



Indonesia deaf and blind communication system (IDBC-system)

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Abstract

This research is motivated by the interaction between deaf students with blind people in the context of friendship and buying and selling, but these two individuals can not communicate well due to the obstacles of the message is not acceptable or delivered by means of existing communication. Communication between the visually impaired and deaf is not established due to deaf children as visual persons, while the blind child is an auditory person, therefore it is necessary to create a communication system that can connect the two individuals, the communication system designed to accommodate the potentials of both parties and easy studied. The system designed by modifying the morse code for morse code is studied by deaf and blind students, modifications made in the way of delivery, communication rules, punctuation and composition of words that adopt the principles of braille, the Indonesian sign language system, and the writing short braille. This study aims to develop an alternative and augmentative communication system between deaf and blind students through Morse code modification. This research uses qualitative approach with three stages of research. The research phase is hierarchical. Based on the results of research, of the 11 conversations made, the message can be sent by the communicator and accepted by the communicant. The results showed that communication system between blind and deaf people through Morse code modification can be functionally used in interpersonal communication interaction.

Keywords Communication systems · Deaf · Blind · And Morse codes

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1 Introduction

Communication is a prerequisite of life for humans to achieve a meaningful life. Without communication, interaction between humans, whether individually, group, or organization is unlikely to happen. Two people are said to interact when each action and reaction. As social beings, every human being can not escape from the act of communication, that is the act of conveying and receiving messages from and to others. This communication action continues throughout the life process. The process takes place in a variety of physical, psychological, and social contexts. Communication becomes important because of the function that can be felt by the perpetrator of the communication. Through communication, people conveys ideas on his or her mind and feelings of conscience to others either directly or indirectly. It can make himself not feel alienated or isolated from the surrounding environment, and easy to meet the needs of his life.

Communication is a social act or behavior that occurs between at least two people. We communicate in many different ways for many different reasons. In order for communication to occur, one person must send a “message” and the other person must receive the message. The person who purposefully expresses a behavior toward another person is using expressive communication. However, for communication to occur between two people, there must be an intent or purpose on the part of one person to impact the other (Stremel et al. 2002).

Communications will not work smoothly if there are obstacles to one or more communication component, This can be understood from the opinion of Wuwungan (2016) which states one will realize that communication will not be easy in case of communication noise (noise), whether the noise occurs in communicators, medium or communicant itself. For example communications between persons with disabilities that of course because with the existence of communication barriers can not run properly, with the existence of these barriers it is necessary to create an environment or system that is accessible for the disabled.

The results of a preliminary study conducted at SLBN Cinta Asih in September 2016 showed that this school received all children with disabilities, namely children with visual impairment, deaf, intellectual disability, physical impairment, emotional and behavior disorder, and others. With the unity of all the disabilities, of course intertwined interaction between them, some children experience interaction-independent communication / does not require a translator, but the communication between the blind and deaf interaction is not established because deaf children as a visual person is a child who is only able to communicate through visual, this causing difficulty for deaf children in verbally communicating. Meanwhile, the blind child is an auditory person, a child who is only able to communicate through verbal. With these two characteristics, of course they can not be communicants and communicators in two-way communication. This happens because the message is not acceptable to both parties, when the blind gives a message with verbal deaf can not accept it because of hearing impairment, while when the deaf became a communicator and convey his message with gestures, visually impaired can not catch the message because the message in the form of a message visual.

Such communication barriers in such a way as the Deaf with the visually impaired can not both be a two-way communication. This happens because the message

delivered can not be accepted by both parties, when the blind gives a message with verbal deaf can not accept it because of hearing impairment, whereas when deaf become communicator, blind can not catch the message. Based on the above description of interpersonal communication between deaf and blind students are not interwoven due to the obstacles of both communicator and communicant, which causes the message is not acceptable. Deaf people with blind people can not communicate directly, so the right to communicate is not met, they need a way or communication system that can resolve communication barriers between the two.

