special education teachers, as they have not had the same exposure to technology throughout their lives (Arslan-Ari & Başer, 2022). Research shows that with appropriate training and support, special education teachers with less AT experience can develop their skills and use AT in classrooms (Arslan-Ari & Başer, 2022). Gender and years of service did not prove to be predictors of competence in the application of AT (Arsenić et al., 2022; Daničić, 2021).

In the research of domestic authors, in which the sample consisted of three groups of respondents who work with children with ID, i.e. classroom teachers, subject teachers, and special education teachers of different profiles, it was found that special education teachers consider themselves more competent than subject education teachers and classroom teachers for the application of AT (Arsenić et al., 2022; Daničić, 2021). Such findings may be the result of greater information and knowledge acquired during undergraduate studies, which relate to the characteristics of persons with ID, as well as types of AT.

### *3.3 The motivation of special education teachers for the use of assistive technology*

Motivation is defined as the desire and energy that moves people to achieve a certain goal (Han & Yin, 2016). Teacher motivation is an area that is continuously receiving attention in research. In his study, Boru (Börü, 2018) points out the existence of intrinsic and extrinsic factors that can influence teacher motivation. Intrinsically, they refer to personal characteristics, desires, and independence in work, while external ones refer to the educational system in which they work. When talking about the motivation of special education teachers, they point out that they are most motivated in their work by the creativity they can show when teaching, as well as the subsequent achievements of students, however, as external factors that negatively affect motivation, they point out low pay, a slow and limited promotion process, as well as a lack of financial resources for materials that would be used to support students (Yasmeen et al., 2019).

Special education teachers point out that they find the application of AT interesting not only for themselves but also for the people with ID with whom they work (Alper & Goggin, 2017). In addition, seeing the benefits that AT brings in the context of the progress of children with ID leads to an increase in the motivation for further use of AT among special education teachers (Ahmed, 2018; Nepo, 2017). Such data are in agreement with previous research that showed that special education teachers have a high degree of motivation to apply AT (Nam et al., 2013; Nordström et al., 2018).

The predictors of a higher degree of motivation of special education teachers to use AT are the length of time needed to master the use of AT devices (Siyam, 2019), the perception of special education teachers about the usefulness of AT devices in working with students with ID (Adebisi et al., 2015; Meiland et al., 2017), but also access to an AT device in a school or institution where special education teachers are employed (Okongo et al., 2015; Siyan, 2019).

However, one of the most prominent predictors of a high degree of motivation of special education teachers for the use of AT was the younger calendar age of persons with ID with whom special education teachers work (Schwartz et al., 2021). Seeing the progress in the development of various skills of children with ID, special education teachers develop motivation for further work (Coldwell, 2017; Lindeblad et al., 2017; Wehmeyer et al., 2017), however, the enthusiasm that any form of AT can alleviate ID deficits decreases with the increase in the calendar age of persons with ID. If special education teachers see the results of their work and the positive effects that the use of AT has on people with ID, as well as the consequent improvement of their quality of life and the

development of new skills (Stanković, 2015; Zapf et al., 2016), they will be more motivated to use AT in the future.

## 4 Discussion

A review of the literature found that special education teachers generally have positive attitudes toward the use of AT in teaching (Atanga et al., 2020; Onivehu et al., 2017; Siyam, 2019), and the most significant predictors of positive attitudes are the degree of special education teachers' knowledge of how to use them in teaching, the ease of using a certain device (Alkahtani, 2013; Teo et al., 2016; Yeşilyurt et al., 2016), while the results are not consistent when it comes to the type of school where special education teachers work, gender, years of work experience, as well as personal characteristics of the children they work with (Alanazi, 2019; Onivehu et al., 2017; Milojević, 2020; Song et al., 2019).

When it comes to the competence of special education teachers in the application of various AT devices in working with children with ID, research from the literature review indicates that special education teachers have insufficiently developed competencies in the area of application of various types of AT (Alkahtani, 2013; Alsolami, 2022; Atanga et al., 2020; Gustafson, 2006; Khalil & Hantira, 2022; Lahm & Niekels, 1999; Onivehu et al., 2017). The biggest predictors of a higher degree of competence were the frequent use of AT in working with people with ID and the younger calendar age of the special education teacher (Arslan-Ari & Başer, 2022; Jones et al., 2019; Svensson et al., 2021), while gender and years of work experience did not show as predictors of competence in the application of AT (Arsenić et al., 2022; Daničić, 2021).

