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Challenges Encountered by Students with Visual Impairment in the Exclusion of Mathematics Education

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Abstract

The integration of students with visual impairment in learning mathematics in school constitutes one of the major challenges in Ethiopia. Most of the educational curriculum is oriented towards the use of the eyesight. To give insight into the situations of challenges faced by blind/visually impaired students due to the exclusion of mathematics education. The study employed a qualitative research approach and purposive sampling technique. From 25 participants 15 of them participated in an interview and 10 participated in focus group discussion guided by semi-structured instruments. Interviews focus group discussion and the key informant interview was employed to get relevant and sufficient data. Accordingly, the thematic data analysis procedure delineated was used. The study was carried out at Sidist kilo campus in Addis Ababa University. Multifaceted challenges encountered by blind/visual impaired students due to the exclusion of math education. Individual's attitudinal or institutional barriers, the existing exclusive curriculum and the use of assistive technology could be an impediment to learn mathematics and its related fields. The result confirmed that the majority of the participants revealed that due to the exclusion of learning mathematics, they are encountered with marginalization from different fields at the university. Ministry of education, the regional educational bureau, schools, and teachers will consistently implement a dependable inclusive for mathematics education and provision of necessary support for the needs of blind students in learning mathematics.

Keywords: Exclusion, challenges, special needs, inclusive education

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1. Introduction

Mathematics emerges as a critical school subject that determines success in life. From pre-school knowledge about simple calculations is important as a foundation for further education (*Agrawal, 2004*, Beal, and Shaw, 2008*).* Inclusive education in mathematics is a blueprint regularly which has a scrupulous core on those learners with visual impairment (Buhagiar, and Tanti, 2013; Diane, Smith, and Brayant, 2012; Martin, Brenda and Michele, 2012). The various studies have revealed the importance of Mathematics for the blind students and it has been very well established that loss of vision does not restrict the learning of Mathematics (Hansen, Shute, & Landau, 2010). In contrast to those who believe mathematics requires visualization, various research shows that blind can learn mathematics, not necessarily under the same conditions or with the same teaching methods (Rosenblum and Herzberg, 2015; Rosenblum, Cheng and Beal, 2018).

Recent research in the area of accessible Mathematics is geared toward graphing and Mathematics or Science texts in electronic format. As computers have become an invaluable tool in all aspects of life, several researchers have worked on and introduced software that could aid visually impaired and blind students in their learning of Mathematics (Alkhashrami, 2009, and Carole, and Penny, 2018). Moreover, a project developed by (Robert Stevens, 2003) at the University of York called *Math talk* has solved difficulties in the learning of Algebra. (Sanchez and Flores, 2005) for the University of Chile have introduced *Audio Math.* Software that aimed at enhancing visually impaired students' memory and mathematical skills through audio. All possible alternatives have to be explored for making the teaching and learning in Mathematics more purposeful (Emerson, and Anderson, 2018; *Martin, and Herrera, 2007).*

The integration of students with visual impairment in learning mathematics in school constitutes one of the major challenges in Ethiopia. Most of the educational curriculum is oriented towards the use of the eyesight. This requirement poses paramount challenges to the blind and visually impaired students (Dagnew, 2013; Teshome, 2006; and Tirussew, 2006). Currently, the Ethiopian educational policies and strategies can be considered a reform that

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aims to address the needs of visually impaired students through inclusive education. However, there are several criticisms of the lack of implementation of this assumption (Asrat, 2013; Dagnew, 2013; Tebeje, 2014; Zelalem, 2018;Teferi, 2018).

As far as the educational setting is concerned, most of the curriculum presumes that the student has perfect eyesight. Most of the educational curricula tend to be eyes-intensive, which makes eyesight as an important feature to take full advantage of educational opportunities. Therefore, the curriculum in regular schools is designed for fully sighted children and is delivered largely through sight-related tasks. It is imperative to understand and appreciate the challenges faced by visually impaired students in an academic setting and various strategies utilized by them to mitigate the challenges (Adababneh, and Hassan, 2012).

