THE INFLUENCE OF BRAILLE LITERACY PROGRAMME LENGTH ON FREQUENCY OF BRAILLE USAGE

[1]VLATKA PENAVA, [1]ANTE BILIĆ PRCIĆ, [2]LIDIJA ILIČIĆ

[1]Faculty of Education and Rehabilitation Sciences, University of Zagreb, Croatia. Contact: vlatka.penava@erf.hr

[2]Kindergarten "Rijeka", Rijeka, Croatia

Received: 30.5.2017.
Accepted: 18.10.2017.

Original scientific paper
UDK: 003.24

Abstract: *A noticeable decline in braille usage, as well as in braille literacy in general, has been present in many countries since the 1980s. Although in Croatia there is no current formal data on braille literacy, organisations of blind people and professionals who work with visually impaired people confirm such decline in this country as well. Numerous studies state that there are various possible causes for such a negative trend. Use of residual vision, additional disabilities, technological development, lack of experts' competencies, and an itinerant service model are just some of the possible reasons.*

The aim of this research is to establish whether the length of a braille literacy programme affects the usage of braille in the areas of educational activities, leisure time activities, daily living activities, and organisation and management activities. For the purpose of this research, conducted in 2016, an extensive questionnaire about usage of braille in those areas was created. The sample consisted of nineteen (N=19) braille-literate visually impaired high school students who were, at the time, attending public and residential schools in Croatia. The collected data were analysed using the quantitative methodology: robust discriminative analysis and univariate analysis of variance.

The results show that there was a statistically significant difference among the groups of students who attended braille literacy programme fewer than 6 months, between 6 and 12 months, and over 12 months in every tested area. The best results in all areas were shown by students with the longest period of time in a braille literacy programme. Braille-literate visually impaired adolescents in Croatia use braille mostly for educational purpose (academic literacy), while functional literacy remains problematic since they rarely use braille in those activities (daily living, leisure time, organisation and management).

Key words: *Braille literacy programme, braille usage*

INTRODUCTION

Nowadays it is unimaginable to be both illiterate and able to fully participate in society and everyday life. Although there is no universal agreement on what literacy is, its importance is immense and many would agree with the statement that "literacy is at the heart of world development and human rights" (Mayor, 1999, p. xiii). The benefits of literacy are numerous and fundamental for the progress of humankind in every aspect – social, cultural, political, economic. Hence, the importance of literacy and literate society has been stated through many international documents and recognised as a right (UNESCO, 2005). Literacy skills are fundamental to informed decision-making, personal empowerment, active and passive participation in the local and global social community (Stromquist, 2005) - and therefore an irreplaceable means to achieving one's full life potential. For a long period of time, written language was – due to the lack of the third dimension – unavailable to blind people. Thanks to Louis Braille's invention of the six-dot tactile system in the 19th century, blind persons finally became able to read and write independently. Braille is the vehicle of literacy for the blind – it is the primary medium that enables blind children to continuously grow in literacy (Rex et al., 1994), excel in school and enter adulthood with a competitive advantage in employment and in life (Koenig and Holbrook, 2000) and, in that way, increase their potential for independence through employment, creativity, and other forms of success (Wormsley & D'Andrea, 1997).

However, a decline in braille usage is evident from the 1980's (DeMario, Lang & Lian,

1998; Schroeder, 1996; Spungin, 1996). The percentage of blind people using braille varies depending on the country, but it is evident that the total number of braille-literate visually impaired people is rather small - usually around 10% - and the number of those who actively use braille is even smaller (American Foundation for the Blind, 1996; American Printing House for the Blind, 1995 in Schroeder, 1996; Dimitrova-Radojichikj & Smilkovska, 2013; Keil, 2012 in Roe et al., 2014).

In Croatia we do not have current data on braille usage, but a survey conducted in 2001 by the Croatian Braille Board and Croatian Blind Union should be mentioned. Thirteen local blind unions participated in the research and reported that out of 3889 of their members, only approximately 30% (N=1162) were literate in braille. Even though that percentage seems higher than in other countries that report a decline in braille usage, it should be noted that only 258 of them were actively using braille, which is less than 7% of the total sample (Croatian Blind Union). In spite of the fact that these data are not current, it shows the negative trend in braille usage in Croatia as well.