A review of the literature found that special education teachers have a high degree of motivation to implement AT (Nam et al., 2013; Nordström et al., 2018). The degree of motivation positively correlates with the perception of special education teachers about the usefulness of a particular device (Adebisi et al., 2015; Meiland et al., 2017), accessibility of AT devices, and ease of use (Okongo et al., 2015; Siyan, 2019), while it negatively correlates with by the calendar age of the population of people with ID with whom they work (Coldwell, 2017; Lindeblad et al., 2017; Schwartz et al., 2021; Stanković, 2015; Zapf et al., 2016; Wehmeyer et al., 2017).



## 5 Conclusion

Based on the literature review, we can conclude that special education teachers are motivated to apply AT in teaching, and have positive attitudes toward its use, however, they do not have sufficiently developed competencies for using AT.

Special education teachers who have more positive attitudes towards the use of AT in teaching have a higher degree of motivation to use AT (Brodwin et al., 2007; Cabero-Almenara et al., 2022; Orr, 2011). Also, special education teachers who have more positive attitudes towards the use of AT in teaching believe that they have more competence in the area of application of AT (Al-Dababneh & Al-Zboon, 2022; Wilson, 2014).

The existence of a positive attitude towards a phenomenon also implies a greater degree of motivation to apply it in everyday life and work (An, 2018). Due to all of the above, it is important to point out that after the implementation of trainings that have a direct effect on increasing the competencies of special education teachers in the field of application of AT, the attitudes towards its use can improve, but also increase the motivation of special education teachers to use it daily in teaching with people with ID (Aldehami, 2022; Khalil & Hantira, 2022).

## Conflict of interest statement

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## References

- Adebisi, R. O., Liman, N. A., & Longpoe, P. K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice*, 6(24), 14-20.
- Ahmed, A. (2018). Perceptions of using assistive technology for students with disabilities in the classroom. *International Journal of Special Education*, 33(1), 129-139.
- Al-Dababneh, K. A., & Al-Zboon, E. K. (2022). Using assistive technologies in the curriculum of children with specific learning disabilities served in inclusion settings: teachers' beliefs and professionalism. *Disability and Rehabilitation: Assistive Technology*, 17(1), 23-33. <https://doi.org/10.1080/17483107.2020.1752824>
- Alanazi, A. S. (2019). *General and special education teachers' attitudes toward using assistive technology in classrooms for students with autism spectrum disorder in Saudi Arabia* (Doctoral dissertation). Concordia University, Chicago.

