

## ANALYSIS OF LEARNING STYLE AND MATHEMATICAL LITERACY ABILITY WITH DISABILITIES IN VISIBLE STUDENTS

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**Abstract:** Learning styles for the blind are very important to know. this is to help accuracy in the learning process carried out so that the material can be well received. Likewise, with the ability of the blind master's mathematical literacy, it is important to measure the ability of the blind master to understand material related to mathematics. This study aimed to determine the learning styles and mathematical literacy abilities of the blind. The subjects taken were the blind with the blind type. Qualitative research using observation data collection methods and unstructured interviews. The conclusion is that the learning styles of the blind type are auditory and kinesthetic. While the ability of mathematical literacy is not good because it only meets one indicator of the problem formulation. It needs to be studied further, the same thing for other types of blindness.

**Keywords:** Learning Style, Mathematical Literacy Ability, Disabilities, Visible Students

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### INTRODUCTION

Learning style or learning method refers to the way a person processes, assimilates, and remembers new information. There are several different learning styles, and some of them are more effective for certain individuals than others (Panglipur, 2023). Here are several kinds of learning styles, namely 1). Visual: People with a visual learning style process information by looking at pictures, graphs, and diagrams, 2) Auditory: People with an auditory learning style process information by listening to sounds, words, and dialogue, 3) Kinesthetic: People with a kinesthetic learning style process information by doing physical activities or practices, such as drawing, writing, or taking notes, 4) Tactile: People with a tactile learning style process information by touching or holding physical objects or objects, 5) Verbal: People with a verbal learning style process information by reading or writing (Wahyuni, 2017). Everyone has different learning styles, and it can help improve learning effectiveness if one can adapt learning methods to their learning style (Hasanudin & Fitriani, 2019). Renewal of this research by finding learning styles that focus on the blind type of blind disability

Mathematical literacy ability is a person's ability to understand, use, and communicate mathematical information and ideas in everyday life. This includes an understanding of mathematical concepts, the ability to apply these concepts in real situations, and the ability to communicate mathematical ideas effectively (Panglipur & Mahendra, 2022). Mathematical literacy skills are important because mathematics is a universal language that is used in many aspects of life, including in the fields of science, technology, business, and finance. In addition, mathematical literacy ability is also an important indicator of one's academic success (Marina & Yani, 2016). In addition to literacy skills, it is necessary to look at the stages of literacy skills (Darwanto et al., 2022).

Learning mathematics for the blind can be a challenge because most mathematics teaching materials use pictures, graphs, and diagrams that are difficult for the blind to

access. However, there are several ways to teach math to the blind, including (Widyastuti, 2016):

1. Using Braille: Braille is a writing system using dots that are felt with the fingertips. Blind people can learn mathematics through Braille books especially made for this subject.
2. Using teaching aids: There are many math teaching aids for the blind available, such as Braille counters, felt calipers, and special graph paper with felt lines and dots.
3. Using verbalization: Teachers can teach mathematical concepts through verbalization by explaining mathematical concepts orally and using concrete examples.
4. Using technology: There are many math apps and software specifically designed for the blind, such as software that produces a sound when a button is pressed, so that the blind can get audio feedback about their math operations.
5. Using three-dimensional models: Three-dimensional models can be used to teach math concepts to the blind, just as they can be used to teach geometry concepts.

In teaching mathematics to the blind, it is important to pay attention to individual needs and adapt teaching methods to their needs. Therefore it is important to know the learning styles of the blind so that mathematics teaching can be appropriate. In addition, mathematical literacy skills related to the daily life of blind people are very important to support their daily activities. Mathematical literacy for the blind includes a person's ability to understand, use, and communicate mathematical information and ideas in everyday life, which are by the abilities of the blind. In addition, it is important to provide blind people with opportunities to practice and apply mathematical concepts in real situations. Gifts that are relevant to everyday life, such as managing finances and solving problems.

In-depth knowledge about learning styles and mathematical literacy abilities in the blind is very interesting and is needed for research to be carried out to help blind teachers to get better and more precise learning to get a good understanding of mathematics material. Besides that, it can help the blind carry out their daily activities for the better. This research took one student as the subject of the Special Education study program at PGRI Argopuro University, Jember, with the moderately blind category. Subject categories were determined based on clinical trials from health institutions that were included when subjects entered college. The results of this test are documented by the head of the study program. Subjects were recommended by the head of the study program based on having good academic skills and being very good at communicating.

