Learning Braille at Higher Education Level: Exploring the Perception of Prospective Special Education Teachers

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ARTICLE DETAILS	ABSTRACT
History *Revised format: May 2022* *Available Online: Jun 2022*	**Purpose:** Braille learning is important for teaching students with visual impairment. This study intended to seek the perception of pre-service teachers who obtain degree in special education with the compulsion of learning Braille.
Keywords *Perception, Pre-service teachers, Braille, Higher Education, Visually Impaired Students.*	**Design/Methodology/Approach:** This was exploratory and qualitative research. The Sample of study included pre-service teachers (N = 21) studying at higher education level. Convenient sampling technique was used to collect data for this study. A self-developed semi-structured interview protocol was instrument to collect data. The validity of the instrument was assured by the expert opinion (N=03). The reliability of the questionnaire was confirmed through an extensive literature review. The data were analyzed through open coding of the interview transcription to draw categories and themes. There were four major themes emerged i.e challenges in learning Braille, reading techniques, Braille comprehension, and Braille Rules.
JEL Classification *123, 120*	**Findings:** The findings of the study revealed more difficulty in reading Braille in grade two as compare to Braille writing, no training in the haptic sense in higher education institutes, and a lack of proper training courses in teaching and learning braille.
	Implications/Originality/Value: The study recommends appropriate support by the institutes and particular trainings and courses for Braille learning.

Introduction

Braille is the system of raised dots for reading and writing in which raised dots signify the letters of the print alphabet for visually impaired persons and blindness. This system contains symbols

to represent math, characters, music, foreign languages, punctuation, and computer notation. (Perkins School for the blind, 2018).

There are six braille dots which are organized in three different pairs. These pairs are known as the upper, middle, and lower pairs (Bin et. al., 2021). Numbers, letters, and symbols of punctuation are formed with different combinations which are used in almost 133 languages of the world (UNESCO, 2013). The formation of Braille is characterized by contracted or un-contracted Braille. There is the use of simple Braille formation in un-contracted Braille while the shortest or abbreviated formation is used in contracted Braille to represent the letters, words, or even sentences. This is done to save both time and paper both. For instance, the English word "above" can be represented through contracted braille as "abv". The creation of Braille characters was probable for those who have any visual challenges. Therefore, Braille is considered a compatible reading and writing tool (Willings, 2017). Moreover, Touch sensitivity is required to read Braille on the fingertips. Braille literacy is the most important part of the Area of Specialization "Visual Impairment" in undergraduate degree programs of special education to serve students with visual impairment (Seid et al., 2022).

The study describes the perception of pre-service teachers who want to join special education schools for teaching to students with visual impairment. It also highlights the triumphs of the pre-service teachers who learn Braille concerning the standards of learning Braille, mentioned in the conceptual framework of this study. These pre-service teachers with a specialization in visual impairment learn Braille to serve students with visual impairment in the future. In modern times, various electronic displays and papers are used to read braille. These electronic displays transform electronic data rapidly in braille (Nadeem, 2016).

Standards and efforts for Braille learning can change the perception of Braille learners. The condition is only to learn the rules and standards with their proper compliance.

Purpose of the Study
The study explores the perception of prospective special education teachers who are currently studying at higher education institutions in the different cities of Punjab.

Objectives of the Study
The objectives of the research were to:
1. Explore the challenges faced by prospective special education teachers in learning Braille at a higher education level.
2. Highlight the efforts delineated by prospective special education teachers at higher education levels while learning Braille.

Questions of the Study
The followings were the questions of the study:
1. What are the challenges faced by prospective special education teachers of special education in learning Braille at the higher education level?
2. What are the efforts delineated by prospective special education teachers at higher education levels while learning Braille?

Significance of the Study
This study is vital because the results take a look at the objectives and will generate expertise in learning Braille for Pre-service teachers of special education at higher educational levels. This study will be beneficial for pre-service teachers to get adequate information about the concepts of standards of Braille learning as compared to the orthodox way of learning Braille. It is also useful for the institutes that facilitate the students of special education degree programs regarding

setting the directions of Braille teaching.

This study will determine the ways of learning Braille for students of special education at the higher education level because Braille learning has been defined as an eligibility to become special education teachers in the field of visual impairment. The study will also contribute information about standards for learning Braille. This study will be very helpful to remove those challenges that pre-service teachers face while learning Braille in during and after their degree programs. For which, they find it difficult to learn. This study will be significant for Braille instructors to understand these challenges and do their best to remove these challenges by following the set standards of Braille teaching to their students at the degree level.