Majority of the educational programs in Ethiopian universities like management, accounting, computer science, economics, business, etc, at the college and university level, have excluded the visually impaired learners. This exclusion of students with visual impairments may result in restricting their opportunity to join different fields at the university level (Teferi, 2018). Although, Schools throughout Ethiopia emphasized instruction in mathematics, consideration for the adaptations needed to ensure inclusion of mathematics education since seven grades for students with visual impairments is hardly ever established since junior level. Due to this exclusion, learners with visual impairment in Ethiopia undergo serious challenges in accessing different opportunities In actual fact, this marginalized the blind students rather than essential zing them learning in the field of the different professions at college and university level (Jacklin, Robinson, O'Meara, and Harris, 2007;Lewis, 2009; Orsini-Jones, 2009; Saint, 2004;Teferi, 2018). Despite the potential usefulness of mathematics education for learners with visual impairments, all of the schools, colleges, and universities that are found in Ethiopia have not been providing a mathematics education. With these constraints that the researchers feel that there is a need to carry out a research in inclusive education regarding mathematics education for learners with Visual Impairment. Thus, this study is aimed at

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identifying the issue of factors/challenges faced by blind/visually impaired students' due to the exclusion of mathematics education with particular reference to sadist kilo campus in Addis Ababa University.

2. Material and Methods

2.1 Research Design

The research method that was employed during this study was the qualitative research approach. The justification for using the method is that the research study was conducted at a single point in a time and was largely based on subjective interpretation of the participants. As (Nick, 2010) elaborated, qualitative research tends to be interpretive and seeks to understand a phenomenon in its context in greater depth. Moreover, it seeks to elucidate the nature of social practices, relationships, and beliefs along with the meaning of human experiences from the participant's point of view. Since the major interest of the researcher was to understand challenges faced by blind learners in the exclusion of mathematics education, the qualitative methodology which imparts phenomenological theory was chosen to conduct the research study. Because this qualitative approach allowed the researcher to access the personal experiences of the informants who frame, articulate, and reveals life as experienced in a case structure (Neuman, 2007).

Comprehending the benefits above, the researcher realized that this method is an exploration process to understand the phenomenon in its entirety, rather than just focusing on specific concepts. Hence this research, as a form of case study phenomenological inquiry aimed at capturing the experiences of blind learners. Thus since the study used an exploratory qualitative approach, substantial data were collected, analyzed, and interpreted about the research objectives. Results were illustrated in themes, which were derived from the challenges experienced by blind/visually impaired students due to the exclusion in learning mathematics education.

2.2 Sampling Technique and Data Collection of the study

The participants were selected using the purposive sampling technique. From these techniques, convenience and purposive techniques were chosen to select the participants. Based on their convenient accessibility and proximity for the study, the

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convenience technique was used to select 15 participants for the interview, 10 discussants for focus group discussion (FGD), and five key informants were selected. According to Creswell (2014), the sample size of qualitative research is largely determined by theoretical data saturation especially at a point during the data collection stage where new participants do not any longer bring new data or additional insights to the research questions. The participants were selected from Sidist Kilo Campus in Addis Ababa University because it is one of the academic institutions that are practicing inclusion of students with visual impairments and the key informants (special needs professionals) from the ministry of education and sidist kilo campus was selected.

Inclusion Criteria: during the sampling process, the study included 16 male and 9 female blind students' participants from the first, second, third, fourth year, and fifth-year university students.

