Visually-Impaired People Studying via eBook: Investigating Current Use and Potential for Improvement

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Everyday activities and tasks should be easy to perform for everyone, especially in an educational context, in order to foster inclusivity and assure equal opportunities for all. In this paper, we investigate strategies and issues experienced by visually impaired people when studying via eBook. An online survey was designed to investigate preferences regarding the different formats and understand what types of actions are possible and desirable when using eBooks in an educational context. We collected the views and experiences of 75 visually-impaired people, which revealed the need to develop tools that can provide both full accessibility and high usability when reading for study. Visually impaired people would like to rely on the same widely-used strategies that sighted people use when studying a text. In addition, 92% of the visually-impaired people participating in the online survey declared they were interested in a (new) reading app. The results could orient the design of new digital reading tools and functionalities that can improve interaction.

CCS CONCEPTS • Human-centered computing~Accessibility~Empirical studies in accessibility

Additional Keywords and Phrases: Accessibility, Visually Impaired, eBook, education

1 INTRODUCTION

Educational tasks and activities using books can be difficult or impossible for a screen reader user. Numerous apps facilitate everyday activities, including learning. However, for many blind people interacting with Web and mobile apps can be difficult and/or require good digital skills [3]. In addition, repeatedly performing tasks such

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* Place the footnote text for the author (if applicable) here.

as reading a book for study can require a lot of time and effort due to the numerous gestures or steps required by interaction with assistive technologies, even for skilled users. Systems and apps should be designed to be accessible, simple and rapid regardless of the user's ability or skills.

When studying, books are the basic means of accessing information, doing exercises, practicing skills and preparing for exams. A number of study strategies are usually carried out when reading an educational text. For example, there are students who underline text with pencil and ruler, others who use colored highlighters, those who prefer to summarize each chapter, or re-read certain sections, or simply read and repeat the information out loud. Whichever study method is used, the aim is to simplify reading, facilitate access, comprehension, and memorization, as well as the creation of logical links between concepts, supporting the learning process.

When designing usable tools to help visually impaired students, it is important to understand their real needs. A study conducted to compare reading performance between visually impaired and sighted school children (n. 299 participants) suggested that visually impaired students required a longer time to read and understand a text. A statistically significant difference was found in the reading rate between the three groups (normal vision, visually impaired print reader, and Braille reader) [11].

In the past, a visually impaired person had to rely on books written in Braille or audiobooks. Today, with the advent of technology and ICT development, electronic books have emerged. However, a wide variety of digital formats (pdf, EPUB, Daisy, txt, doc, etc.) also require many different applications and devices, which offer various features and functions; consequently, they can also limit both accessibility and usability for the visually impaired. Furthermore, performing tasks may vary between desktop and mobile platforms.

In our study, we investigate what visually-impaired students need in order to read and study texts easily and successfully, identifying the difficulties they face when reading for educational purposes. This is an initial step in promoting the development of new digital tools and functionalities that facilitate the study process and empower blind and visually impaired people. An online survey was conducted with 75 visually impaired people in order to investigate: a) habits, views and strategies used by the visually impaired when reading a book using existing support b) necessary/desirable aspects of accessibility and usability for students when reading a book for educational purposes.

The paper is organized as follows: the next section introduces related works; section 3 describes the methodology used in this study; section 4 reports the survey results. Section 5 discusses those results. The conclusions end the paper.

2 RELATED WORKS

Prior research indicates that visually impaired students face a number of barriers [1],[5], and numerous works investigate accessibility in electronic publishing. Text-customization enabling visually-impaired users to read PDF documents is discussed in 5. Visually impaired users may also be interested in reading graphic content, such as comics [8]. A variety of methods and tools have been proposed to make any document or eBook accessible to everyone, including visually-impaired people [2, 4]. However, recent technologies are not yet able to provide accessible content [8]. For instance, the Daisy Consortium promotes, develops and maintains open international DAISY (Digital Accessible Information System) Standards for documents. This format was designed to provide eBooks that are accessible in both audio and text versions. In 2011, EPUB3 (DAISY 4 distribution format) was approved as Final Recommended Specification by International Digital Publishing

Forum (IDPF) and in 2019 the new version ePUB 3.2 was defined by W3C (https://www.w3.org/publishing/groups/epub3-cg/). Nevertheless, accessibility issues are still encountered when reading via screen reader, on both desktop and mobile platforms [5].

