

Research area: Special education

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Use of technology and applications in orientation and mobility of visually impaired persons in Bulgaria



INTRODUCTION

In 1948 Lowenfeld wrote that visual loss is associated with 3 main limitations:

1. In the control of the environment and the self in relation to it;
2. In the ability to get about;
3. In the range and variety of concepts.

Pick (1987) states that orientation is "knowing where objects are in relation to each other and in relation to ourselves".

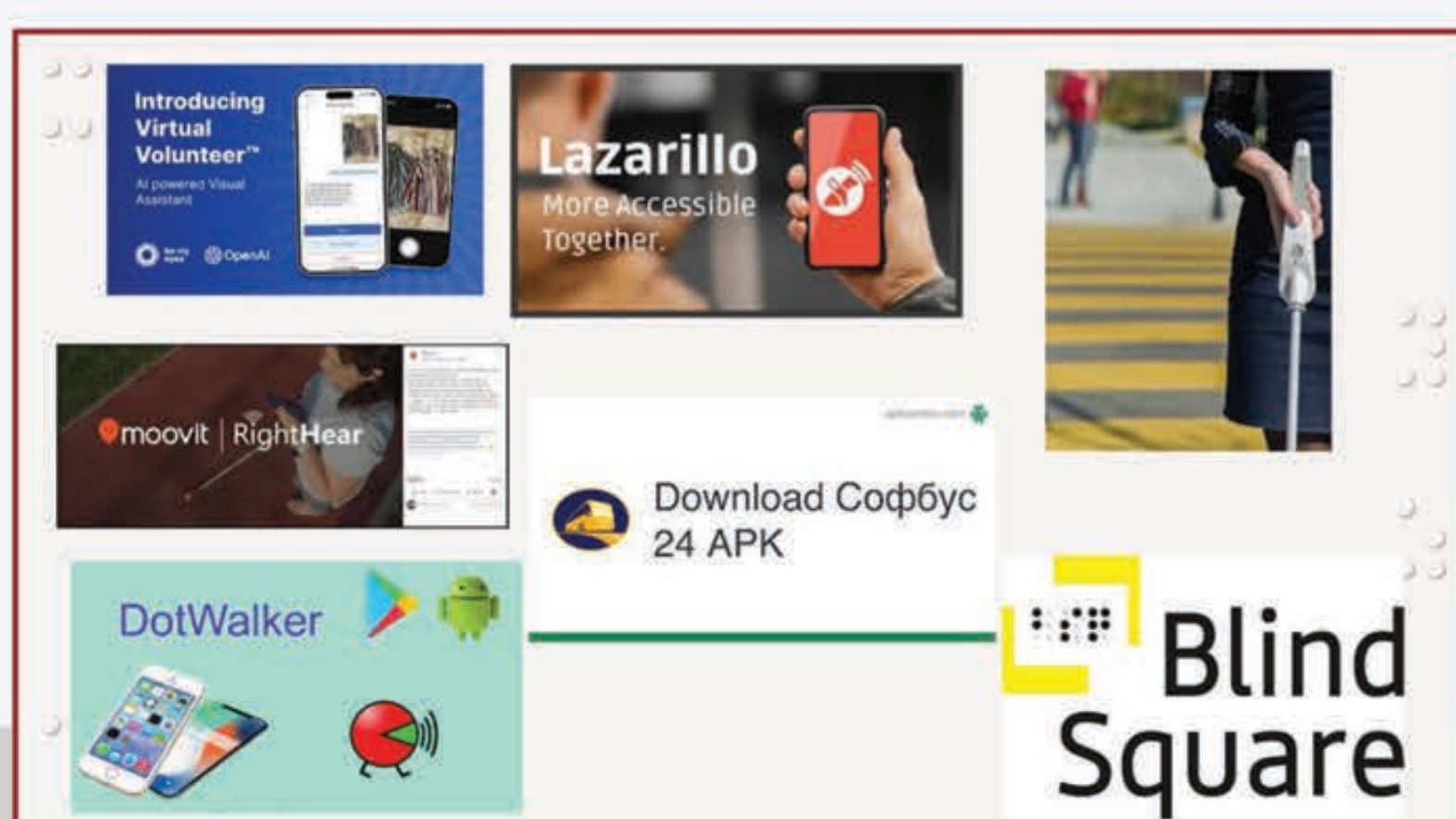
Mobility is "the capacity or facility of movement" (Hill & Ponder, 1976).