## **METHOD**

The research was designed using qualitative research by analyzing the phenomena that occur in subjects related to their learning styles and mathematical literacy abilities. The source of the data in this study involved subjects with visual impairments as many as 1 person with an undergraduate degree who was blind. The source of the data in this study was by taking a blind type of blind subject (total blindness). The selection of this subject is based on the type of visual impairment with the most severe limitations (Rosyendra et al., 2017). Blind type (totally blind) is a type that is suffered from birth so that it has no basic visual (has no visual memory at all) (Sofiyatil 'Ilmi MB, 2023). This type has the most learning difficulties when compared to other types of blindness (Darwanto et al., 2022). This is very interesting to study to get results about their learning style with the assumption that if the type of blind person has known his learning style and ability to

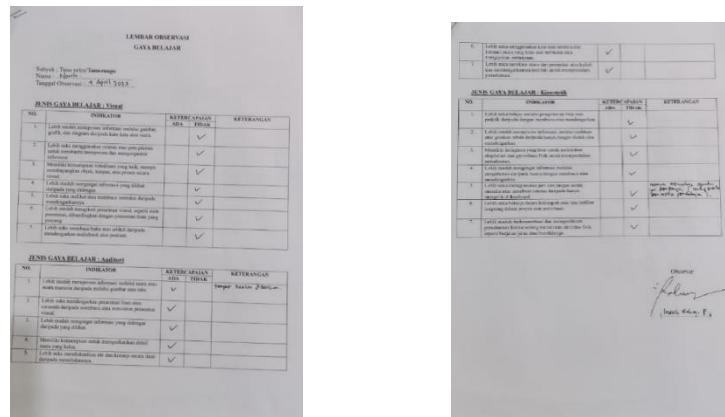
mathematical literacy then other blind people will have the same thing. this is because other blind people have lighter limitations. The focus of this research is only on the blind type of blind disability and not on other disabilities because special research on disability subjects cannot only be done with detailed analysis and according to the disability group. So that the results obtained in the study are sharper and more precise (Khasanah, 2020). Data collection techniques carried out in this study used observation and interviews. researchers have prepared in advance the observation instruments and the interviews conducted were unstructured interviews. The interviews and observations used aim to obtain mutually supportive data. The results of these 2 methods are expected to obtain valid data. Observations were conducted to collect data about understanding learning styles and mathematical literacy abilities, interviews were conducted to determine mathematical literacy abilities adjusted from the observations. Mathematical literacy ability, namely the first indicator formulates real problems, the second indicator uses mathematics, the third indicator interprets solutions, and the fourth indicator fulfills, namely evaluating solutions (Utami et al., 2020) are shown in tabular form below Table 1. The selection of observation and interview methods is a recommendation from the head of the study program by looking at the communication skills and limitations of the subject's writing. Data analysis was carried out from the data collection results using descriptive analysis so that the research objectives describe the data in a detailed and clear history.

**Table 1.** Indicators of Mathematical Literacy

No.	Indikator Mathematical literacy ability
1	formulates real problems
2	uses mathematics
3	interprets solutions
4	evaluating solutions

## RESULT

The research was carried out on April 4, 2023, in the classrooms of the Education Study Program PLB, PGRI Argopuro University, Jember. Activities were carried out by observation and unstructured interviews. In this activity, a learning video was given about geometric shapes and shapes. Based on the Learning Style Instrument in Figure 1, the subjects did not meet the indicators for visual learning styles, the subjects met the indicators for auditory and kinesthetic learning styles. although there are a few notes worth noting. The ability to hear the subject is very sharp and good than the media used using video. In addition , books, paper, sharpeners, pencil cases, and others are prepared, which can be used as a medium for carrying out observation activities with fingers and hands. The sound in the video is played using a headset so that the subject can hear the sound from the video properly. Following are the results of observations related to learning styles seen in the observation sheet instrument shown in Figure 1. To show some notes from the observer at the time of observation.



**Figure 1.** Learning Style Observation Instrument

Based on Figure 1, we can see that the subject pays close attention to the sound conveyed in the video media, even though they cannot see the visual appearance of the video, they seem to like and pay attention to the details of each material explained in the video. It can also be seen that some of the material that was listened to was recorded. Occasionally ask the researcher to confirm what has been heard. Spoken words and intonation of voice also use some emphasis. Of course with the characteristics of the subject, namely speaking quickly. When listening to the flat wake, the subject occasionally looks for objects that are nearby, the researchers have prepared several objects as media, namely paper, books, wooden blocks, pencil cases, tube sharpeners, food lunch boxes, and milk cans. It appears that the subject is trying to understand the material provided by looking for objects and touching objects. The subject also saved the video on his cell phone to be able to review it later.

After listening to the video and conducting further observations interview was a clarification of the observations. The results of the interviews obtained data that the subject still needed confirmation back by asking several questions about the concept of a flat shape. At the time of confirmation orally, the subject also made finger and hand movements by touching the media that had been prepared, such as books, pencil cases, and sharpeners.