A decrease in braille usage is a recognised issue, but there is no apparent consensus on the reasons for this decline (Bell, Ewell & Mino, 2013). There are various possible reasons for it. The emphasis on using residual vision, combined with technology development that enables easier and cost-effective access to enlarged print, have led a great number of visually impaired persons to use print as their primary literacy medium (Spungin, 1996). For blind people, development of assistive technology has been very helpful because it enables them to "more easily use computers to communicate, to access information, and to produce written and multimedia materials" (D'Andrea, 2012, p. 586), but at the same time the use of audio output in many technological devices has also pushed braille aside. However, it should be noted that reading by touch, even if it is slower than visual reading, restores some of the informational redundancy that is lost (Millar, 1997) and also enables a tactual reader to (re) read at his or her own pace, to pause and reflect on what was read, and to make his or her own interpretation of the read material. Technological advances may have had an impact on reduced braille usage, but they have also led to quicker, easier and less expensive braille printing, thereby making braille printed materials more widespread and accessible to many blind people (D'Andrea & Siu, 2015).

An increasing number of children and adults with multiple disabilities, who are not able to read braille due to their limited cognitive, motor or perceptual abilities, is also one of the reasons why braille usage is in decline (Rex, 1989). However, an appropriate approach and teaching methodology can be helpful in some of those cases. Wormsley (1997) suggests a functional approach, later renamed to *Individualized Meaning-Centered Approach to Braille Literacy Education* (Wormsley, 2016), which takes into consideration a learner's individual likes (and dislikes), specific needs, and individual goals.

Teachers of students with visual impairment play an important role in students' acquisition of braille literacy skills. Their professional competencies, as well as their attitudes toward braille, may have a great impact on the braille usage of their learners (Amato, 2002; Amato, 2009; DeMario, Lang, & Lian, 1998; Mullen, 1990; Ponchilla & Durant, 1995; Rex, 1989; Schroeder, 1989; Stephens, 1989; Wittenstein, 1994; Wittenstein & Pardee, 1996). Although they are usually confident in their skills when it comes to literary braille (Wittenstein & Pardee, 1996), they often admit to lack of knowledge in Nemeth code (DeMario, Lang, & Lian, 1998; Hung, 2008). Also, teachers of visually impaired students usually receive very little training in reading instructions (Kamei-Hannan & Ricci, 2015). This importance of pre-service programmes that put emphasis on the methodology of teaching braille reading was confirmed in Wittenstein's research, since he found that such programmes affect the teachers' feeling of competence "in their own braille skills and in their ability to impart their knowledge to youngsters who are blind or visually impaired" (Wittenstein & Perdee, 1996). Gilson (2014) points out that certified blindness professionals who have not provided braille instruction for several years might need a brush-up training to refresh their skills.

AIM OF THE STUDY AND HYPOTHESES

The purpose of this study was to establish how often visually impaired adolescents in Croatia use braille in certain activities and whether the length of a braille literacy programme affects the usage of braille in academic and functional literacy. Since we have no recent data on braille usage in Croatia, this research was aimed at obtaining that information. Based on that aim, we made four hypotheses:

H1: As a result of a braille literacy programme's length, there is a difference among adolescents in their braille usage **during educational activities**.

H2: As a result of a braille literacy programme's length, there is a difference among adolescents in their braille usage **during leisure time activities.**

H3: As a result of a braille literacy programme's length, there is a difference among adolescents in their braille usage **in daily living activities**.

H4: As a result of a braille literacy programme's length, there is a difference among adolescents in their braille usage **in organisation and management activities.**

METHOD

Participants

The sample consisted of nineteen (N=19) (10 male and 9 female) visually impaired students in secondary education, with a mean age of 17.6 years (ranging from 15 to 19 years). All of them were, at the time of the research, attending residential or public schools in Croatia. For most students (58%), the onset of visual impairment occurred between the ages of 0 and 5. According to the Croatian classification of visual impairments, 95% (N=18) of the students in our sample were blind, while only 1 participant had low vision. Almost half of the participants (N=9; 47.4%) had additional disabilities (such as hearing impairment, cerebral palsy and asthma).