The researcher employed different data collection instruments to get relevant and sufficient data that were needed in the study. To gain an understanding of the challenges encountered by blind learners due to the exclusion of mathematics education, the researcher conducted qualitative interviews and focus group discussions with a total of 25 blind individuals (9 of females and 16 of males students). Of these, Nineteen of the participants were completely blind and the remaining six had low vision. Only one participant reported having slight difficulty in hearing along with the blindness. The first method that the researcher employed was an interview. It was the primary technique used by the researcher to gather data using semi-structured questions. In this research, face to face interview was used as a tool for data collection. Based on the participants' consent, audio recording and note-taking were used in the study session. The interviews were recorded in the "Amharic" language, and were later translated into English. The questions were intentionally kept open-ended to capture the student's real-life academic experiences. Regarding the Key informant interview, (the former blind students who thought inside kilo campus in Addis ababa university, special needs professionals from the ministry of education and sidist kilo university) were chosen to share their views and experiences on the issue and understand their stance in dealing with the problem of exclusion in

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learning mathematics subject to the blind/visual impaired learners.

The second technique is Focus Group Discussion. Through focus group discussion of the data gathering technique, the researcher planned to obtain relevant qualitative data, which encompasses the discussant attitudes, opinions, and feelings. Selection of participants of FGD was done deliberately by enlisting females and males students who are attending their education at sadist kilo campus in Addis Ababa University. Accordingly, from the total of 25 participants, two focus group discussion sessions were arranged (one group from female's students and one group from male's students). Each comprising five discussants and a total of ten discussants participated. The discussion lasted for one and a half hours. The researcher used a discussion guide which has drawn up from relevant questions geared to obtain richer information. To facilitate the discussions, the researcher employed different communication techniques. These included, probing, clarifying, reflecting, paraphrasing, and summarizing.

The thematic data analysis procedure delineated by (Braun and Clarke, 2006) was used. The data were analyzed by the constant comparison method by referring to qualitative analysis.

3. Results of the Study

This section presents the analysis and interpretation of the research findings. During the data analysis, the following categories based on the comprehensive themes were presented. These are challenges encountered by visually impaired students due to the exclusion of mathematics education, reasons that hindered for the implementation of inclusive mathematics education, and strategies that can be employed to ensure the realization of inclusion of mathematics education for visually impaired learners. Researcher attempted to reach 15 students for interview, and received a total of 10 responses because of data saturation. Six of the participants were male and the remaining four were female students.

Challenges encountered by blind learners due to the exclusion of Math Subject.

The finding confirmed that the participants are experienced different challenges due to the exclusion in learning mathematics

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education. These include, segregation from participating in different fields at university, individual's attitudinal problems or institutional barriers, and curriculum problems could be an impediment to learn mathematics and its related fields. **The interviews** participant 1:

P1 is a female student and partially sighted, she was 2nd year special needs education student when I was interviewing to her. She narrated as she followed high school education in a regular school along with sighted peers. She attended Math up to the 10th-grade level. About the way mathematics was taught at high school, she said "I could not benefit enough from my high school education in terms of learning mathematics. There were so many challenges for me". She expressed her experience and dissatisfaction with the mathematics taught in high school. During the course of the interview, she mentioned the detailed challenges. The teachers generally read aloud the text on request. If she missed any information from the teacher's narrative, her peers used to explain it to her.

She explained that besides the traditional teaching method and frequent use of the blackboard for teaching, her teachers also used uncertain directional cues; which created another problem. She added that "she had serious problems in geometry lessons". She reiterated the use of enlarged diagrams while grasping the concepts in Geometry. She also alluded to a home-grown workaround of using a chessboard and a woolen thread to create raised geometry figures. On probing "so you never used tactile graphics", she mentioned the use of "tactile graphics" for understanding graphs and charts. When the teacher would say things like take this and put it here, I did not understand what he meant. She stated that teachers did not have enough information about visually impaired learning materials about mathematics and they were not interested in teaching about us. My classmates' help with mathematical content was no longer enough. I felt like I was not able to learn. I became a disadvantage in learning mathematics.