Several studies have focused on the accessibility and usability of reading activities. The study in [5] discusses the text-customization needed by visually impaired users in order to read PDF documents. The work in [13] suggests an approach to personalize EPUB visualization so as to adapt the rendering for sighted, visually-impaired and blind people. The results of the studies have encouraged better text customization functionalities in reading tools and eBooks. Other works propose specific reading tools or audio books for blind people [7, 10]. eBooks represent great opportunities, especially for those who have difficulty reading printed versions. With the recent release of reading applications, authors are able to develop highly interactive e-books. In fact, by engaging directly with the individual reader, interactive e-books offer the chance to broaden knowledge and improve learning as well as enhance the entertainment value of the book [14]. An interactive e-book can trigger different behaviors depending on the user actions, e.g., the activation of multimedia content, interactive tests and so on. Unfortunately, even recent studies on the personalization of interactive eBooks (in EPUB 3 format) confirm that the problems of interacting via screen reader continue to exist, since assistive technologies and reading applications are not yet mature enough to support advanced functionality [9].

Previous studies [12,15] take into account visually impaired students and the reading process, but they focus on aspects other than those involved in our investigation. Our study aimed to collect insights and needs from students with vision impairments regarding interaction with a book for learning purposes. We focus on interaction and navigability, essential features when studying. This is very different from activating a command or performing a gesture to start the reading of a book in a sequential way. Novel assistive technology reading systems to make eBooks accessible to the blind and visually impaired have been proposed. The TactoBook system translates textbooks to Braille and stores them in a USB memory drive which can be reproduced by exploiting a compact, portable tactile Braille display [15]. This solution is scalable; the user can read a vast number of eBooks without carrying the tactile paper versions. However, younger students usually exploit smartphones, tablets and computers as an assistive technology with the screen reader when studying, as confirmed in this study (see Table 1).

3 THE SURVEY

A survey was conducted with a group of visually impaired Italians in order to collect their preferences and expectations when reading a book for educational purposes. The anonymous online questionnaire (in Italian) was created using Google Form, which is accessible via screen reader. The survey includes general questions for the sample characterization, a section investigating the tools used for reading autonomously, and their expectations and needs regarding tasks performed while reading and studying for educational purposes.

In general, questions were the single-choice type (radio buttons) but with an "other" option, giving the user the opportunity to specify a different answer (when not satisfied by the proposed ones). Comments were translated into English by one author and checked by the other one to verify the correctness of the translation. Both authors are skilled in accessibility. For reading convenience, similar comments have been manually merged.

Participants were first contacted via email by one of the authors, a computer science researcher who is totally blind, through the Italian Association for the Blind. An invitation to participate in the survey was also

circulated through social networks (Facebook and Whatsapp groups) and via mailing lists. Users were informed about the purpose of the study, data collection, processing and publication of results, according to EU privacy legislation. User participation was entirely voluntary with no compensation.

3.1 The sample

A total of 75 visually impaired people participated in the study: 34 males (45%) and 41 females (55%). Of total participants, 43 (57%) were blind, 31 (42%) were partially sighted and only 1 (1%) had moderate low vision. Regarding age, 35 participants (47%) were under 30 years old, while 25 out of 75 (33%) were over 40 years old (Fig. 1). Over half of the users (51%) indicated a high school diploma as their educational level, while 13 (17%) had a   middle school diploma (10 users were < 20 years old), and 23 (31%) a master's degree; one has a PhD.

4 RESULTS

4.1 Type of book preferred for learning purposes

 The results indicated that the preferred type of book for studying was the digital book, with 56% of preferences (Table 1), followed by the audiobook with 14% of responses. A small number of people expressed a preference for books with large print (10%) and Braille code (8%).