All participants were literate in braille. More than half of them (52.6%) learned braille at the Centre for Education and Rehabilitation *Vinko Bek*, between the age of 6 and 9 (78.9%). Braille instruction was mainly (89.5%) provided by an educational rehabilitator (Croatian equivalent of a teacher of visually impaired students [TVI]), but in most cases for only 1 hour per week (57.9%). For 21% of the participants, their braille literacy programme lasted between 0 and 6 months, for 47.4% between 6 and 12 months, and for 31.6% of them the programme duration was over 12 months.

Instrument

A three-part questionnaire was designed specifically for the purposes of this study. The first part contained 10 questions related to socio-demographic data, the second part consisted of 5 questions related to the braille literacy programme, and the last part contained 9 questions about braille usage. All questions in every part of the questionnaire were multiple-choice, except for the question about the usage of braille in various activities, which was a scale containing 35 variables related to braille usage in various activities, divided into 4 groups (educational activities, leisure time activities, daily living activities, and organisation and management activities). Possible answers ranged on a scale from 1 (very rare braille usage) to 5 (always), or 0 (no usage at all).

Data analysis

The programme STATISTICA 7 was used for calculating basic statistical parameters (mean, standard deviations, minimum and maximum, distribution normality) and the Programme for Robust Discriminant Analysis (ROBDIS) (Nikolić, 1991) was used for performing the discriminant analysis and univariate analysis of variance (ANOVA). Due to the small sample, we used robust discriminant analysis in order to resolve the problem of connection between the items in the questionnaire and the criterion variable. ANOVA was used to determine which variables will affect differences in results between criterion variables.

RESULTS AND DISCUSSION

To see whether or not braille was used in certain activities, we calculated the frequencies of braille usage in every activity of each area (Table 1). After

Table 1. *Frequencies of using braille in educational activities, leisure time activities, daily living activities, and organisation and management activities (N=19)*

ACTIVITY	Never	Very rarely	Rarely	Occasionally	Often	Always
EDUCATIONAL ACTIVITIES						
Reading books (for book reports)	26.3%	5.3%	21.1%	26.3%	10.5%	10.5%
Writing homework	10.5%	0%	5.3%	15.8%	26.3%	42.1%
Tests	5.3%	0%	5.3%	10.5%	21.1%	**57.9%**
Reading written materials in class	10.5%	5.3%	10.5%	26.3%	10.5%	36.8%
Reading written materials at home	31.6%	0%	5.3%	42.1%	0%	21.1%
Writing papers	47.4%	0%	0%	26.3%	10.5%	15.8%
Writing notes during the class	21.1%	5.3%	10.5%	0%	10.5%	**52.6%**
Using braille in science class	5.3%	0%	0%	0%	10.5%	**84.2%**
Searching the Internet for educational purposes	**68.4%**	10.5%	0%	15.8%	0%	5.3%
LEISURE TIME ACTIVITIES						
Reading books (for pleasure)	**52.6%**	5.3%	5.3%	15.8%	15.8%	5.3%
Writing diaries	47.4%	21.1%	0%	5.3%	15.8%	10.5%
Playing an instrument	47.4%	10.5%	0%	0%	5.3%	**36.8%**
Using the Internet	**78.9%**	10.5%	10.5%	0%	0%	0%
Playing board games	47.4%	15.8%	21.1%	5.3%	0%	10.5%
Taking care of pets	**84.2%**	15.8%	0%	0%	0%	0%
Correspondence with family and friends	**84.2%**	15.8%	0%	0%	0%	0%
DAILY LIVING ACTIVITIES						
Labelling and using personal hygiene products	**84.2%**	10.5%	0%	0%	0%	5.3%
Measuring temperature	**84.2%**	15.8%	0%	0%	0%	0%
Measuring blood pressure	**84.2%**	15.8%	0%	0%	0%	0%
Taking medicine (pills)	31.6%	10.5%	0%	15.8%	0%	**42.1%**
Clothes organization and sorting	**84.2%**	10.5%	0%	0%	0%	5.3%
Using the kitchen appliances	**84.2%**	10.5%	0%	5.3%	0%	0%
Using the cleaning products	**84.2%**	10.5%	0%	5.3%	0%	0%
Waste sorting	**84.2%**	10.5%	0%	5.3%	0%	0%
Labelling food and groceries	**84.2%**	10.5%	0%	5.3%	0%	0%
Reading and writing recipes	**63.2%**	15.8%	5,3%	10.5%	5.3%	0%
ORGANISATION AND MANAGEMENT ACTIVITIES						
Financial management	**84.2%**	15.8%	0%	0%	0%	0%
Shopping list	**63.2%**	21.1%	0%	5.3%	10.5%	0%
Writing down important information	47.4%	10.5%	5.3%	10.5%	21.1%	5.3%
Labelling and sorting documents	**68.4%**	21.1%	0%	5.3%	0%	5.3%
Official correspondence	**52.6%**	21.1%	5.3%	15.8%	5.3%	0%