She clarified that however, she was successful in mathematics and she loved it, the condition forced her to break in learning math since 10 grades. She narrated, not learning mathematics and related subjects at preparatory school restricted her to be involved in the department she wanted to

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join. As a result, she said, “I was forced to choose to study a field, not because I am interested in it”. According to her description, teachers' lack of awareness, lack of interest or motivation by schools to teach blind students in mathematics, lack of supervision, and negligence by the Ministry of Education are all factors that contribute to the challenge. Therefore, the concerned government bodies must work hard to enforce our right to education in all subjects by the constitution of our country.

Participant 2

P2, He was blind from birth and had no visual sight. He was a 5^{th-}year law department student when I was interviewed by him. He learned mathematics education till 9th grade. He explains his experience regarding mathematics as follows. He said, when I was in high school, mathematics teachers gave an oral explanation to mathematics problems at hand for the sake of students with visual impairment. They spoke out or explained whatever they wrote or put it on the blackboard so that visually impaired students could follow them. This was true until grade 8. But in the case of grade 9, one of the mathematics teachers for the section the three visually impaired attended, openly refused to say anything in their favor claiming that he had not come to teach the blind and that he did not know how they studied mathematics. This lack of awareness was a serious barrier to him to learn mathematics education at high school.

He suggested that if provided with the right tools and instructions, potentially he can learn math. He narrated, “I wanted to go to university and study management, but I could not perform it because of the lack of mathematics knowledge. Instead, he says, I have to study the field that I do not want”. He stated the challenges he faced due to the limitation of mathematics knowledge have been very much restricted him from studying the field he wanted to study. In my opinion, to solve the problem of blind students not being able to learn math, it is important to have a clear understanding of all levels, including teachers, schools, and policymakers. In addition, it requires proper monitoring to ensure that inclusive education is implemented properly.

Participant 3

P3 said, “I was born in Hawassa and I lost my sight as a 9th-grade student. Due to the unavailability of braille training in my area

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at the time, I was unable to continue my education. Then, I came to Addis Ababa to get braille training and to continue my education. After taking the Braille training in Yemisrach braille training center in 5 Kilo, I persisted in my interrupted education since 9th grade. And I did well in the 12th grade and went to Sidist Kilo Campus and am now a third-year sociology student. When I was a sighted student, I loved math and related subjects like physics, chemistry and I was successful in all subjects. When I was sighted, I wanted to study physics at a university, but Due to the lack of a suitable education system with related to mathematics and its related fields for the blind in our country, I could not get the education I wanted. Although in our country, some subjects of social science are reachable in the inclusive education system at university, most of them are not allowed to blind students.

When I asked the participant about his high school education, he shared it with me. According to him, I personally applied for a school permit to study math and related subjects, but I was unable to do so because neither the school principal nor the teachers refused to teach me. School officials and teachers told me that because of the lack of curriculum, assistive technologies, and trained teachers, they could not teach math and math to blind students. This indicates that due to the country's limited focus on education for blind students; it has not been possible to expand educational opportunities for blind students. In my opinion, this problem is not caused by the incompetence of blind students, but by the problem of consciousness or the attenuation problem of the concerned bodies. Therefore, to solve the challenges I have mentioned above, blind students must primarily demand and enforce their rights. This is because our constitution gives us the right to education without discrimination.

Participant 4

P4 has been blind since the age of 22. When I asked him to describe his past experience, he responded insightfully. When he was a third-year student at Arat Kilo Campus, he lost his eyes and was totally blind. He pronounced “I was able to see and I had no sight problem until third-year university]. Although I have math skills and I want to continue my studies in engineering, the university did not allow me to do so, so I was forced to interrupt my education and

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compelled to be involved in another social field. To continue my education in another field, I need to have Braille knowledge. So, I took Brailleskill training at Yemsrach center in Addis Ababa. After a year of braille training, I have re-entered in law school and continued my study in the law field at sidist Kilo campus.