Limitations of the Study
The following were the limitations of the study:
- The study was limited to Punjab only due to limitations of time and financial constraints.

Delimitations of the Study
The delimitations of the study were:
- The study was delimited to students in special education degree programs learning Braille and studying at a higher level.

Review of the Literature
According to the readers of Mwangi (2009), blind or partially sighted students can greatly benefit if they play an active role in the Braille learning process; an opportunity that can be achieved if they are on condition with resources of learning braille. However, there are rarer things for readers of Braille than for sighted students. A shortage of Braille resources has a significant impact on Braille students in academic attainment equated to print students (Spungin, 2012).

The (NFP) National Federation of the Blind (2009) has acknowledged five aspects that contribute to lower reading of Braille. Of course: lack of qualified teachers for braille teaching, delusions about the Braille system, i-e, "reading Braille distinguishes and discriminates against students who are learning to write," and "Braille is always slower than learning to print and is difficult to read" (NFB, 2009). Most educators agree that the use of aids &technology ought to be used as a Braille addition instead of used, braille is more reachable than ever before with the help of Technological developments. (NFB, 2009). Braille encryption is a tangible code in which severely people with visual impairment can literate and be able to read, according to common literacy concepts (Corter, 2019; Farnsworth, 2007).

There is an ongoing debate around the need to read Braille and there are numerous technological developments in the field of assistive technology for visually impaired people (Argyropoulos & Ravenscroft, 2019) that have influenced the most common ideas for reading and writing.
These technological developments include many, varied communication information ways to discourse the miscellaneous and diverse requirements of people with emotional needs like blindness or hearing. (Miller & Ferrell, 2017; McCall, 2011: Luckner, Dymond & Gaffney, Ruppar, 2017; Creswell, 2013).

Conceptual Framework
This study deals with the perception of the students of a special education degree program enrolled in various colleges and universities in Punjab. These are known as pre-service teachers as they need to get a job in special education to teach students with visual impairment. To fulfill the eligibility criteria, these pre-service teachers are required to get a comprehensive and

deliberate Braille learning skill. However, there are numerous challenges experienced by them. The Braille learning skill should be based on standards of Braille which are recognized and complied with at the international level. These standards of Braille learning include understanding the updated Braille system, recognizing Braille dots, memorization of Braille dots, learning of combination of contractions, feeling Braille dots through touch sense, writing simply to complex words, writing a maximum of two pages of basic two subjects daily note down the time, practicing Braille daily to read for almost one hour, learning and complying the rule of Braille, co-operation with Braille instructor, tactile sensitivity training, ignore the misconception about Braille, reading of own written content in Braille, reading aloud while practicing Braille, using little pressure with fingers while touching dots, reduce stress for easy understanding of Braille, and set time and goal to become the good Braille expert.

However, the above-mentioned standards of Braille are not promulgated or informed to Braille learners concerning their Braille instructors or institutes where they learn. For this reason, students of special education degree programs feel difficulty or various challenges in understanding the Braille system. Therefore, this study ensures the standards of Braille with Braille learning Manners. It also highlights the perception of pre-service teachers regarding Braille learning.

Research Design
This is exploratory qualitative research. Exploratory research is often thought to be qualitative and inductive. Qualitative research of the inductive approach does not provide a priori thoughtful and constructing on historical groups of information (Casula et al., 2021).

The population of the Study
The population is referred to as a group of human beings that are well defined and which the researchers want to generalize the findings of the study by other entities. The populations of the study were the pre-service teachers of special education studying at the higher education level in Punjab.

Sample of the Study
The sample of the study included pre-service teachers (N = 21) who were learning braille. The age range of pre-service teachers was 17 years to 30 years & above. A convenient sampling technique was used to collect data for this research

An instrument for Data Collection
A semi-structured interview was developed comprising items related to standards of learning Braille at the international level. After obtaining the expert opinion (N=03), 17 statements were finalized to collect relevant data by following the appropriate interview protocol. The content validity of the instrument was ensured by the opinion of the concerned field expert (N=03). All experts declared the self-developed research questionnaire valid and relevant to the topic. Additionally, an extensive literature review validated the questionnaire. Before starting the data collection process, permission to collect data and conduct the interview was obtained from the administrators of the higher education institution. Different probing questions were also asked according to need. Responses were recorded and transcribed by the researchers.

Data Analysis
The data were analyzed by using an interpretive approach. At first, we read the interviews of the respondents and scan similar findings through an open coding technique. The data was categorized further into codes based on similar ideas and expressions. Finally, in the end, four major themes are generated to reach the finding and the conclusion.