- Aldehami, S. (2022). Saudi Arabia Special Education Teachers' Attitudes toward Assistive Technology Use for Students with Intellectual Disability. *Contemporary Educational Technology*, 14(2), 353-365.
- Alkahtani, K. D. (2013). Teachers' knowledge and use of assistive technology for students with special educational needs. *Journal of Studies in Education*, 3(2), 65-86. <https://doi.org/10.5296/jse.v3i2.3424>
- Alper, M., & Goggin, G. (2017). Digital technology and rights in the lives of children with disabilities. *New Media & Society*, 19(5), 726-740. <https://doi.org/10.1177/1461444816686323>
- Alsolami, A. S. (2022). Teachers of Special Education and Assistive Technology: Teachers' Perceptions of Knowledge, Competencies and Professional Development. *SAGE Open*, 12(1), 215-238. <https://doi.org/10.1177/21582440221079900>
- An, Y. (2018). The effects of an online professional development course on teachers' perceptions, attitudes, self-efficacy, and behavioral intentions regarding digital game-based learning. *Educational Technology Research and Development*, 66(6), 1505-1527. <https://doi.org/10.1007/s11423-018-9620-z>
- Aronson, S. L., (2014). Best practices and assistive technology tools for students with learning disabilities used in the business education classroom. *Curriculum and Instruction Undergraduate Honors Theses*, 1(5), 1- 20.
- Arsenić, I., Jovanović-Simić, N., & Daničić, Z. (2022). Primena asistivne tehnologije za komunikaciju u edukaciji učenika sa smetnjama u razvoju-samoprocena nastavnog osoblja. *Nastava i vaspitanje*, 71(2), 267-282. <https://doi.org/10.5937/nasvas2202267A>
- Arslan-Ari, I. & Başer, D. (2022). Assistive technology training within an educational technology course: Perceptions of Preservice Special Education Teachers. *Journal of Digital Learning in Teacher Education*, 39(1), 4–20. <https://doi.org/10.1080/21532974.2022.2137606>.
- Arulsamy, S., & Murugaiyan, A. (2013). Attitude of student teachers towards integration of assistive technology in inclusive classrooms. *International Journal of Teacher Educational Research*, 2. <http://dx.doi.org/10.24193/adn.10.4.3>
- Atanga, C., Jones, B. A., Krueger, L. E., & Lu, S. (2020). Teachers of students with learning disabilities: Assistive technology knowledge, perceptions, interests, and barriers. *Journal of Special Education Technology*, 35(4), 236-248. <https://doi.org/10.1177/0162643419864858>
- Bennett, C. L., Brady, E., & Branham, S. M. (2018, October). Interdependence as a frame for assistive technology research and design. In *Proceedings of the 20th international acm sigaccess conference on computers and accessibility* (pp. 161-173). <https://doi.org/10.1145/3234695.3236348>
- Börü, N. (2018). The Factors Affecting Teacher- Motivation. *International Journal of Instruction*, 11(4), 761-776. <http://hdl.handle.net/20.500.11787/2319>
- Brodwin, M. G., Star, T., & Cardoso, E. (2007). *Users of assistive technology: The human component*. The psychological and social impact of illness and disability, pp. 505-519. Springer Publishing.
- Cabero-Almenara, J., Guillén-Gámez, F. D., Ruiz-Palmero, J., & Palacios-Rodríguez, A. (2022). Teachers' digital competence to assist students with functional diversity: Identification of factors through logistic regression methods. *British Journal of Educational Technology*, 53(1), 41-57. <https://doi.org/10.1111/bjet.13151>
- Caligari, M., Godi, M., Guglielmetti, S., Franchignoni, F., & Nardone, A. (2013). Eye tracking communication devices in amyotrophic lateral sclerosis: impact on disability and quality