Table 1. Type of book preferred by the 75 participants

Tool	N. users	%
eBook	42	56.0
Audio book	11	14.7
Magnified paper book	8	10.7
Braille book	6	8.0
All the same	6	8.0
Others	2	2.6

4.2 Type of eBook preferred for study

Table 2 reports the participants' preferences. Regarding the most frequently used format, MS Word (chosen by 16 blind and 10 low-vision subjects), these users' preference was basically due to the easy interaction via screen reader, as well as the possibility of manipulating the text (editing, copying, adding notes, and so on). The PDF format (chosen by 13 low-vision and 5 blind people) was considered a useful format for reading when changes are not required. Some advantages are font enlargement and content navigability without risking changing the content and the formatting. Table 3 and Table 4 contain the reasons reported by the participants, in more detail.

   The HTML format is preferred by blind people (6 blind, 1 visually impaired) mainly because it is not "inadvertently editable" and is hypertextual, however with the limitation of the impossibility of adding bookmarks. Surprisingly, plain text format (6 users) is equally preferred by blind and partially sighted people, probably due to its flexibility, ease of use via Braille displays, and content customization. At the same time, it allows you to take notes and make comments. The RTF is portable and at the same time editable. Instead, the EPUB is preferred since it can be easily used on mobile devices, although it is not editable. No comment on the EPUB format mentioned the feature enabling one to select font type and size, and background color on many devices.

Table 2. Formats preferred for educational eBooks

eBook format	N. users	%
MSWord (doc)	26	34.7
Portable Document Format (PDF)	18	24.0
Plain text (TXT)	7	9.3
Hypertext (HTML)	7	9.3
Electronic Public format (EPUB)	6	8.0
Daisy	2	2.7
Rich Text Format (RTF)	1	1.3
Other	5	6.5

Table 3. Comments received on MS Word (DOC) format

Comments	N. users
Document is easily navigable via screen reader.	6
It is easier to copy, modify, underline, enlarge, print.	10
It allows writing notes, additional content, comments etc.	5
It allows you to customize the text in every way.	2
It is manageable and I can easily convert it to the formats that I need.	1
I find it flexible for reading and easy to manage.	1
It can be read 100% by apps such as Voice Dream (voicedream.com/).	1

Table 4. Comments received about the PDF format

Comments	N. users
I can use apps that allow underlining, to make notes; it has the advantage that I can highlight (without the risk of erasing what is written).	3
There is no risk of inadvertently changing text and formatting while reading, underlining, copying.	6
It is compatible with all devices.	2
Via an app I can zoom in and highlight/write/annotate.	3
A well-designed pdf can replace an html file while offering the same functionality.	1
It is a format more like a book on paper.	1

4.3 EPUB format knowledge

About 52% of people answered positively about EPUB format knowledge, while 48% were unfamiliar with it. From the few comments received on the EPUB format, the feeling is that the potential EPUB features are actually not fully known. In fact, no comments on the ability to browse content, customize fonts and colors, use bookmarks, etc. were received. Moreover, some users expressed a preference for the HTML format due to its portability and the possibility of using links; these features are also offered by the EPUB format, with the advantage of being able to read more easily through specific reading apps for mobile devices. However, the applications for reading the different formats might differ in terms of accessibility and usability via assistive technology commands and gestures.

4.4 Devices for reading an educational eBook

Table 5 reports the preferences expressed for the devices to be used. The Personal Computer was the device mostly preferred by the participants (43%), against mobile devices (37% including both tablet and smartphone).

The participant's preference for Personal Computers was mainly due to the presence of a keyboard, which allows the student to edit content, perform searches, etc. more easily. Some people specified that using a Personal Computer when focusing on learning is easier and more practical.

An interesting comment was reported by a blind user: "Mainly because I can add notes to the text I am reading faster; but if you propose a mobile app that allows the reader to manage notes and comments while quickly navigating through the sections in the book, it would be very interesting". Otherwise, the choice for mobile devices (tablet and smartphones) was motivated by the portability of many eBooks that are always handy. However, in the latter case the issue is the lack of usable editing functions of the contents, adding notes and carrying out searches (which may become very difficult tasks). A blind user clearly stated "Many editing functions are not available or are impracticable via screen reader and gestures on the touch-screen".