Ethical Considerations for the Study

The ethical considerations for the Study were compiled strictly and properly. The respondents were informed earlier before collecting data and conducting the interviews. They were also assured about their information from them was not be revealed in the future by their names.

The procedure of the Study

After the selection of the problem for this research, the researchers reviewed the literature. The researchers developed a semi-structured interview protocol for data collection. The sample of the study was pre-service teachers (N=21) who were selected by using a convenient sampling technique. After introducing the topic and its purpose to the sample, the researcher assured that the finding from this research will be used for academic purposes only. Respondents were also urged to present information in good faith about themselves and factors related to their perceptions about learning braille. After data collection, interviews were transcribed and codes were assigned to the similar expressions of the respondents. The themes were formed based on codes related to similar concepts.

Data Analysis

Coding & Thematic Analysis

The data analysis was done on the base of interview transcription. After taking the data through a semi-structured interview protocol, the data was accumulated into interview transcription. It contained two parts i.e, demographics and the answers of the respondents. The data analysis of the demographics has been given below:

Table 1: Frequencies of the Respondents based on their institutions

University/College	Sample	Frequency
University of Punjab Lahore	03	14.2%
University of Education Lahore	05	23.8%
University of Management & Technology Lahore	04	19.4%
Baha u Din Zakariya University Multan	03	14.2%
Govt. Training College for Teachers of Blind Lahore	06	28.5%
Total	21	100%

Table 1 shows that respondents from the university of Punjab were 14.2%, 23.8% from the university of education Lahore, UMT Lahore 19.4%, BZU Multan 14.2%, and government teachers college for the teachers blind, Lahore 28.5%. It means that a maximum number of respondents belong to the government training college for teachers of Blind Lahore with 28.5%.

Table 2: Frequencies Distribution as Per Gender

Gender	Numbers	Frequency
Males	09	42.8%
Females	13	61.9%

Table 2 shows that male respondents were 42.8% while female respondents were 61.9%. It shows that the maximum number of respondents were females 61.9%.

Table 3: Frequency Distribution of the Respondents with or without Visual Impairment

Status	Numbers	Frequency
Students with visual impairment	07	33.3%
Students without visual impairment	14	66.7%

Table 3 depicts that 33.3% of the respondents were with visual impairment. However, 66.7% of respondents were without visual impairment. It means that the major respondents in the study

were 66.7% who were without visual impairment.

Research Question 1: What are the challenges faced by students of special education in learning Braille at the higher education level?

Theme 1: Challenges in learning Braille
This theme has emerged from the problems which students of special education degree programs face while learning Braille in their colleges or universities. There are various challenges that students at higher education level face while learning braille including age and personal interest and these challenges can be addressed through practice and policy support (Martiniello et. Al., 2021).

Category 1: Conceptual difficulty
The category conceptual difficulty emerged from the students' interview findings based on the difficulty in understanding basic concepts of braille. It includes dot memorization, placement of dots in a cell, and sequence. The majority of the respondents have difficulty in conceptual learning the Braille system. However, one of the respondents responded that
Yes, I have a very clear concept of the Braille system. Whereas one of the respondents expressed as
Learning the position of braille dots in a cell often confused me.

Category 2: Grades Differentiations
Thematic analysis from interview transcription reveals that Braille is divided into two grades i.e, grade I & grade II. Grade I is very simple and grade II is complex with abbreviations and contractions. The majority of the respondents have an understanding of both grades of Braille but some of them have been facing problems in learning the lines of braille grade II. Additionally, one of the respondents revealed that
I have no difficulty in recognizing or learning Braille I but face problems in memorizing the signs of lines 5 to 7.

Category 3: Difference in Abbreviations & Contractions
This category depicts that abbreviations and contractions are quite different from each other. The majority of the respondents have an understanding learning of abbreviations and contractions. However, one of the respondents exposed that
I know very well the difference between abbreviations and contractions but while writing I got confused between them.

Category 5: Utilization of Haptic Sense
This category reflects the respondents' concerns about the use of haptic sense. The haptic sense is used by the respondents while touching Braille dots. The majority of the respondents have difficulty feeling Braille dots through touch sense in grade two as compared to grade one. One of the respondents expressed as
I use my haptic sense while reading through Braille. However, sometimes I feel that I do not know much about it.