that, in order to test the differences among the three groups of participants (group 1 – braille literacy programme length of 0-6 months, group 2 – braille literacy programme length of 6-12 months, and group 3 – braille literacy programme length of more than 12 months), we used the robust discrimination analysis model and tested each hypothesis individually.

The frequency of braille usage in educational activities, leisure time activities, daily living activities, and organisation and management activities is shown in Table 1. It can be seen that students generally use braille for educational purposes, mostly in science classes and for taking tests. That can be explained by the fact that for both science classes and tests, it is necessary to retain a great amount of information in working memory, especially for tasks and problems that contain many numerical expressions. Therefore, it is important to have the data written so one can go back and verify what one has read. In other activities, such as reading books or searching the Internet for educational purpos-

es, it is quite possible that students rely mostly on audio formats because of the greater speed.

The results of the frequency of braille usage in leisure time activities show that more than half of the participants never or (very) rarely use braille in their leisure time activities. Some of them (36.8%) always use Braille for playing an instrument. As in science, it is difficult in music to replace written information (such as musical notes) with an alternative format, so braille is irreplaceable in those situations. The fact that fewer than half of participants (42.1%) regularly use Braille in that activity can be explained by the fact that not all of them play an instrument in their spare time.

A very high frequency of answers "never" and "very rarely" in the area of daily living activities indicate that students do not use braille in activities involving personal hygiene and health, meal preparation, or cleaning. The exception is the activity of taking medicine (pills), which is probably the result of the fact that in Croatia medicine packages have braille written on them. A possible explanation for such low braille usage in daily living activities is that visually impaired students at this age do not participate in some housekeeping activities (such as using cleaning products) or even in cooking, which would be facilitated by labelling some food and groceries, as well as kitchen appliances. Similar results were obtained in the activities of organisation and management. Presumably, blind adolescents do not engage in such activities because a large number of our participants were minors and still lived with their parents.

Educational activities

In Table 2 the results of robust discriminant analysis are shown. It can be seen that two discriminant functions were extracted, and that both of them were statistically significant since p<5%. Discriminant value for the first discriminant function was 1.85, and for the second was 1.06. Variables OBR06 (0.77) and OBR07 (0.48) were responsible for creating the first discriminant function, while OBR09 (0.57), OBR02 (0.49) and OBR05 (0.40) were responsible for creating the second discriminant function.

In Table 3 we can see the ANOVA results. A statistically significant difference was found for the variables OBR06 (writing papers), OBR07 (writing notes during class), OBR08 (using braille in science classes) and OBR09 (searching the Internet for educational purposes). The best results in the activity of writing papers were achieved by the participants of the third group, and in the activity of writing notes during class by the second group. For the variable OBR09 (searching the Internet for educational purposes), participants of the second group had the worst results. The most surprising result was obtained on the variable OBR08 (using braille in science classes), where the third group of participants had the worst results, while the other two groups showed similar results. This somewhat

Table 2. *Results of robust discriminant analysis*

Discriminant function	Lambda	Mean			Standard deviation			F	p
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3		
1	1.8465	-1.29	0.07	0.41	0.57	1.20	1.15	5.92	0.012
2	1.0587	0.02	-1.00	0.24	0.35	0.83	0.68	5.26	0.017

$\bar{x}_1$; $\Sigma_{1=}$ 0-6 months
$\bar{x}_2$; Σ_{2} = 6-12 months
$\bar{x}_3$; Σ_{3} = over12 months

Table 3. *Results of ANOVA*

Variable	Mean			Standard deviation			F	p	F1	p1
	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3				
OBR06	-1.00	0.00	0.33	0.00	0.71	1.01	9.83	0.000	0.00	1.000
OBR07	-0.63	0.33	0.13	0.90	0.68	1.01	3.77	0.008	2.20	0.349
OBR08	0.32	0.32	-0.19	0.00	0.00	1.22	10.17	0.000	0.00	1.000
OBR09	0.11	-0.58	0.11	0.84	0.00	1.12	5.82	0.001	0.00	1.000

illogical finding could be explained in the context of other factors such as the type of secondary school (which may affect the number of classes related to mathematics and science in general), educational setting (residential or public school), and the provider of braille instruction (certified instructor or para-educator).