Table 5. Devices used for reading an educational book

Device	N. users	%
Personal Computer	32	42.7
Smartphone	15	20.0
Tablet	13	17.3
eReader	1	1.3
Other (Braille display/book, magnifying lenses etc.)	6	7.8
No preference	8	10.7

4.5 EBook navigation

Being able to navigate backwards and forwards through content is very important when studying and revising topics. For this reason, some questions were aimed at gathering information on the usefulness of the navigation by chapters, paragraphs, sentences as well as by pages. Indeed, these are basic tasks that should be very easy for anyone to perform. For sighted people tasks such as moving through paragraphs and sentences are usually not mentioned when designing an eBook or document, because they are implicit in reading by sight. Unfortunately, these tasks may not be easy or even possible for people who must interact via assistive technology and screen reader gestures. Thus, to understand the importance of those navigation functions as perceived by the visually impaired students, they were asked to express a value from 1 (Not at all helpful) to 5 (Extremely helpful) to indicate the level of usefulness for each function. Analogously, the ability to easily and rapidly jump to different parts of the book, with different granularities (by chapters, paragraphs, and pages) was evaluated. The Likert scales were homogeneous to make results with different granularities comparable.

Participants were also asked to comment on or state the reason for their preferences. As shown in the following sections, the participants expressed values significantly positive for all the search tasks (Fig. 1). Although the averages are very similar among them ($a = 4.3$ for navigation by chapter, $a = 4.2$ by paragraphs, $a = 4.4$ by sentences, and $a = 4.3$ by pages), we can observe that there were some small differences for navigation by paragraphs. For the navigation by paragraphs, 42 participants selected '5' against 52 ('5' value) recorded by the other navigation modalities investigated (by chapter, by pages); however, navigation by paragraph received a higher number of preferences for the '4' option that rebalances the sum of the two top values (Helpful and Extremely helpful). In Fig. 1 answers were aggregated to show the difference between the "search by" preferences.

4.6 Navigation by chapter

Navigation by chapter is one of the most frequently encountered tasks when reading a non-narrative book. Usually, a non-narrative book, especially one used for educational purposes, might not be read sequentially from beginning to end. On the contrary, the Table of Contents (TOC) is usually used to obtain information on the contents and thus skip directly to the desired part. A specific question focused on this type of navigation.

Results showed that visually impaired participants are certainly interested in navigation by chapter (a = 4.3), as reported in Fig. 1 (left solid column). They are especially interested in easy use of the list of chapters and sections thanks to specific commands or gestures made available by assistive technology and reading applications. This has been confirmed by the user comments, summarized in Table 6. Participants would like to have ad-hoc commands or gestures to simplify navigation by chapter and section.
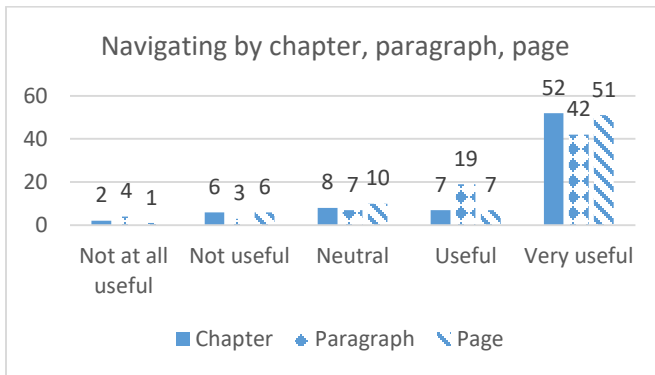

Fig. 1. Perception of helpfulness for navigation by chapter vs by paragraph and by page