Existing communication systems use applications such as research that has been done by Ujjwala Pawar (2015), entitled Portable Communication Android System for Disable Person, attempted to create an application for communication between Deaf and blind people by utilizing Morse code. But if the communication using the application, according to researchers is not effective because gadgets have weaknesses, such as battery limitations, and certainly not all blind and deaf have gadgets, while communication is done any time, anywhere, anytime. Referring to these considerations, the communication system is prepared for manual use by modifying the morse code. Morse code is used because the morse code is studied by all students in SLBN Cinta Asih in the extracurricular activities of the scout.

Based on this background, the problem of this research is formulated is how alternative and augmentative communication system between deaf and blind students through Morse code modification. Based on the formulation of the problem compiled research questions as follows:

1. What is the objective condition of communication between blind and deaf students at SLBN Cinta Asih school?
2. What is the design of a communication system between the Deaf students and the visually impaired through Morse code modification?
3. Is the communication system between the Deaf students with the visually impaired through Morse code modifications functionally used in interpersonal communication?

2 Methods

This study has the purpose of developing an alternative and augmentative communication system between deaf and blind students through Morse code modification. Appropriate methods to achieve the purpose of the study researchers using qualitative research methods. A qualitative study by Strauss and Corbin (in Creswell, J, 1998: 24), qualitative research research is a type of research that results in unachievable findings by using statistical procedures or other means of quantitative (measurement). The approach of qualitative research in this research is grounded theory, according to Breuer (2009) grounded theory approach is to generate or find a theory related to certain situation. Situations in which individuals interact, act or engage in a process in response to an event. The essence of the grounded theory approach is to develop a theory closely related to the context of the learned event.

Based on the description above then this research is done through a procedure consisting of stages, where step by step done in sequence:

2.1 Patients

Subjects in stage one are teachers, students deaf and blind students at SLBN Cinta Asih Soreang which amounted to 10 people, with details of deaf students amounted to 1 person, blind students amounted to 2 people, and teachers. SLBN Cinta Asih became the research locus because the initial problems occurred in this school, namely the direct interaction between deaf and blind students but no communication. Problems that occur are blind students who like deaf students, but have difficulty expressing feelings so asking one of the researchers how to communicate with the deaf.

Phase 3 aims to determine the functioning of alternative and augmentative communication systems between the blind and deaf through modification of morse codes that have been developed in interpersonal communication. Phase 3 is a test phase of communication system that has been designed, limited test conducted on 6 students ie two people with visual impairment and four people deaf (Tables 1 and 2).

B1, B2, B3 and B4 are deaf students, while A1 and A2 are students with visual impairment. A 1^k and A2^k students with visual impairment as communicators. B1^k, B2^k, B3^k and B4^k are deaf students as communicators. Figure shows a conversation performed by changing pairs and roles as a communicator or communicant. Figures 1 and 2 shows the number of conversations that occurred, conversations should have occurred 16 times, but only 11 conversations were shown in the orange box. Conversation only occurs 11 because 5 conversations cannot be done because students cannot. Results of 11 conversations are found in Table 3.

Subjects in the extensive trial used 10 deaf students and 10 blind students, subjects were taken from schools in Bandung Regency, subject selection by purposive sampling, invitations were given to 10 schools and asked to send 1 blind and 1 deaf.

3 Results

As shown in Fig. 1, following field findings of each stage:

- A. The objective condition of communication between students with hearing impairment and visual impairment in schools:
 1. Communication between Deaf and visually impaired occurs in the context of playing during breaks, buying and selling where blinds are selling and children are deaf buying, otherwise the other context that occurs is in expressing

Table 1 Subject of the deaf as a communicant

Students	A 1 ^k	A2 ^k
B1	A 1 ^k B1	A2 ^k B1
B2	A 1 ^k B2	A2 ^k B2
B3	A 1 ^k B3	A2 ^k B3
B4	A 1 ^k B4	A2 ^k B4

k initials of communicator, *A* initials of blind student, *B* initials of deaf student, *1,2,3,4* student numbering