Category 6: Braille Learning Anxiety
This category is based on Braille's learning anxiety. Braille learning anxiety is common among Braille learners. This category has emerged from the responses that the majority of the respondents have difficulty in reducing stress for an easy understanding of Braille. One of the respondents responded that
I feel anxious when I thought to learn Braille in my early days of braille learning. This anxiety let me forget the braille rules while writing

Category 7: Tactile training
Thematic analysis of interview transcription reveals the common responses of the respondents regarding tactile training. There is no such haptic training if it is associated with Braille learning. The majority of the respondents have no tactile sensitivity training. However, one of the respondents expressed that
I have never received tactile or haptic sense training in my life, it creates problems in learning braille and memorizing the dots patterns.

Theme 2: Reading Techniques
This theme has emerged from the techniques of reading to which students of special education comply while learning Braille. These reading techniques are significant for reading books of Braille on various subjects. The active reading process is significant while reading in Braille (Papadimitriou, 2019). However, reading is not possible by not using these techniques of reading while reading books.

Category 1: Using Pressure
The sub-theme of this category is based on the response regarding putting pressure while reading Braille content in Braille books. The majority of the respondents have an understanding of using little pressure with a finger while touching dots. One of the respondents responded that
I use my index finger by applying pressure so that I could feel appropriately but learned this skill after great practice by myself.

Category 2: Reading Aloud
The thematic analysis from interview transcription reveals that respondents do not read aloud while doing reading practice or during their reading time for Braille even though this strategy is one of the vital strategies for learning braille. However, one of the respondents exhibited surprising behavior and responded that
I read in my heart when I read Braille books. Why should I read louder?

Research Question 2: What are the efforts delineated by students at higher education levels while learning Braille?
While seeking the answer to the second question following themes and categories have emerged from the respondents' interview.

Theme 3: Written Braille Comprehension
Braille comprehension means to understand, memorize, write and then read Braille whether its content or any narrative material. Writing braille is a skill that is mandatory for every Braille learner. This theme reflects respondents' views on writing in Braille. The categories in this theme are significant for Braille learners to improve their Braille comprehension while writing. Literature has narrated cognition factors, the complexity of code, limited strategies of scanning, low redundancy, and comparison with ink print, writing difficulties, slow reading, and difficulty in writing are those problems that are concerned with Braille writing and reading (Tobin, Hill, 2015).

Category 1: Simple to Complex Words
The category of this theme is based on the response of the respondents that they tend to write or read from simple to complex words. The majority of the respondents have an understanding of the writing of simple to complex words. According to these respondents, it is significant for them to go from simple to complex words. One of the respondents expressed in the following words that
I have the habit to write or reading Braille always from simple to complex stages, writing easy words in the early stages gives braille writers confidence, and we should avoid writing braille

randomly if we want experts in braille.

Category 2: Time Management
Thematic analysis from interview transcription depicts the involvement of the respondents in writing Braille pages at a particular time. The majority of the respondents have an understanding of writing max 2 pages of basic 2 subjects daily & note down the time. Moreover, one of the respondents responded that
I note my time when I write pages of Braille in any of the subjects including English, Math, Urdu, & Arabic. The time management strategy s followed by a few of the learners.

Theme 4: Braille Rules
Braille learners are required to learn and memorize braille rules first to become good Braille experts. Therefore, this theme has emerged from learning and complying with the Braille rules, cooperation with Braille instructors, and setting time & goals to become a good Braille expert. To become teachers of visually impaired students, it is significant to have training in reading in Braille. This helps a teacher to evaluate any class activity, class tests, final exam papers, and also homework (Hamid, LaRose, 2021).

Category 1: Complying the Rules of Braille
The sub-theme of this category depicts the application and following of the rules by Braille learners. Complying with the Braille rules is significant to write and reading Braille correctly. The majority of the respondents have an understanding of learning and complying with the rules of Braille. One of the respondents responded that
I have learned Braille rules from one of my Blind teachers in college and for that, I apply all these rules while writing and reading Braille.

Category 2: Cooperation with Instructors
The thematic analysis from interview transcription is based on the cooperation of the Braille instructor. Co-operation with Braille instructors is important to learn Braille. The majority of the respondents have an understanding of cooperation with Braille instructors. One of the participants expressed as
I do what my instructor says. I know my instructor is telling me braille rules and techniques which are essential to learning braille.

Category 3: Set Goal
The category is based on the setting of goals by Braille learners. Goal setting is important to learn Braille. The majority of the respondents have an understanding of the set time & goals to become a good Braille expert. One of the participants expressed that
I have set goals during my degree program to learn Braille before the completion of my degree at my university. I decided to learn braille by heart to become an impactful teacher for visually impaired students.

Discussion
The perception of students about learning Braille in colleges and universities about gender and qualification depict numerous views which have been mentioned above with four major themes: challenges while learning Braille, reading techniques, written Braille comprehension, and Braille rules. It is generally thought that braille instructions are not provided according to standardized instructional procedures (Musgrove, Yudin, 2013). Lack of proficient Braille teachers, stigmatization, or isolation of braille teachers may be the reasons for such misconceptions (NFB, 2009).