Leisure time activities

The results of robust discriminant analysis are shown in Table 4. Two discriminant functions were extracted and both of them were statistically significant since p<5%. Discriminant value for the first discriminant function was 2.24, and for the second was 0.85. The structure of discriminant functions showed that variables SLO01 (0.59) and SLO05 (-0.42) were responsible for creating the first discriminant function, while the variables SLO05 (0.59), SLO6 (0.46) and SLO07 (0.46) were responsible for creating the second discriminant function.

ANOVA results are shown in Table 5. On only one variable (SLO02 Writing diaries) was a statistically significant difference found, and the best results on that variable were achieved by the third group of participants. This might be an indicator that those with the longest exposure to a braille programme tend to transfer their braille skills at least to some activities that are not directly tied to education.

Daily living activities

In Table 6 the results of robust discriminant analysis are shown. It can be seen that two discriminant functions were extracted, but only the first one was statistically significant since its p was less than 5% - it was only 0.1%, while for the second one p was 9.8% and therefore not statistically significant. Discriminant value for the first discriminant function was 2.80, and for the second one was 0.31. Variables SVA02 (0.39) and SVA03 (0.39) were responsible for creating the first discriminant function. The variable SVA10 (0.96) was mostly responsible for creating the second discriminant function, while all the others contributed approximately equally since their discriminant coefficients were -0.10, -0.09, -0.08 and 0.08.

The results of ANOVA (shown in Table 7) indicate that statistically significant differences were found for six out of 10 variables: SVA01 (labelling and using personal hygiene products), SVA05 (clothing organisation and sorting), SVA06 (using kitchen appliances), SVA07 (using cleaning products), SVA08 (waste sorting) and SVA09 (labelling food and groceries). The best results on all those activities were achieved by the participants who spent most time in a braille literacy programme (over 12 months). This leads us to the conclusion that longer exposure to braille instruction enables students to transfer their braille literacy skills to some everyday activities, which surely facilitates

Table 4. *Results of the robust discriminant analysis*

Discriminant function	Lambda	Mean			Standard deviation			F	p
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3		
1	2.2369	-0.09	-1.44	0.39	0.61	0.85	1.15	8.20	0.004
2	0.8495	-0.88	0.12	0.26	0.80	0.65	0.90	5.28	0.017

Table 5. *Results of ANOVA*

Variables	Mean			Standard deviation			F	p	F1	p1
	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3				
SLO02	-0.15	-0.28	0.12	0.87	0.75	1.07	2.89	0.026	2.01	0.374

Table 6. *Results of the robust discriminant analysis*

Discriminant function	Lambda	Mean			Standard deviation			F	p
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3		
1	2.8047	-1.19	-0.99	0.64	0.05	0.29	3.26	10.74	0.001
2	0.3109	-0.35	0.43	0.01	0.10	1.11	1.01	2.68	0.098

Table 7. *Results of ANOVA*

Variable	Mean			Standard deviation			F	p	F1	p1
	X1	X2	X3	Σ_1	Σ_2	Σ_3				
SVA01	-0.32	-0.32	0.19	0,00	0,00	1.22	10.17	0.000	0.00	1.000
SVA05	-0.32	-0.32	0.19	0,00	0,00	1.22	10.17	0.000	0.00	1.000
SVA06	-0.37	-0.37	0.22	0,00	0,00	1.21	10.52	0.000	0.00	1.000
SVA07	-0.37	-0.37	0.22	0,00	0,00	1.21	10.52	0.000	0.00	1.000
SVA08	-0.37	-0.37	0.22	0,00	0,00	1.21	10.52	0.000	0.00	1.000
SVA09	-0.37	-0.37	0.22	0,00	0,00	1.21	10.52	0.000	0.00	1.000