- of life. *Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration*, 14(7-8), 546-552. <https://doi.org/10.3109/21678421.2013.803576>
- Carver, J., Ganus, A., Ivey, J. M., Plummer, T., & Eubank, A. (2016). The impact of mobility assistive technology devices on participation for individuals with disabilities. *Disability and Rehabilitation: Assistive Technology*, 11(6), 468-477. <https://doi.org/10.3109/17483107.2015.1027295>
- Coldwell, M. (2017). Exploring the influence of professional development on teacher careers: A path model approach. *Teaching and Teacher Education*, 61(1), 189-198. <https://doi.org/10.1016/j.tate.2016.10.015>
- Collins, J. C., & Collet-Klingenberg, L. (2018). Portable electronic assistive technology to improve vocational task completion in young adults with an intellectual disability: A review of the literature. *Journal of Intellectual Disabilities*, 22(3), 213-232. <https://doi.org/10.1177/1744629516689336>
- Cooper, S. A., McLean, G., Guthrie, B., McConnachie, A., Mercer, S., Sullivan, F., & Morrison, J. (2015). Multiple physical and mental health comorbidity in adults with intellectual disabilities: population-based cross-sectional analysis. *BMC Family Practice*, 16(1), 1-11. <https://doi.org/10.1186/s12875-015-0329-3>
- Daničić, Z. (2021). *Kompetentnost učitelja, nastavnika i defektologa za upotrebu asistivne tehnologije kod učenika sa smetnjama u razvoju* (master rad). Univerzitet u Beogradu, Fakultet za specijalnu edukaciju i rehabilitaciju.
- Faucett, H. A., Ringland, K. E., Cullen, A. L., & Hayes, G. R. (2017). (In) visibility in disability and assistive technology. *ACM Transactions on Accessible Computing (TACCESS)*, 10(4), 1-17. <https://doi.org/10.1145/3132040>
- Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2018). *Learning disabilities: From identification to intervention*. Guilford Publications.
- Gustafson, G. S. (2006). *The assistive technology skills, knowledge, and professional development needs of special educators in southwestern Virginia* (Doctoral dissertation). Virginia Polytechnic Institute and State University.
- Han, J., & Yin, H. (2016). Teacher motivation: Definition, research development and implications for teachers. *Cogent Education*, 3(1) <https://doi.org/10.1080/2331186X.2016.1217819>
- Hercigonja, Z. (2018). Kompetencije nastavnika i učenika u postizanju optimalnoga obrazovanja. *Zbornik radova Međimurskog veleučilišta u Čakovcu*, 9(1), 22-30. <https://doi.org/10.5937/norma2102149K>
- Jankelin, I., & Slavković, S. (2020). Stručne kompetencije zaposlenih radnika u programima okupacione terapije u ustanovama socijalne zaštite. *Pedagoška stvarnost*, 66(2), 191-200. <https://doi.org/10.19090/ps.2020.2.191-200>
- Jones, B. A., Rudinger, B., Williams, N., & Witcher, S. (2019). Training pre-service general educators in assistive technology competencies for students with visual impairments. *British Journal of Visual Impairment*, 37(1), 29-39. <https://doi.org/1177/0264619618814066>
- Jonjić, V. (2017). *Stavovi i stereotipi* (Doktorska disertacija). University of Split. Faculty of Maritime Studies. Department of maritime systems and processes.
- Khalil, A. I., & Hantira, N. Y. (2022). Special education teachers' knowledge and attitudes toward the use of assistive technology for disabled children management: impact of an educational intervention. *Creative Education*, 13(3), 821-845. <https://doi.org/10.4236/ce.2022.133054>
- Kirby, M. (2017). Implicit assumptions in special education policy: Promoting full inclusion for students with learning disabilities. In *Child & Youth Care Forum* (Vol. 46, pp. 175-191). Springer US.

- Lahm, E. A., & Niekels, B. L. (1999). Assistive technology competencies for special educators. *Teaching Exceptional Children*, 32(1), 56-63. <https://doi.org/10.1177/004005999903200108>
- Lancioni, G. E., & Singh, N. N. (Eds.). (2014). *Assistive technologies for people with diverse abilities*. Springer Science & Business Media. <https://doi.org/10.1007/978-1-4899-8029-8>
- Lersilp, S., Putthinoi, S., & Lersilp, T. (2018). Facilitators and barriers of assistive technology and learning environment for children with special needs. *Occupational Therapy International*, 1(1), 1-10. <https://doi.org/10.1155/2018/3705946>
- Lindeblad, E., Nilsson, S., Gustafson, S., & Svensson, I. (2017). Assistive technology as reading interventions for children with reading impairments with a one-year follow-up. *Disability and Rehabilitation: Assistive Technology*, 12(7), 713-724. <https://doi.org/10.1080/17483107.2016.1253116>
- Maćešić-Petrović, D., & Đurić-Zdravković, A. (2009). Računari i deca sa smetnjama intelektualnog razvoja. *Beogradska defektološka škola*, 1(1), 173-178.
- MacLachlan, M., Banes, D., Bell, D., Borg, J., Donnelly, B., Fembek, M., & Hooks, H. (2018). Assistive technology policy: a position paper from the first global research, innovation, and education on assistive technology (GREAT) summit. *Disability and Rehabilitation: Assistive Technology*, 13(5), 454-466. <https://doi.org/10.1080/17483107.2018.1468496>
- Mechling, L. C. (2007). Assistive Technology as a Self-Management Tool for Prompting Students with Intellectual Disabilities to Initiate and Complete Daily Tasks: A Literature Review. *Education and Training in Developmental Disabilities*, 42(3), 252-269. <http://www.jstor.org/stable/23879621>
- Meiland, F., Innes, A., Mountain, G., Robinson, L., van der Roest, H., García-Casal, J. A., Gove, D., Thyrian, J. R., Evans, S., Dröes, R. M., Kelly, F., Kurz, A., Casey, D., Szcześniak, D., Denning, T., Craven, M. P., Span, M., Felzmann, H., Tsolaki, M., & Franco-Martin, M. (2017). Technologies to Support Community-Dwelling Persons With Dementia: A Position Paper on Issues Regarding Development, Usability, Effectiveness and Cost-Effectiveness, Deployment, and Ethics. *JMIR Rehabilitation and Assistive Technologies*, 4(1), 1-12. <https://doi.org/10.2196/rehab.6376>
- Milojević, J. (2020). *Kompetencije nastavnika u primeni asistivne tehnologije* (Master's thesis). Univerzitet u Beogradu, Fakultet za specijalnu edukaciju i rehabilitaciju.
- Morash-Macneil, V., Johnson, F., & Ryan, J. B. (2018). A systematic review of assistive technology for individuals with intellectual disability in the workplace. *Journal of Special Education Technology*, 33(1), 15-26. <https://doi.org/10.1177/0162643417729166>
- Nakić, S. (2014). Područja primjene stavova potrošača. *Praktični menadžment: stručni časopis za teoriju i praksu menadžmenta*, 5(1), 14-21.
- Nam, C. S., Bahn, S., & Lee, R. (2013). Acceptance of assistive technology by special education teachers: A structural equation model approach. *International Journal of Human-Computer Interaction*, 29(5), 365-377. <https://doi.org/10.1080/10447318.2012.711990>
- Nepo, K. (2017). The use of technology to improve education. In *Child & youth care forum* (Vol. 46, pp. 207-221). Springer US.
- Nordström, T., Nilsson, S., Gustafson, S., & Svensson, I. (2018). Assistive technology applications for students with reading difficulties: special education teachers' experiences and perceptions. *Disability and Rehabilitation: Assistive Technology*, 14(8), 798-808. <https://doi.org/10.1080/17483107.2018.1499142>
- Okongo, R. B., Ngao, G., Rop, N. K., & Wesonga, J. N. (2015). *Effect of availability of teaching and learning resources on the implementation of inclusive education in pre-school centers in Nyamira North Sub-County*. Nyamira County, Kenya.