Daily and sufficient practice is required to become a master in braille successfully (Koenig,

Holbrook, 2000). Positive impression leads to increased Braille literacy among pre-service teachers, but negative perception leads to a lack of understanding of Braille literacy (WaMunyi, 2017). There are many challenges faced by students of special education in learning Braille at higher education level such as poor haptic skills due to deficient haptic training in life, phonological unawareness, and misconceptions about braille, reading difficulties, and time constraints to drill the skills. Students in special education degree program experience difficulties in reading and writing Grade 2 braille, particularly with contractions and abbreviations, which can be confusing at times, but by applying various rules or techniques and complying with the standards of Braille literacy, they become proficient in writing and reading of Braille (WaMunyi, 2017). However, students of special education degree program experience difficulty in one, two, or even all four basic subjects i.e., English: Mathematics: Urdu & Arabic, taught in their colleges and universities. This is due to various reasons including poor Braille literacy skills, lack of interest, deficient resources for learning Braille, etc. If students get appropriate support from their Braille instructors, they become proficient in Braille which they can teach further in the future while teaching students with visual impairment. But students are not encouraged by their Braille instructors to improve their reading skills concerning the subject of English (Rooma, 2015). Nevertheless, efforts are still delineated by students at higher education levels for learning Braille such as the application of rules of writing and reading Braille, Tactile sensitivity training, and Recognizing & Memorization of Braille dots. It also includes the process of intrinsic motivation to reduce stress or anxiety for an easy understanding of Braille. Braille including contractions is taught to young children with passion. They have the time and the drive to succeed. Young people eventually gain a sense of mastery and acquisition of abilities for learning Braille. Shortage of time becomes an impediment to development (Heilbrunn & Woodin, 2018).

Conclusion

Braille requires extra time with an optimistic approach to learning. The reason for doing this is to consider it as a professional preparation task for getting employment in the field of visual impairment as a teacher. There are numerous challenges that future teachers experience while learning, writing, and reading Braille. Misconceptions of braille and discouragement of Braille learners form a barrier in the way Braille learners learn Braille with zeal and zest. In a kind of stressful environment, it is quite difficult to learn and apply the rules and techniques while writing or reading Braille. It has also been investigated in this study that there is a fascination for Braille learners and the easy subjects, but there is quite a difficult situation for Braille learners in a bit difficult subject. The reason is to read Braille which becomes much more difficult for students at the higher education level. To this concept, grade one is preferred as compared to grade two of Braille. However, grade two is essential to read and understand to meet the eligibility criteria for becoming a teacher in special education for students with visual impairment. For this reason, learners of Braille are always encouraged to make themselves proficient in both grades i.e. grade one and grade two. Therefore, the role of appropriate haptic training and phonological orientation is very mandatory for Braille learning skills.

Educational Implications
This research finds out insights of pre-service teachers of special education about their Braille learning for their upcoming professional careers. Therefore, this study is beneficial for all those students of special education who are enrolled in degree programs to become special education teachers in the field of visual impairment. It helps in understanding Braille with its learning ways and to know the barriers to learning Braille for professional preparation of pre-service teachers who wants to join special education schools for students with visual impairment. Concerning this perspective, this study is useful for braille instructors. This research highlights the significance of learning Braille for professional preparation and depicts the advantages of learning braille. This point of view helps the candidates in the special education teaching field. This study defines the

standards of learning Braille which can be useful for those institutes, colleges, and universities that can set standards for learning Braille. Additionally, this study defines the ways to learn braille.

The proven findings and recommendations of this study can also be useful for the special education department of Punjab to develop a handout or a book template for the promulgation of Braille learning skills. Furthermore, this study motivates fresh students to get admission to special education for learning and teaching Braille to students with visual impairment.

Recommendations

The followings are the recommendations of this study:

1. Students of special education at the higher education levels must be provided with appropriate Braille learning support by their colleges and universities.
2. There should be training in haptic sense sharpness which could enable the Braille learners to feel all kinds of Braille dots easily whether they are sighted or not.
3. Students of special education at the higher education level must be motivated and encouraged from time to time by their teachers for using and spending time in Braille learning i.e., reading and writing to become good Braille teachers
4. Students in special education degree programs should practice Braille more and more to get competence. Interest-based practice is recommended.
5. The application of Braille rules must be taught accurately to students of special education in their institutes so that they could become good teachers in the future.

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