Table 8. *Results of the robust discriminant analysis*

Discriminant function	Lambda	Mean			Standard deviation			F	P
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$	Σ_1	Σ_2	Σ_3		
1	2.5565	-1.05	-1.04	0.61	0.36	0.19	1.36	16.68	0.000
2	1.4300	-0.82	0.87	0.06	0.14	1.98	1.02	0.35	0.717

their daily routine. Usually, when a braille literacy programme lasts over 12 months, it is not focused only on mastering (basic) reading and writing skills, but it also includes many instructions and opportunities for functional application of literacy skills.

Organisation and management activities

The results of the robust discriminant analysis (Table 8) show that, again, two discriminant functions were extracted, but only the first one with a value of p=0.0% was statistically significant, while the other one was not since its p was above the 5% level (71.7%). Discriminant value for the first discriminant function was 2.56, and for the second one was 1.43. The structure of discriminant functions showed that variables ORG05 (0.52), ORG02 (0.45) and ORG01 (0.41) were responsible for creating the first discriminant function, and variables ORG04 (0.94) and ORG03 (0.27) mostly contributed to creating the second discriminant function.

The results of ANOVA indicate that there was no statistically significant difference for any of the six variables in the area of organisation and management activities. This might be explained by the fact that blind adolescents in Croatia do not engage in activities such as financial management, labelling and sorting documents, official correspondence, or creating shopping lists simply because most of them still live with their parents or in a residential school where most of these tasks are performed by adult caregivers, or at least supervised by them.

CONCLUSION

A literate society is a progressive society. Wagner (1999) says that a minimum literacy rate is a prerequisite for economic growth in developing countries, while Ryles (1996) and Bell & Mino (2013) found in their research a higher employment rate among those who were literate in braille. Hence, acquiring literacy skills and applying them not only to educational purposes but to everyday living activities – functional literacy – will beyond doubt lead to a better quality of life. In spite of the widespread use of various technology devices that rely on audio output, braille remains the only method of true literacy for blind people. Therefore, it is essential that every blind child receives adequate braille instruction that will enable him or her to be independent, to fully participate in society and to achieve his or her full life potential.

Based on the data analysis, we can conclude that braille-literate visually impaired adolescents in Croatia use braille mostly for educational purpose (academic literacy), while functional literacy remains problematic since they rarely use braille in those activities (daily living, leisure time, organisation and management). This leads us to conclude that adolescents mainly use braille in educational settings because they "must", according to their individualized education plan (IEP). These find-

ings should be a sign to practitioners to aim their instructional methods at helping individuals transfer their literacy skills from educational settings to everyday activities because attaining functional literacy is also a part of conventional literacy programmes (Koenig & Holbrook, 1995).

We can say that there is a statistically significant difference among the groups of students who attended a braille literacy programme fewer than 6 months, between 6 and 12 months, and over 12 months in every tested area, and therefore we accept all four hypotheses. The best results in all areas, in general, were shown by students who spent the longest period of time in a braille literacy programme (more than 12 months). However, this finding should be interpreted with some caution since there are some variables in which the best results were achieved by the other two groups of participants, who spent less time in a braille literacy programme. The reason for this most likely lies in the fact that other factors (such as the frequency of a programme's implementation, competencies of professionals and teachers, and usage of new technologies) might have affected the final result. Although there is no consensus on how long a braille literacy programme should last, it usually takes one year to master basic reading and writing skills. At the same time, Rex et al. (1994) point out that students in braille literacy programmes should receive at least 1.5 to 2 hours of literacy instruction each day.

This research also has some limitations due to small sample and the fact that the questionnaire was based on self-assessment, so generalisations should be made carefully. Future research on this topic should include adult visually impaired persons to get a full insight into braille usage in Croatia and its focus should be on reasons for decline in braille usage, as well as on suggestions of visually impaired people and professionals on how to increase braille usage.

REFERENCES

Amato, S. (2002). Standards for Competence in Braille Literacy Skills in Teacher Preparation Programs. Journal of Visual Impairment & Blindness, 96 (3), 143-153

Amato, S. (2009). Louis Braille Celebration: Challenges and Solutions in Teaching Braille in an Online-Education Model. Journal of Visual Impairment & Blindness, 103(2), 78-80.