When he narrated his story, to continue his new field in the law department, he faced some challenges because he was a natural science student. He said, "I had a hard time in studying law because I didn't have much knowledge of social studies. After many struggles, I was able to overcome the problem I encountered in the new department". He said that although I did not have the same math problems and experiences as other blind students, I believed math was important for the blind. In my opinion, if math education is properly started from the bottom, other junior blind students may not have the same problem as senior blind learners faced.

Participant 5

P5 narrated her story as follows. She has been completely blind after birth. She was a third-year social work student. She received primary education till six grades at Sebeta blind school. From ninth grade to twelfth grade onwards she had followed her education at Sebeta elementary school, a high-school and preparatory school in a regular school with sighted peers. She learned math up to sixth grade. In the context of Math, she mentioned that, till 6th grade, she had thought of basic arithmetic concepts. At the blind school, in the very beginning, she was able to learn math's using Braille. She said, since seventh grade, the school system did not allow blind students to learn math subjects, which resulted in the discontinuation of learning math subjects. However, she stated, to satisfy her curiosity or desire to know, learning mathematics would be the means for satisfying her desire.

When she described her experience, she said she wanted to learn mathematics during his elementary, but was unable to do so because the school system did not allow blind students to teach mathematics.

She narrated that while "I wanted to study economics, the department did not allow me to involve in the field because of the existence of certain math content in the economics course". She pronounced that it

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is a known lack of awareness in our country's universities, but it is well known that blind students in other parts of the world can drop math-related courses and be involved in different departments during their stay at the university. She further revealed that however, Universities that are found in our country do not allow blind students to involve in different fields except in certain fields unless they are required mathematics concepts. All of these challenges are caused by a lack of awareness at both schools and universities, and professionals working in Special Needs should provide the necessary awareness training to all concerned. Otherwise, she says, the problem will never be solved.

> The data gained from the FGD participants, the main challenges in their academic sphere is they are enforced to join in various departments without their inquisitiveness to participate in different fields at university. According to the FGD participants narrative, "we lack of access to join in various departments has limited us to certain professions. The effect of this situation is that when we graduate from university, we only work in a certain organization. This leads to various forms of discrimination. For example, during employment, we suffer from high unemployment because we are not allowed to hire different organizations due to our size". The discussants gave their perception that, mathematics is a key enabler for the right to an inclusive education and support in all academic areas as well as in expanding other professions.

Reasons that hindered for the implementation of inclusive mathematics education for blind/visual impaired students majority of the participants identified various factors that can be the reason for the exclusion of students with visual impairment in the learning process of mathematics. They also pronounced that lack of awareness concerning the capacity in the study of mathematics by students with visual impairment, ignorance of the existence of inclusive curriculum, special assistive devices, and mathematics learning materials for the blind, etc. is likely to have contributed reasons in the exclusion of Students' with a visual impairment from the learning process of mathematics.

Participant 1:

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P1: She was a third-year sociology student. She is completely blind since the age of 12. After losing her sight due to glaucoma, she had to shift to a blind school, where she learned Braille. She studied Math till 6th grade only. She specifically mentioned that the blind school officials did not allow her to take up Math beyond 6th grade. As a result, throughout her high school education, she was compelled to interrupt in learning Math. She pronounced that reason for the exclusion of learning math for the blind might be lack of awareness, teachers' lack of pre-knowledge and ignorance of the existence of curriculum and special assistive devices and mathematics learning materials, etc is likely to have contributed factors in the exclusion of students with a visual impairment from the learning process of mathematics.

In the sociology department where I am studying, a statistic and quantitative research course are offered. The courses I mentioned above require mathematics. As a result, we cannot take these courses. Therefore, when we want to do research, we have to ask for help from students who are able to see.

She describes, as sighted students, we blind students can learn mathematics subjects if we have all the necessary learning materials are available. However, education policy enforcement, school-based problems, teacher attitudes, and cultural influences prevent blind students from learning math. She added that Mathematics teachers do not know about the special abacus for us, the Braille alphabet, or how to use these effectively in mathematics lessons. She said, it is possible to take advantage of different opportunities by enrolling blind students in mathematics to involve them in different departments of the university.