- Onivehu, A. O., Ohawuiro, O. E., & Oyeniran, B. J. (2017). Teachers' Attitude and Competence in the Use of Assistive Technologies in Special Needs Schools. *Acta Didactica Napocensia*, 10(4), 21-32. <https://doi.org/10.24193/adn.10.4.3>
- Orr, L. B. (2011). *Counseling in a technical world: Student counselors' technical skills, motivation, and self-efficacy*. Capella University.
- Owuor, J., Larkan, F., & MacLachlan, M. (2017). Leaving no-one behind: using assistive technology to enhance community living for people with intellectual disability. *Disability and Rehabilitation: Assistive Technology*, 12(5), 426-428. <https://doi.org/10.1080/17483107.2017.1312572>
- Pinard, S., Bottari, C., Laliberté, C., Pigot, H., Olivares, M., Couture, M., ... & Bier, N. (2021). Design and usability evaluation of COOK, an assistive technology for meal preparation for persons with severe TBI. *Disability and Rehabilitation: Assistive Technology*, 16(7), 687-701. <https://doi.org/10.1080/17483107.2019.1696898>
- Rispoli, M. J., Franco, J. H., van der Meer, L., Lang, R., & Camargo, S. P. H. (2010). The use of speech generating devices in communication interventions for individuals with developmental disabilities: A review of the literature. *Developmental Neurorehabilitation*, 13(4), 276-293. <https://doi.org/10.3109/17518421003636794>
- Schwartz, A. E., Hopkins, B. G., & Stiefel, L. (2021). The effects of special education on the academic performance of students with learning disabilities. *Journal of Policy Analysis and Management*, 40(2), 480-520. <https://doi.org/10.1002/pam.22282>
- Sharma, L., & Srivastava, M. (2020). Teachers' motivation to adopt technology in higher education. *Journal of Applied Research in Higher Education*, 12(4), 673-692. <https://doi.org/10.1108/JARHE-07-2018-0156>
- Siyam, N. (2019). Factors impacting special education teachers' acceptance and actual use of technology. *Education and Information Technologies*, 24(3), 2035-2057. <https://doi.org/10.1007/s10639-018-09859-y>
- Song, J., Sharma, U., & Choi, H. (2019). Impact of teacher education on pre-service regular school teachers' attitudes, intentions, concerns and self-efficacy about inclusive education in South Korea. *Teaching and Teacher Education*, 86(1), 102901. <https://doi.org/10.1016/j.tate.2019.102901>
- Sorgini, F., Calìo, R., Carrozza, M. C., & Oddo, C. M. (2018). Haptic-assistive technologies for audition and vision sensory disabilities. *Disability and Rehabilitation: Assistive Technology*, 13(4), 394-421. <https://doi.org/10.1080/17483107.2017.1385100>
- Stanković, Ž. (2015). *Primena informaciono-komunikacionih i asistivnih tehnologija za podršku učenicima u inkluzivnom obrazovanju*. Fakultet tehničkih nauka, Čačak.
- Stephenson, J., & Limbrick, L. (2015). A review of the use of touch-screen mobile devices by people with developmental disabilities. *Journal of Autism and Developmental Disorders*, 45(1), 3777-3791. <https://doi.org/10.1007/s10803-013-1878-8>
- Svensson, I., Nordström, T., Lindeblad, E., Gustafson, S., Björn, M., Sand, C., & Nilsson, S. (2021). Effects of assistive technology for students with reading and writing disabilities. *Disability and Rehabilitation: Assistive Technology*, 16(2), 196-208. <https://doi.org/10.1080/17483107.2019.1646821>
- Sze, S. (2009). The effects of assistive technology on students with disabilities. *Journal of Educational Technology Systems*, 37(4), 419-429. <https://doi.org/10.2190/ET.37.4.f>
- Teo, T., Milutinović, V., & Zhou, M. (2016). Modeling Serbian pre-service teachers' attitudes towards computer use: A SEM and MIMIC approach. *Computers & Education*, 94(1), 77-88. <https://doi.org/10.1016/j.compedu.2015.10.022>
- Vuković, D. (2010). Obrazovanje za sve-primene standard UN i EN u obrazovanju učenika sa smetnjama u razvoju i invaliditetom u sistemu Republike Srbije. *Tehnika*, 67(5), 847-858.