Table 6. Users' comments about navigation by chapter

Comments	N. users
I would like to have a list of the chapters via a specific command (like the Jaws command Insert+F6).	7
The TOC should be always handy via a specific command or gesture.	5
I would like to skip quickly from one title to the next or previous one via a gesture or specific command (like the Jaws H key).	27
A different voice could be used to announce a chapter or paragraph title when reading in a sequential way.	1

4.7 Navigation by paragraph

Navigation by paragraph is useful for the visually impaired who use assistive technology and keyboard interaction to quickly survey the contents. Comments revealed that not only screen reader users are interested in this task (Table 7). In fact, two people (low-vision users) would like to have the opportunity to color the paragraph pointed by the mouse. However, some users observed that navigation via paragraph in MS Word depends on how they have been formatted and written (i.e., the use of the carriage). Other users observed that this type of navigation does not work properly with PDF documents. These comments confirm that visually impaired people usually navigate by paragraph and are interested (a = 4.2) in performing this (see Fig. 1).

Table 7. User comments about navigation by paragraph

Comments	N. users
When learning it is very important to move quickly among paragraphs and sentences to reread them.	7
In MS Word I can move through paragraphs only if they are well-formatted.	3
In the PDF format the command to move paragraph by paragraph usually does not work properly.	8
Paragraphs should be very easy to select, copy or use for other purposes via keyboard or gestures.	11
I would like to move paragraph by paragraph also in audiobooks to read important concepts again.	1
Navigating paragraphs or sentences is not possible in mobile apps. I can do it only with MS Word.	2
I want to have the same functions as Voice Dream (to navigate by chapter, paragraph or sentence).	1
I want a function that can color or magnify the current paragraph or sentence (mouse hover).	2

4.8 Navigation by page

When reading an electronic book, some features such as moving to a specific page may not be required. In fact, the number of a page in an eBook might be different from the same page in a paper book. This can depend on the font type and size, which can be modified by the user. Furthermore, thanks to the interactive Table of Contents, the user can quickly reach a specific chapter or section. Thus, we were interested in understanding whether navigation by page was considered useful by the visually-impaired. Responses not only highlighted an interest (a = 4.3) in navigating by page (see Fig. 1) but as shown in Table 8, three people asked for the opportunity to have a correspondence between the digital-number with the paper-number.

Table 8: Users' comments about navigation by chapter

Comments	N. users
I do not use it very much, but I think it is useful to have it in the reading app.	24
It should allow the reader to go to the page number matching the paper book.	3
The number of page is useful for perceiving the section length.	15
I do not use it, because the table of contents is enough.	2

4.9 Repetitively reading parts of text

A total of 65 participants (86.7%) expressed an interest in iteratively (re)reading specific parts of the text and understanding how much of text still remained until the end of the paragraph or the chapter. More specifically, concerning the opportunity to obtain information about the amount of content remaining until the end of the book, chapter, or paragraph (multiple answers were enabled), most users declared they were interested in "the chapter" (57 users out of 71, i.e. 80.3%), followed by the selection "the book" (38 users, 53.8%), and in "the paragraph" (31 users, 43.7), as shown in Fig. 2.

Learn the amount of text remaining to the end of:

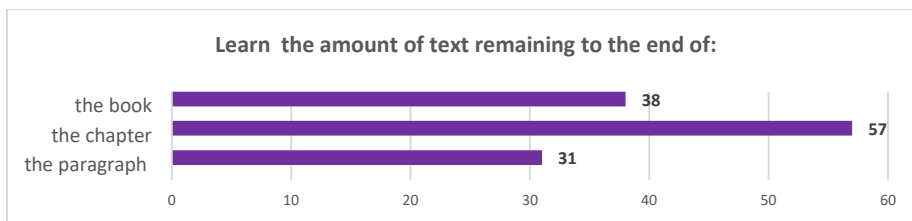the book — 38
the chapter — 57
the paragraph — 31

Fig. 2. Usefulness of knowing amount of text remaining until end of book, chapter, paragraph

4.10 Image descriptions

To further evaluate user needs encountered while reading the book, participants were asked to express their preferences regarding the figures encountered when reading the contents. Of the persons interviewed, 90% were interested in having a description of the images (semantically equivalent), while 10% declared they did not need them. Users who responded positively preferred to receive a reading of the image description as soon as it is encountered along with the text (71%), or at the end of the section (19%). No comment was reported by the users regarding the alternative descriptions.