Participant 2

P2 was a 2nd-year political science department student. He was partially sighted. He stated his perception about the exclusion of learning mathematics, limits his involvement in different fields in diverse departments he can involve. He viewed reason for the exclusion of learning mathematics education can be realized in various ways. Like, Teacher training institutions, usually, do not give supplementary or complimentary training to teachers for teaching students with visual impairment and the institutions themselves may not have the information or knowledge as to how students with visual impairment

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could be taught. He added that math teachers have some prejudice about how to give inclusive education in math lessons for the blind. He said when I was an eighth-grade student; the mathematics teacher told me that visually impaired students cannot learn mathematics. He narrated I utterly do not agree with this idea. Because of the special equipment or assistive devices for learning is facilitated can learn mathematics. He explained that his teacher tried to ignore him and did not care about his attainment in learning mathematics. He added that teachers' limited awareness in teaching mathematics to address the individual needs of blind students had negative consequences to learn mathematics. He described, Although, mathematics subject is more vital for visually impaired learners to support them in all academic areas at college and university level, individuals' attitudinal problem or institutional barriers that could be an obstruction to learn mathematics and other related fields as their sighted peers. According to his remark, to solve the problem from the bottom up, the schools and universities system have a preference that the visually impaired students should exempt any visual-based portion from learning including mathematics and different fields. Majority of the participants confirmed that as they have an interest to learn mathematics, individuals' attitudinal problems or institutional barriers that could be an obstruction to learn mathematics and other related fields as their sighted peers.

Participant 3

P3 was a 2nd year English department student. She was partially sighted from birth. Her sight rate was very limited. She was living with her parents. She was attended her primary and secondary school in the regular school with sighted peers. She did not know about the Braille writing and reading style. There is no special training center to learn braille. Therefore, she can attend her education by recording using a tape recorder when she was in elementary and high school. She illustrated at the time, she can use the computer for her educational purpose at university. She actually attended mathematics to neither an elementary nor a middle school. As a result, she is imposed to depend on others sighted persons in matters involving mathematical operations. She expressed her views on mathematics as, although her opinion on the inclusive education regarding mathematics was generally positive, she expressed her

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concern about the way mathematics was taught at elementary and high school, "I could not benefit enough from my high school education in terms of learning mathematics. There were so many challenges for me".

She narrated her views, Some of The Challenges of this sidist Kilo University where I study is that all blind students are taught in limited departments and we are often assigned to a specific department. This situation makes it difficult for us to find students who can read and help us. In addition, during the exam time, we also find it difficult to find examiners. She said, in my opinion, all of this could have been avoided if blind students could have entered different departments in the university. This can only happen if, according to university law, blind students can learn math since elementary school. In fact, in the other world, only blind students are taught a course that they can learn. However, the university leaders of this country do not allow us to study mathematics-related fields in general because they have lack of awareness.

Participant 4:

P4 was a let blind, and participated in the interview when He was a second-year law department student. He elucidated his history, "I was blind to the pain I experienced when I was in the 12th grade. I was a natural science student before I lost my sight. As only blind students can involve in the social science field, I started school again by reviewing since ninth grade. Although I had a background in mathematics, I could not continue my studies in natural sciences, because I was not allowed to study at a university in the field of natural sciences. As a result, I was forced to study law in the social sciences". Before entering the law department, I applied to arat kilo campus to study computer science. But because of my blindness, the university was not willing to accept me. As a result, I was forced to continue my law studies at sides Kilo Campus.