American Foundation for the Blind (1996). Estimated Number of Adult Braille Readers in the United States. Journal of Visual Impairment and Blindness, vol. 90, no. 3

Bell, E. C., Ewell, J. V., & Mino, N. M. (2013). National Reading Media Assessment for Youth with Visual Impairments. Journal of Blindness Innovation and Research, 3(2).

Bell, E.C., & Mino, N. (2013). Blind and visually impaired adult rehabilitation and employment survey: Final results. Journal of Blindness Innovation & Research 3(1)

Croatian Blind Union. Rezultati ankete HOB 2001 o stanju upotrebe brajice, http://www.savez-slijepih.hr/hr/kategorija/rezultati-ankete-hob-2001-stanju-upotrebe-brajice-73/

D'Andrea, F. M. (2012). Preferences and practices among students who read braille and use assistive technology. Journal of Visual Impairment & Blindness, 106(10)

D'Andrea, F.M., & Siu, Y.T. (2015). Students with Visual Impairments: Considerations and Effective Practices for Technology Use, in Dave L. Edyburn (ed.) Efficacy of Assistive Technology Interventions (Advances in Special Education Technology, Volume 1) Emerald Group Publishing Limited, pp.111 - 138

DeMario, N. C., Lang, S., & Lian, M. J. (1998). Teachers' self-assessed competence and attitudes toward literary braille and the nemeth code. Journal of Visual Impairment & Blindness, 92, 5

Dimitrova-Radojichik, D., & Smilkovska D. (2013). Using of the Braille alphabet in the Republic of Macedonia. Journal of the International Phonetic Association

Gilson, C. (2014). Braille Training for Blindness Professionals at the Hadley School for the Blind. Journal of Visual Impairment & Blindness, Nov/Dec2014, 108 (6)

Hung, H. (2008). Teachers' perspectives about Braille literacy in Taiwan. Dissertation. The Ohio State University.

Johnson, L. (1996). The braille literacy crisis for children. Journal of Visual Impairment & Blindness, 90, 276-278.

Kamei-Hannan, C., & Ricci, L. A. (2015). Reading Connections: Strategies for Teaching Students with Visual Impairments. New York: AFB Press.

Koenig A., & Holbrook M. (1995). Learning Media Assessment of Students with Visual Impairments. A Resource Guide for Teachers. Texas School for the Blind and Visually Imapaired

Koenig A., & Holbrook M. (2000). Foundations of Education: Instructional strategies for teaching children and youths with visual impairments, Volume II. New York: AFB Press

Mayor, F. (1999). Foreword. In: Wagner, D. A., Venezky, R. L., Street, B. V. (Ed.) Literacy. An International Handbook. Unites States of America and United Kingdom: Westview press

Millar, S. (1997). Reading by Touch. London, New York, Routledge

Mullen, E. A. (1990). Decreased braille literacy: A symptom of a system in need of reassessment. RE:view, 22, 164-168.

Nikolić, B. (1991). Neki modeli za rješavanje problema planiranja i kontrole transformacijskih procesa u primjeni kompjutora kod osoba s teškoćama socijalne integracije, Defektologija, 28,1,129-139

Ponchillia, P.E., & Durant, P.A. (1995). Teaching Behaviors and Attitudes of Braille Instructors in Adult Rehabilitation Centers. Journal of Visual Impairment and Blindness, Part 1 of 2, 89, 5

Rex, E.J. (1989). Issues related to literacy of legally blind learners. Journal of Visual Impairment and Blindness, 83, 306-313

Rex E. J., Koenig A. J., Wormsley D. P., & Baker R. L. (1994). Foundations of Braille Literacy. New York: AFB Press.

Roe, J., Rogers, S., Donaldson, M., Gordon, C., & Meager, N. (2014). Teaching Literacy through Braille in Mainstream Settings whilst Promoting Inclusion: Reflections on Our Practice. International Journal of Disability, Development and Education, v61 n2 p165-177

Ryles, R. (1996). The Impact of Braille Reading Skills on Employment, Income, Education, and Reading Habits. Journal of Visual Impairment and Blindness, 90 (3), 219-226.