4.11 Customized bookmarks

A specific question was included in the questionnaire regarding the need and type of use for bookmarks by users with vision problems. All participants expressed interest in the bookmark functionality (Table 9). A number of people (14) declared that they are interested in the traditional use of bookmarks, i.e., to mark the point of reading interruption (and therefore a resume point); others (4) instead expressed a need to be able to mark several important content parts in order to reach and review them more quickly. Most of the interviewees declared that they were interested in both types of use, traditional mode (as a marker of the current reading point) and customized mode (to mark the points of important parts).

Table 9. Use of bookmarks

Use	N. users	%
To know the reading POSITION	14	18.7
To mark the important parts to be covered	4	5.3
Both to keep track of the point and to mark the important parts	56	74.7
I'm not interested	0	0.0

4.12 Notes and comments

Regarding the possibility of adding personal notes or comments to the contents, 95.8% of the interviewed expressed interest. They were also asked to indicate their preferred formats for adding notes and comments. Interest in the text-mode was expressed by 64.8%, while 31% were interested in text- and voice-based comments. No one indicated the possibility of adding voice content alone.

4.13 Highlighting content

A practice widely used by sighted students is underlining relevant parts of the text in order to be able to read them again in the review phase. The visually impaired participants were asked if they were interested in this opportunity. For this purpose, users were asked on a scale of 1 (not at all Helpful) to 5 (Extremely Helpful) if it was useful to highlight parts of the text. Most participants showed interest in these features. In fact, 69% of users selected '5', 15% the value '4', with an average of 4.4 out of 75 participants as shown in Fig. 3.

The interviewees were also asked to indicate the type of use they wanted to make of the highlighted content (multichoice answer). The results show that users would like to read, navigate and copy the content, as well as export the content into a file (Table 10). Four participants selected the "other" option, adding the following comments: Adding text to highlighted content, email it or share it, Adding the highlighted content to a summary that you can easily manage while reading the book, Using different highlights to distinguish the type of content highlighted.
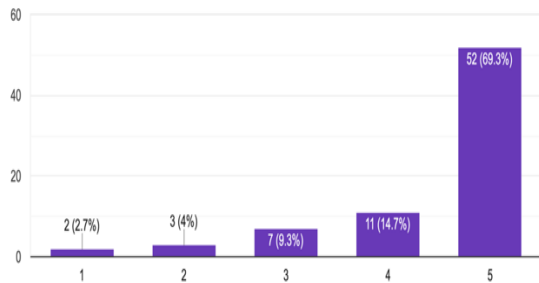
Fig. 3. Preferences for highlighting content (1-5 Likert scale)

Table 10. Actions to perform with highlighted content

Action	N. choices
Reread only highlighted content	54
Export highlighted content to an external file	54
Copy highlighted content to the clipboard	43
Navigate highlighted content while remaining in the book	31
Other	4

4.14 Potential new tools

Through a specific question in our survey, we investigated whether the participants felt the need for a new application, in order to evaluate whether the current applications available on the market are able to support the reading of a book for study. Results suggest that visually impaired users are interested in a new application enabling them to handle the various activities to be performed while studying a book. A total of 92% of participants were interested in a new simple and powerful reading/note-taking application, and all the participants declared themselves available for testing such a new (reading/note-taking) application. Regarding the type of application, most people would like a standalone application (61%), while a small number of users would opt for a web application (8%). For the remaining 31%, it was indifferent.

5   DISCUSSION

The results of the online survey show that when reading a book for study, visually impaired people are interested in using many of the strategies performed by sighted students (e.g., highlighting or underlining text, adding notes and comments, and so on). More specifically, with reference to notes and comments, a noteworthy result was the interest shown in using not only text-based comments but also voice-based comments. This function would make for more natural interaction, and would also be especially useful for mobile interaction where writing is problematic. The ability to highlight and underline important concepts was revealed to be of great value. The use of bookmarks is also considered a tool not only to mark the current reading point, but could be also used for marking important concepts.