He clarified his observation when he was a high school student, the school could be ignorant of the needed special equipment or assistive devices for teaching mathematics to students

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with visual impairment. He narrated; complacency on the part of students with visual impairment for being exempted from learning mathematics might have contributed to their exclusion from being taught mathematics. According to his explanation, failure by the authorities responsible for education to take steps to include students with visual impairment in the learning process of mathematics and other subjects involving aspects of mathematics may be another factor for such exclusion. Therefore to solve this problem, government intervention, especially the Ministry of Education, must work hard for the implementation of mathematics education in an inclusive manner to the blind.

Participant 5:

P5 is a blind lecturer at a university. He is a Ph.D. student in the Department of Social Work. He holds his first degree in sociology and is taught in the same profession. He pronounced, even though, I wanted to continue my master's degree in sociology, but the Department of Sociology at sides Kilo University did not allow blind students to study, so I had to pursue my master's and Ph.D. studies in the Social Work department. The department's reason for not accepting blind students is that some courses require mathematics and blind students do not know math. I was forced to join the Social Work Department because of the limitation of my math knowledge. Such an experience is a problem not only for me but also for most blind students.

He said, in my opinion, blind students are not allowed to study mathematics, not because they cannot learn math, but because the education system in our country is not inclusive. He explained his views as Schools' motivation to make blind students learn math, teachers' awareness, curriculum problems, and other related challenges prevent blind students from learning math in the inclusive education system. To solve this problem, he the relevant bodies, for example, the Ministry of Education, the education system developers must pay attention and work hard. Therefore, to solve such problems, if blind students are taught math and related subjects from elementary school, mathematical challenges can be avoided.

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The results indicate that education policy enforcement, school-based problems, teacher attitudes, and cultural influences prevent blind students from learning math. Majority of the participants revealed that failure by the authorities responsible for education to take steps to include students with visual impairment in the learning process of mathematics and other subjects involving aspects of mathematics may be another factor for such exclusion. Special needs professionals who participated in the interview revealed that attitudinal and Cultural obstacles are related to blind students' weak motivation to study math. They also argue that a lack of awareness regarding the capacity of persons with visual impairment in learning mathematics on the part of curriculum developers could be another problem or barrier, especially at higher levels. They highlight creating special curricula for blind students in primary, preparatory, and secondary stages.

They gave their insight that blind students need an integrated math's curriculum that observes their special conditions. Such as providing physical objects, models, mathematical language, and comprehensive communication tools for math, as well as integrating other systems - like Braille - for mathematical symbols. The interviewees also articulated, Teacher training institutions, usually, do not give supplementary or complementary training to mathematics teachers and the institutions themselves may not have the information or knowledge as to how students with visual impairment could be taught.

They gave their perception of the failure by the Ministry of Education and Regional Education offices to take the initiative of addressing the barriers that are adversely affecting students with visual impairment with respect including them in the learning process of mathematics; schools at all levels may not be motivated to address such barriers. Maybe, students with visual impairment have not done enough, or even have failed in fighting for inclusion in the learning process of mathematics and this may be a factor that has kept schools and institutions from taking the necessary measures to rectify the existing discrepancy. They verified the launching of mathematics, as planned to be opened, it covers a full range of assistive and mainstream education that enables a student with a visual disability to enjoy an inclusive education. They point

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out that blind students can study and understand significant elements of Mathematics. Besides, they also pronounced complacency on the part of students with visual impairment for being exempted from learning mathematics and related fields might have contributed to their exclusion from being taught mathematics. They verified that failure by the authorities responsible for education to take steps to include students with visual impairment in the learning process of mathematics subjects may be another factor for such exclusion.

4. Discussion of Findings

The finding revealed that there are several future concerns the participants experienced due to the exclusion of math education. These include, individual's attitudinal problem or institutional blockades, curriculum barriers, and use of assistive technology could be an impediment to learn mathematics and mathematics-related fields. Each of the problems identified by participants due to the exclusion of mathematics education is linked to others challenges, either as a contributing factor to involve in different fields at university. Research conducted by (Orsini-Jones, 2009) has shown that blind university students face a variety of challenges during their studies.