Besides that a clarification of the material heard with the subject's hand movements with the media assisting several tools that have been prepared. The subject's fingers and hands appear to be coordinating movements to try to get the right information about the material being discussed. The results of the interview above discuss clarification of the circle and tube material. The subject tries to understand the material by connecting the circle as a part of the shape of an object. Besides that, the subject tries to understand that the size of the circle varies which forms the parts of an object. In the transcript, it is a sharpener thing. These objects seem to be recognized by the subject through the finger movements on the hands.

Subsequent research by providing several problems related to the area and perimeter of flat and spatial shapes. Still using the learning video the subject listens carefully to the further explanation of the video. After that, to find out their mathematical literacy skills, an unstructured interview was conducted. The result of the interview is that the subject can formulate the problem well but has not correctly used mathematical symbols in solving it. The solution to the problem at first experienced difficulties but being directed and assisted was still quite difficult. So the solution can not be found exactly. But for very simple problems can be found a solution. Furthermore, evaluation

activities can be carried out but are still very limited due to a lack of understanding of the material provided on the problem.

## DISCUSSION

From the results of observations, the blind is more towards the audio learning style because the auditory learning style indicators are all met and perfectly clarified from the interview results. This is by the results of the study that the blind learn mathematics more than what is heard (Aulia, 2019). Auditory abilities tend to be used by the blind in learning activities (Permatasari et al., 2017). Auditory learning styles have been developed in learning media for the blind because they can assist in the learning process (Scoy et al., 2005). In addition, from observations it is known that the movements of the fingers and hands during the activities take place in the research given. fingers and hands to feel the media that has been prepared such as books, paper, pencil cases, blocks, and others. The purpose of this touch is to instill concepts that are understood from hearing and communicated orally to the observer. it was at this time that the unstructured interviews took place. This simple media that is close to everyday life helps subjects in exploring material related to flat shapes. So the learning style practiced by the blind also leads to a kinesthetic learning style. This was also well clarified in the interview results. Research on the development of game media improves kinesthetic abilities in the blind because kinesthetic learning styles help to learn (Efriyanti & Sumaryanti, 2016). In addition, kinesthetic media has also been developed for the blind in understanding learning in various scientific fields, one of which is religion (Kuspitasari, 2022)

Mathematical literacy skills from the results of the interviews showed that only one indicator was well fulfilled, namely the first indicator, namely formulating a problem. For the use of mathematics, interpreting solutions, and evaluating solutions is still not well resolved. Still need a lot of help and direction in solving the given problem. So that the ability of mathematical literacy is not good because it only fulfills one indicator. This is by the results of research that the ability of mathematical literacy in the visually impaired is still low (Agustina & Zayyadi, 2023). This is by the results of the study that the ability of mathematical literacy in the blind is still low or lacking, so it requires the development of media to help improve meta- mathematical literacy skills. (Indriani & Yuli, 2022).

## CONCLUSION

Learning styles for the blind are auditory and kinesthetic learning styles. Based on the results of observations that were confirmed properly and appropriately using an unstructured interview technique. Meanwhile, the mathematical literacy ability of the blind is still not good because only one indicator of the problem formulation is fulfilled. These results were obtained from the results of interviews because of the limitations of the subject in solving problems using writing.

## REFERENCES

- Agustina, E., & Zayyadi, M. (2023). Kemampuan Literasi Numerasi Siswa Di Sekolah Inklusi. *Jurnal Program Studi Pendidikan Matematika*, 9(1), 15–20.
- Aulia, W. P. (2019). PEMBELAJARAN MATEMATIKA KELAS X ( Studi Kasus di SMK Negeri 7 Padang ) SKRIPSI. *Repository.Unp*.  
[http://repository.unp.ac.id/25521/1/2\\_WENI\\_PUTRI\\_AULIA\\_15003074\\_5270\\_2019.pdf](http://repository.unp.ac.id/25521/1/2_WENI_PUTRI_AULIA_15003074_5270_2019.pdf)