The study revealed not only that the visually impaired need more advanced tools, but they also still feel the need for accessible support for basic tasks, such as navigating among paragraphs, sentences and pages. This seems to imply that existing applications for reading or editing content and assistive technologies as well are not yet sufficiently mature to fully support those activities. This will have to be better investigated from these

findings. A particular feature that emerged from the study is navigating page by page; it should be based not only on dynamic numbering (i.e., defined on the basis of the current font size and type) but also be linked to the page number corresponding to the paper book. As a consequence, this feature could foster interaction between blind and sighted students who use traditional paper books, for example, during classroom discussions. Going over the text again and learning how much content remains until the end of the "paragraph", "chapter" and "book" are two features considered interesting.

For some years now, electronic books have been the most popular format in education for people with visual impairments [1]. Interestingly the preferred format for an educational eBook is not EPUB, as is the case of reading narrative books. Instead, two types of format were singled out: the MS Word DOC format and the PDF format. The first one is chosen because it allows for easier editing and copying, and also because it is widely considered to be easily navigated via screen reader. The PDF format, on the other hand, is mainly preferred by low-vision users because it is more similar to a paper book, and allows for tasks such as underlining without the risk of modifying the contents by mistake. For this last reason, it was also chosen by a group of blind people. This too will need to be further explored with users.

Furthermore, the most widely used devices are computers used to manage documents via editing software like MS Word, and also preferred due to the use of a keyboard. Although mobile devices are considered preferable due to their portability and ability to store a large number eBooks and materials, it transpires that they are more complex to use when handling tasks that support studying a book.

With regard to the images and figures in the text, the participants expressed interest in obtaining alternative descriptions while reading. It could be worth carrying out a specific study to better analyze users' expectations with respect to the alternative descriptions. Finally, the study pointed out that the development of a fully accessible application capable of supporting various tasks performed when studying is desired by a large number of the visually impaired. This result highlights the fact that despite the numerous guidelines proposed in the literature to develop eBooks and tools that are accessible to all, the needs of screen reader users continue to be unfulfilled.

5.1 Study Limitations

The main limitations of this study are related to the sample. Since the survey includes only Italian participants, results cannot be generalized because the sample is quite limited in terms of geographic distribution. However, apart from cultural aspects, the studying techniques can be reasonably shared between all students, regardless of any visual impairment. In addition, these findings provide an initial outline of the interest and preferences of visually impaired users, which could be valuable for further studies.

6 CONCLUSION

This paper investigates the knowledge of eBook format via an online survey conducted with 75 visually-impaired people. Despite the progress in using ICT to support accessibility, there are still many unfulfilled needs and expectations. Even basic tasks such as navigating between chapters, paragraphs and sentences are not yet fully supported by assistive technology and reading tools. People with vision impairments have a strong preference for being able to carry out activities similar to those used by sighted students when reading an educational book, such as underlying and highlighting contents, adding notes and comments. A (new) reading app able to support numerous learning tasks via screen reader, is considered desirable by 92% of participants.

Many questions need to further be investigated -- for instance, understanding why people do not know ePub functions, or what prevents them from using it. To receive valuable insight into any unclear aspects of this study, a set of semi-structured interviews with visually-impaired and blind subjects (balanced for gender, skill and age) will be performed. Results will be shared and discussed in a focus group with end users, to elicit ideas for a new functional and usable app to help blind and visually impaired people to effectively study ebooks. Future work would also include an in-depth study of some more specific aspects, such as interaction with tables or formulas. Furthermore, the accessibility level and supported reading tasks for current reading and editing applications that can support the aspects considered in this study will be investigated. Moreover, an analysis of existing tools and apps will be carried out to evaluate which of them actually support reading tasks preferred by visually-impaired people. For instance, the Voice Dream App makes reading easier, but it lacks note-taking or highlighting functions, which can enrich and personalize the study strategy, possibly promoting the learning process.

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