FGD discussant also reported that blind/visually impaired learners have no chance to learn mathematics subjects, Because of a lack of awareness of issues related to vision impairment. The finding also confirmed that as they have the interest to learn mathematics, individuals' attitudinal problems or institutional barriers that could be an obstruction to learn mathematics and other related fields as their sighted peers. This finding was supported by (Bader, 2006; Brawand, Johnson and Kolvites, 2015) who confirmed that the exclusion of learners with visual impairment in mathematics education could be an obstruction to succeed their education less likely than their sighted classmates.

The study signified that the participants gave their insight that mathematics subject is more vital for visually impaired learners to support them in all academic areas at the university level. Most of the opinions reported by interviewees and discussants pronounced that a thorough understanding of mathematics enhances educational and occupational opportunities for all blind/visual impaired people. They revealed

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that there are likely to be students with visual impairment that are naturally gifted in mathematics and as such if they are given the chance of learning this subject, they could have the opportunity of pursuing an alternative field of professional career. According to their expression math's subject can apply current technical concepts and practice in the core area of mathematics.

Some of the participants describe, as sighted students, they can learn mathematics subjects if the necessary learning materials are available. According to a study conducted by (Sanchez & Flores, 2005), blind students can easily learn math with the help of various assistive technology. They validated in their study, if blind students they were allowed to study mathematics, they would be able to learn math like other sighted students. The finding also supported by the study conducted by the works of (*Agrawal, 2004;* Martin and Herrera, 2007; Beal, and Shaw, 2008; Giesen, Cavenaugh and McDonnall, 2012) who demonstrated that if provided with the right tools and instructions, potentially every blind student can appropriately learn math. The finding from special needs professionals verified that the launching of mathematics education has the potential to facilitate the inclusion of students with visual impairments. Researchers such as (Beal, and Shaw, 2008) affirmed in their research, if provided with the right tools and instructions, potentially every blind student can be engaged in a Mathematical task.

5. Conclusions

The study intended to explore challenges that visually impaired students encounter with various difficulties due to the exclusion of mathematics subjects. In this research study 25, blind/visually impaired students and five key informants participated. The findings of this study exemplify the multifaceted challenges encountered by blind/visual impaired students due to the exclusion of math education, limits the fields of study they can pursue from participating in different fields at university. The result confirmed that the majority of the participants gave their perception that mathematics is a key enabler for the right to an inclusive education and support in all academic areas as well as in expanding other professions.

About the perception of visually impaired learners towards mathematics education, the findings showed that students with visual

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impairment agreed that mathematics education is more essential for visually impaired learners to support them in all academic areas at the university level. If they are given the chance of learning this subject, they could have the opportunity of pursuing an alternative field of professional career and practice in the core area of mathematics. Hence, learning mathematics is an important input for persons with visual impairment. As sighted students, learners with visual impairment may desire to have knowledge or wish to know the concept of any discipline or subject. So, to satisfy their curiosity or desire to know, learning mathematics would be the means for satisfying such desire or wish.

The key informants demonstrated that the launching of mathematics education for blind/visual impaired learners has the potential to facilitate the inclusion of students with visual impairments in different fields at the college and university level. It is consultable from this datum that their perception about mathematics learning in the academic sphere was very significant for visually impaired learners. So the researcher recommends that the concerned body like the ministry of education, schools, etc. should give an acute attention to the subject of mathematics to make it inclusive for the blind at primary school would be part of their focusing area.

6. *Recommendations*

Based on the findings from the research study, the following recommendations are forwarded:

1. Ministry of education, schools, etc take action like adapting curriculum, arranging necessary materials to make inclusive mathematics for visually impaired learners.
2. Advocacy and policy issues should be instituted for the benefit of visually impaired students regarding mathematics;
3. Involving well-qualified special needs experts in the development of the curriculum is likely to be useful in the developing process.
4. Acquainting adaptive technology products and making such products easily available at affordable prices to the users

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