In time Orientation and Mobility became a key area of the education and the rehabilitation of the visually impaired individuals of all ages.

Along with the classical teaching of the techniques of the sighted guide, of the white cane and of moving alone, the Orientation and Mobility includes recently the implementation of new modern devices and applications (Smith & Penrod, 2010).

STATE OF THE ART

- After the electronic travel aids (ETA), such as laser canes, Sonicguide etc., many applications were developed to be used on smartphones, iPads and other portable smart devices to support the Orientation and Mobility (O&M) of the Visually Impaired.
- A recent study of Bahtiyar & Can (2021) found a total of 2241 studies in selected database about technological solutions for O&M purposes.
 - **WeWalk cane** is a smart cane that can detect obstacles and provide navigation by using ultrasound (<https://wewalk.io/en/>).
 - **Lazarillo** is accessible GPS application for visually impaired people to explore the environment and to create routes with audio guidance. It was translated into Bulgarian language (<https://play.google.com/store/apps/details?id=com.lazarillo>).
 - **Be My Eyes** connects visually impaired people with sighted volunteers who provide virtual assistance through a live video call. (<https://www.bemyeyes.com/>).
 - **Moovit** assists users with public transportation navigation and was one of Apple's Best Apps for 2017 (<https://moovit.com/about-us/>).
 - **BlindSquare** is the world's most widely accessible GPS-application. It is available in Bulgarian language. (<https://www.blindsquare.com/about/>).
 - **DotWalker** is a travel assistant application primarily designed for visually impaired users (https://play.google.com/store/apps/details?id=cz.lido.dotwalk&hl=en_US&pli=1). It was optimized to meet the needs of visually impaired users in Bulgaria in 2017.
 - Nationally developed application named **Sofbus 24**.



METHODOLOGY

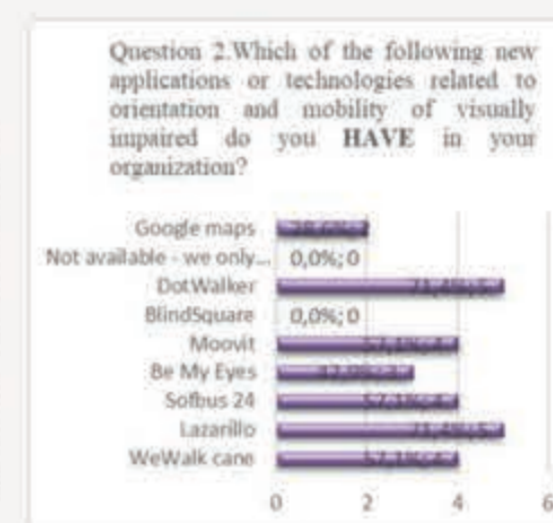
1. **First Questionnaire** containing 4 questions was distributed to the CEOs of the five biggest special organizations for visually impaired in Bulgaria in order to establish what technological devices and applications are known and used for O&M purposes in order these devices and applications to be later included in the second Questionnaire. The five organizations were: the two special schools for visually impaired in Sofia and in Varna, the Union of the Blind in Bulgaria; two rehabilitation centers for adults blind – one of daily type in the capital Sofia and the National rehabilitation center for Blind situated in the city of Plovdiv.
2. **Second Questionnaire** containing 11 questions was distributed to visually impaired persons from the same 5 organizations, who may be users of one or more of the technological devices and applications reported in the first questionnaire – students and adults.