Schroeder, F. K. (1989). Literacy: The key to opportunity. Journal of Visual Impairment and Blindness, 83, 290-293

Schroeder, F. K. (1996). Perceptions of Braille Usage by Legally Blind Adults. Journal of Visual Impairment & Blindness, v90 n3 p210-18

Spuning, S. J. (1996). Braille and Beyond: Braille literacy in a larger context. Journal of Visual Impairment and Blindness, 90 (3), 271-274.

Stephens, 0. (1989). Braille-Implications for living. Journal of Visual Impairment and Blindness, 83, 288-289

Stromquist, N. P. (2005). The political benefits of adult literacy. Background paper for EFA Global Monitoring Report 2006

UNESCO (2005). Education for All, literacy for life, United Nations Educational. Scientific and Cultural Organization (UNESCO), France

Wittenstein, S. H. (1994). Braille literacy: Preservice Training and Teachers' Attitudes. Journal of Visual Impairment and Blindness, 88 (6), 516-524.

Wittenstein, S. H., Pardee, & M. L. (1996). Teachers' Voices: Comments on Braille and Literacy From the Field. Journal of Visual Impairment and Blindness, Part 1 of 2, 90, 3.

Wagner, D. A. (1999). Rationales, Debates, and New Directions: An Introduction. In: Wagner, D. A., Venezky, R. L., Street, B. V. (Ed.) Literacy. An International Handbook. Unites States of America and United Kingdom: Westview press

Wormsley, D. (2004). Braille Literacy: A Functional Approach. New York, AFB Press

Wormsley, D. (2016). I-M-ABLE: Individualized Meaning-Centered Approach to Braille Literacy Education. New York, AFB Press.

Wormsley, D., & D'Andrea, M. (1997). Instructional Strategies for Braille Literacy. New York, AFB Press.

UTJECAJ DULJINE TRAJANJA PROGRAMA OPISMENJAVANJA NA BRAILLEOVOM PISMU NA UČESTALOST KORIŠTENJA BRAILLEOVOG PISMA

Sažetak: *Značajno smanjenje korištenja Brailleovog pisma te slabljenje pismenosti na Brailleovom pismu općenito, zapaža se u mnogim zemljama još od 80-ih godina prošlog stoljeća. Iako u Hrvatskoj nemamo novijih službenih podataka o pismenosti na Brailleovom pismu, organizacije slijepih osoba te stručnjaci koji s njima rade potvrđuju takav trend i u našoj zemlji. Brojna istraživanja navode različita objašnjenja tog trenda: korištenje rezidualnog vida, dodatne teškoće, razvoj tehnologije, nedostatne kompetencije stručnjaka te integracija učenika oštećena vida u redovni sustav obrazovanja.*

Cilj je ovog istraživanja utvrditi utječe li duljina trajanja programa opismenjavanja na Brailleovom pismu na korištenje Brailleovog pisma u edukacijskim aktivnostima, aktivnostima slobodnog vremena, svakodnevnim aktivnostima te u aktivnostima organizacije i upravljanja. U svrhu ovog istraživanja, provedenog 2016. godine, konstruiran je opsežan upitnik o korištenju Brailleovog pisma u navedenim područjima. Uzorak se sastojao od devetnaest (N=19) srednjoškolaca oštećena vida koji su u to vrijeme polazili srednju školu u redovnim ili posebnim uvjetima u Hrvatskoj. Svi učenici bili su opismenjeni na Brailleovom pismu. U obradi podataka korištena je kvantitativna metodologija: robusna diskriminacijska analiza te univarijatna analiza varijance.

Rezultati pokazuju da postoji statistički značajna razlika u svim testiranim područjima između grupa ispitanika koji su program opismenjavanja na Brailleovom pismu polazili manje od 6 mjeseci, između 6 i 12 mjeseci, te više od 12 mjeseci. Najbolje rezultate u svim područjima postigli su učenici koji su u program bili uključeni najduže vrijeme. Brailleovo pismo najčešće koriste u edukacijskim aktivnostima, a znatno rjeđe u aktivnostima slobodnog vremena, svakodnevnim aktivnostima te u aktivnostima organizacije i upravljanja.

Ključne riječi: *program opismenjavanja na Brailleovom pismu, korištenje Brailleovog pisma*