- Darwanto, Khasanah, M., & Putri, A. M. (2022). Penguatan Literasi, Numerasi, Dan Adaptasi Teknologi Pada Pembelajaran Di Sekolah. *Ekspone*, 11(2), 25–35. <https://doi.org/10.47637/ekspone.v11i2.381>
- Efriyanti, R., & Sumaryanti, S. (2016). Pengembangan model permainan untuk pembelajaran kinestetik pada anak tunanetra. *Jurnal Keolahragaan*, 4(1), 74. <https://doi.org/10.21831/jk.v4i1.8134>
- Hasanudin, C., & Fitriani, A. (2019). Analisis Gaya Belajar Mahasiswa Pada Pembelajaran Flipped Classroom. *Jurnal Pendidikan Edutama*, 6(1), 31. <https://doi.org/10.30734/jpe.v6i1.364>
- Indriani, A., & Yuli, V. (2022). Pengembangan Media B - Math Berbasis STEM ( Science, Technology , Development of B-Math Media STEM-based. *FUNDADIKDAS: Fundamental Pendidikan Dasar*, 5(1), 12–25.
- Khasanah, W. (2020). GAYA BELAJAR SISWA TUNANETRA DALAM PEMBELAJARAN PAI DI SEKOLAH UMUM (Studi Kasus SMA Taman Siswa Bekasi). *Turats*, 13(2), 15–31. <https://www.jurnal.unismabekasi.ac.id/index.php/turats/article/download/3130/2009>
- Kuspitasari, W. (2022). Peningkatan ketrampilan sholat melalui metode kinestetik dengan media sajadah kontrol bagi siswa tunanetra di SLB Negeri 1 Bantul Improving prayer skills through the kinesthetic method with control prayer mats fo. *Al-Maziyah : Jurnal PAI Sekolah Luar Biasa*, 1(1), 21–34.
- Marina, E. Y., & Yani, A. T. (2016). Proses Literasi Matematis Dikaji Dari Content Space And Shape Dalam Materi Geometri Di SMA. *Jurnal Pendidikan Dan Pembelajaran*, 5(11), 1–11. <http://jurnal.untan.ac.id/index.php/jpdpb/article/view/17415>
- Panglipur, I. R. (2023). Analisis Gaya Belajar dan kemampuan Literasi Matematika Pada Tuna Rungu. *Math-Edu: Jurnal Ilmu Pendidikan Matematika*, 8(April), 37–46. <https://doi.org/https://doi.org/10.32938/jipm.8.1.2023.24-36>
- Panglipur, I. R., & Mahendra, I. W. E. (2022). Kemampuan Berpikir Matematis Dengan Kajian Metode Pemikiran Analogi Untuk Permasalahan Literasi Numerasi. *Laplace : Jurnal Pendidikan Matematika*, 5(2), 434–439. <https://doi.org/10.31537/laplace.v5i2.792>
- Permatasari, E. G., Wayhuno, E., & Adi, E. P. (2017). Kemampuan Mengasosiasikan Soal Cerita “Peluang” Siswa Tunanetra melalui Metode Penemuan Terbimbing. *Jurnal ORTOPEDAGOGIA*, 3(2), 127–131. <https://doi.org/10.17977/um031v3i22017p127>
- Rosyendra, V. H., Yuwono, E. C., & Mardiono, B. (2017). Perancangan Media Interaktif Pengenalan Area Publik untuk Anak-anak Penyandang Disabilitas Tunanetra Usia 4-6 Tahun. *Jurnal DKV Adiwarna*, 1(10), 1–8.
- Scoy, F. Van, McLaughlin, D., & Angela, F. (2005). AUDITORY AUGMENTATION OF HAPTIC GRAPHS : DEVELOPING A GRAPHIC TOOL FOR TEACHING PRECALCULUS SKILL TO BLIND STUDENTS Lane Department of Computer Science & Electrical Engineering, *International Conference on Auditory Display*, 5.

- Sofiyatil 'Ilmi MB. (2023). *ANALISIS KESULITAN BELAJAR SISWA TUNANETRA PADA PELAJARAN EKONOMI DI SMA KERTAJAYA SURABAYA*. 11(2), 72–76.  
<https://doi.org/https://doi.org/10.26740/jupe.v11n2.p72-76>
- Utami, N., Sukestiyarno, Y. L., & Hidayah, I. (2020). Kemampuan Literasi dalam Menyelesaikan Soal Cerita Siswa Kelas IX A. *Prisma, Prosiding Seminar Nasional Matematika*, 3, 626–633.  
<https://journal.unnes.ac.id/sju/index.php/prisma/article/view/37679>
- Wahyuni, Y. (2017). Identifikasi Gaya Belajar (Visual, Auditorial, Kinestetik) Mahasiswa Pendidikan Matematika Universitas Bung Hatta. *Jurnal Penelitian Dan Pembelajaran Matematika*, 10(2), 128–132.  
<https://doi.org/10.30870/jppm.v10i2.2037>
- Widyastuti, R. (2016). Pola Interaksi Guru dan Siswa Tunanetra SMPLB A Bina Insani Bandar Lampung Rany Widyastuti. *Jurnal Pendidikan Matematika*, 7(2), 257–266.