RESULTS

ANALYSIS OF THE RESULTS:

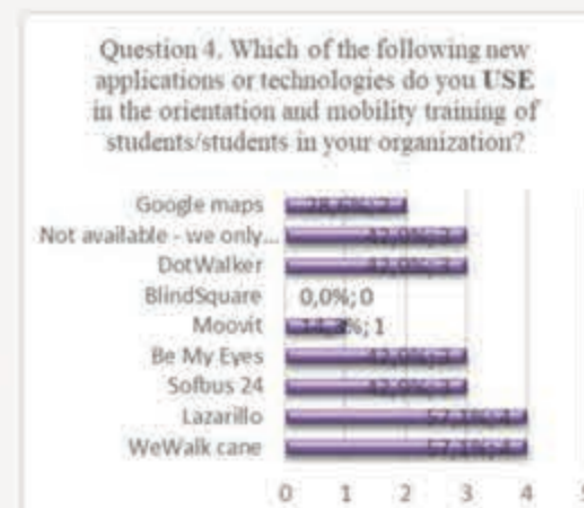
1. First Questionnaire

The CEOs indicated that all applications and technologies were available except for BlindSquare. 5 respondents (71.4%) mentioned the availability of DotWalker and Lazarillo, 4 (57.1%) noted the availability of WeWalk cane, Sofbus 24, and Moovit. Be My Eyes was marked as available by 3 respondents (42.9%), and 2 respondents (28.6%) included Google Maps.



First Questionnaire – continued:

The five CEOs provided multiple answers about the usage of the applications and new technologies. According to them leading in use were Lazarillo and WeWalk cane (57.1%). Three individuals (42.9%) indicated DotWalker, Be My Eyes, Sofbus24, and the usage of a white cane or a sighted guide, followed by Google Maps – 2 (28.6%). Only one person mentioned Moovit (14.3%). Logically, BlindSquare was not mentioned as it was not available within the organizations.



ANALYSIS OF THE RESULTS:

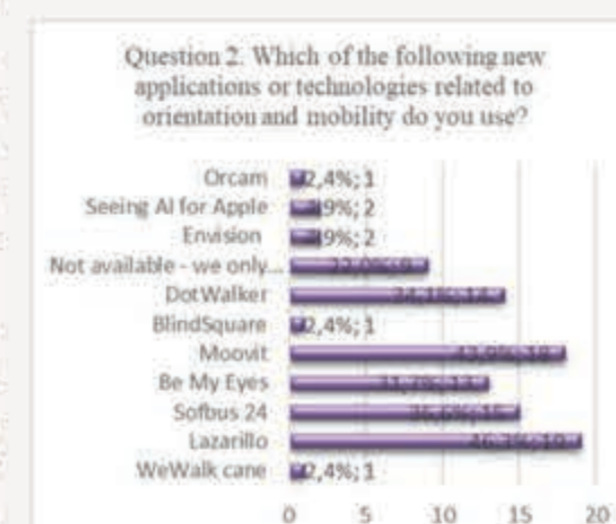
2. Second Questionnaire

41 visually impaired individuals participated:

- from the Union of the Blind - 14 (34%),
- from Center for Social Rehabilitation and Integration "Svetlina" in Sofia - 11 (27%),
- From the Special school for visually impaired "Louis Braille" in Sofia - 7 (17%),
- From the Special school for visually impaired "Prof. Dr. Ivan Shishmanov" in Varna - 5 (12%)
- From the National Center for the Rehabilitation of the Blind in Plovdiv - 4

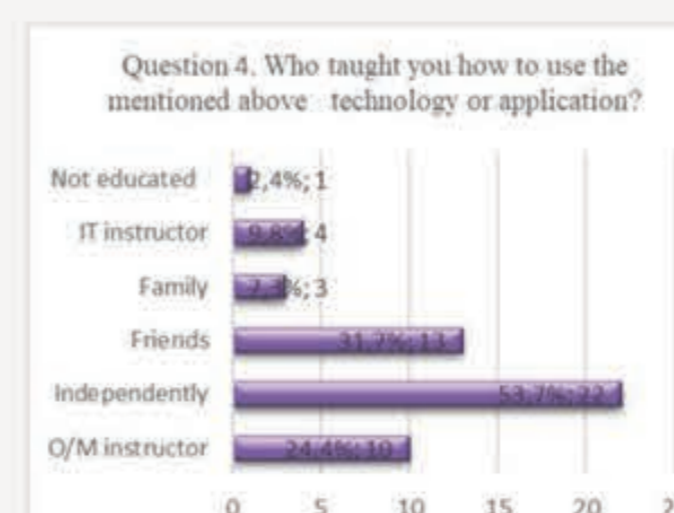
Second Questionnaire – continued:

Leading in use were Lazarillo – by 19 participants (46.3%) and Moovit – by 18 (43.9%). Sofbus24 was used by 15 people (36.6%), while DotWalker was actively used by 14 individuals (34.1%), and Be My Eyes was noted by 13 (31.7%). The BlindSquare application was used by 1 individual (2.4%), as well as WeWalk cane (2.4%). Nine respondents (22%) indicated that they used mainly the techniques of the white cane and a sighted guide. Under "other applications" the Envision was pointed out by 2 persons (4.9%), Seeing eye for Apple by 2 (4.9%) and Oream by 1 individual (2.4%).



Second Questionnaire – continued:

When asked about who taught them to use the mentioned technologies and applications, multiple answers were provided. 22 persons (53.7%) responded that they learned how them by themselves. For 10 individuals (24.4%), part of the training came by an O&M instructor, 13 (31.7%) received support by friends. Four users (9.8%) learned about the applications they used by an IT specialist in the center where they were trained. One individual (2.4%) stated he/she has not received any training, and 3 participants (7.3%) were taught by a family member.



Second Questionnaire – continued:

The answers to Question 5 showed that the majority of the visually impaired – 25 persons (61%) were definitely satisfied with the use of new technologies and applications. Eleven individuals (26.8%) were rather satisfied. Two (4.9%) were unable to determine, another 2 (4.9%) noted they were rather dissatisfied, 1 person (2.4%) stated he/she did not use technologies.

Questions 6 and 7 were open-ended and aimed to find out the positive characteristics and the negative features. The positives prevailed and included: additional information about the environment, support for mobility with the white cane, control over the sequence of bus stops in transportation, information about location of nearby places, independence and confidence in O&M, integration into daily activities. The negative features were: signal delays, difficulties in working with the application, inaccuracies in navigation, the need for a good internet connection.

Second Questionnaire – continued:

To Question 8 about the practical application of the used technologies and apps in Bulgarian conditions, 31 participants (75.6%) replied positively with YES, 4 people (9.9%) thought that only some are applicable, 6 people (14.6%) could not tell. There were no negative answers giving NO as reply.

Second Questionnaire – continued:

Most of the participants reported their orientation and mobility changed for better since the start of using technologies and apps. 36 people (87.8%) were fully convinced about it, only 2 (4.9%) reported no change and 3 (7.3%) did not use them.



Second Questionnaire – continued:

Regarding the accessibility of the analyzed applications, 28 persons (68.3%) reported they were fully accessible, while 11 visually impaired (26.8%) indicated partial accessibility, and two participants (4.9%) reported no accessibility.

The last open-ended question, attempted to reveal reasons for lack of accessibility, if a negative answer was provided to the previous question. There was a contradiction with the answers to question 2, in which 9 people indicated not using new technologies and apps for O&M purposes, and with the answers to question 3, where one respondent noted not using technologies or apps. Here 4 participants reported lack of accessibility simply because they did not use technologies or apps. All other participants (37) reported technologies or apps were fully accessible or somehow accessible.

CONCLUSIONS

1. The results showed that many technologies and applications for O&M purposes are known, available and used among the visually impaired individuals in Bulgaria – foreign and national. A good sign is the development and adaptation of national technologies and apps, such as Sofbus24 and Lazarillo.
2. Most of the visually impaired showed real practical experience by reporting about advantages and disadvantages as well as the use of technologies and applications in variety of cases – job purposes, education, shopping etc.
3. Some of the participants knew, used and named additional apps, which were not originally included.
4. A small number of visually impaired people relied on the classical white cane and sighted guide techniques only. However, part of the same participants later reported that the technologies and applications were accessible in Bulgaria, which can be interpreted as having some knowledge about them.
5. Most of the respondents reported a positive change in their O&M skills after the start of using technologies and applications. There was also criticism, such as the Internet dependency, the need for updates with change in the environment, delays in signaling for obstacles etc.
6. A recommendation can be made for more time in training in the use of technologies and apps for O&M purposes provided by schools, centers, instructors and specialists.

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