- Wehmeyer, M. L., Shogren, K. A., Toste, J. R., & Mahal, S. (2017). Self-determined learning to motivate struggling learners in reading and writing. *Intervention in School and Clinic*, 52(5), 295-303. <https://doi.org/10.1177/1053451216676800>
- Wilson, N. (2014). *Implementation of assistive technologies in classrooms: a shift in attitudes*. University of Victoria (masters degree). Preuzeto sa: <http://hdl.handle.net/1828/5326>
- Yasmeen, Z., Mushtaq, I., & Murad, M. (2019). Intrinsic and Extrinsic Motivation of Teachers in Special Education Secondary School: A Qualitative Study. *Journal of Educational Research*, 22(2), 15. <https://www.proquest.com/scholarly-journals/intrinsic-extrinsic-motivation-teachers-special/docview/2354065543/se-2>
- Yeşilyurt, E., Ulaş, A. H., & Akan, D. (2016). Teacher self-efficacy, academic self-efficacy, and computer self-efficacy as predictors of attitude toward applying computer-supported education. *Computers in Human Behavior*, 64(1), 591-601. <https://doi.org/10.1016/j.chb.2016.07.038>
- Zapf, S. A., Scherer, M. J., Baxter, M. F., & H. Rintala, D. (2016). Validating a measure to assess factors that affect assistive technology use by students with disabilities in elementary and secondary education. *Disability and Rehabilitation: Assistive Technology*, 11(1), 38-49. <https://doi.org/10.3109/17483107.2015.1104559>
- Zigmond, N. P., & Kloo, A. (2017). General and special education are (and should be) different. In: *Handbook of special education* (pp. 249-261). Routledge.
- Zilz, W., & Pang, Y. (2021). Application of assistive technology in inclusive classrooms. *Disability and Rehabilitation: Assistive Technology*, 16(7), 684-686. <https://doi.org/10.1080/17483107.2019.1695963>