Table 2 Subject of the deaf as a communicator

Students	A 1	A2
B1 ^k	A1B1 ^k	A2B1 ^k
B2 ^k	A1B2 ^k	A2B2 ^k
B3 ^k	A1B3 ^k	A2B3 ^k
B4 ^k	A1B4 ^k	A2B4 ^k

k initials of communicator, *A* initials of blind student, *B* initials of deaf student, *1,2,3,4* student numbering

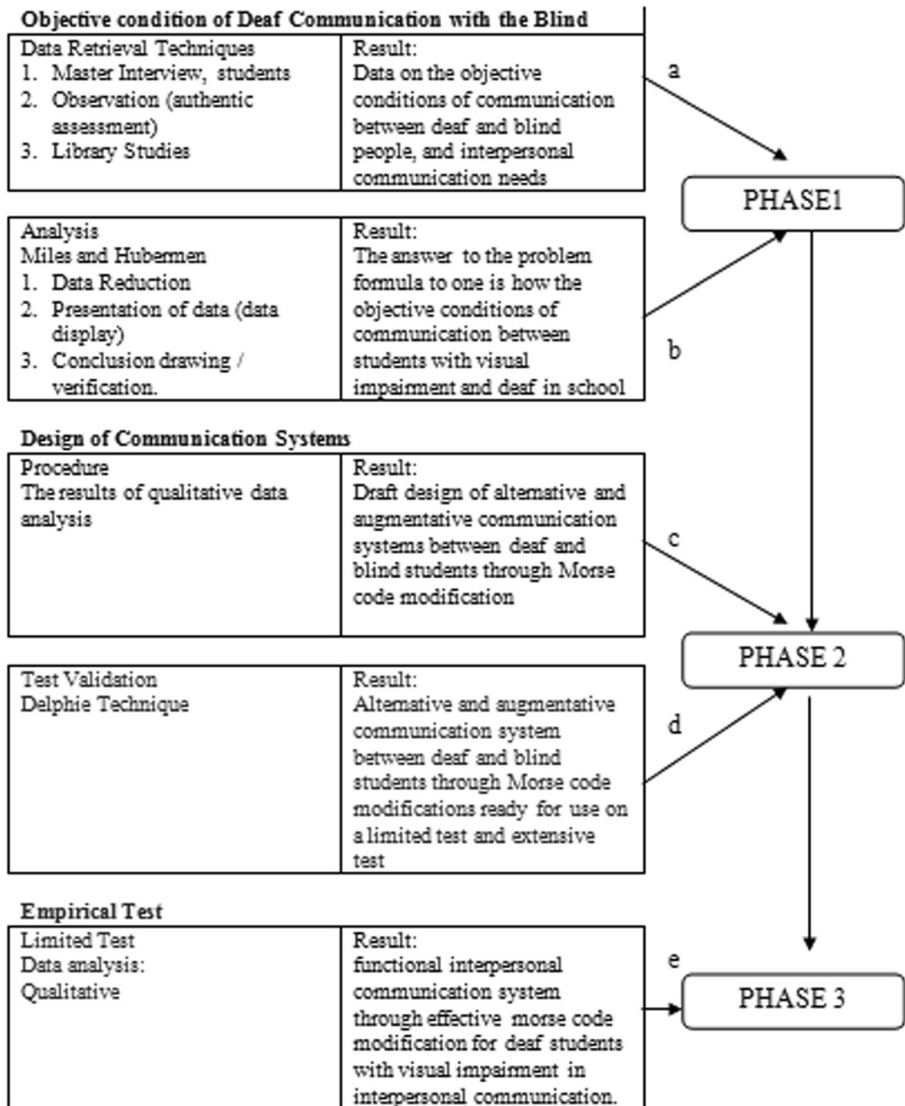


Fig. 1 Procedure Research Development of Communication System between Deaf Students with the Blind through Morse Modification Password: (a) and (b) part of phase 1, (c) and (d) part of phase 2, (e) part of phase 3

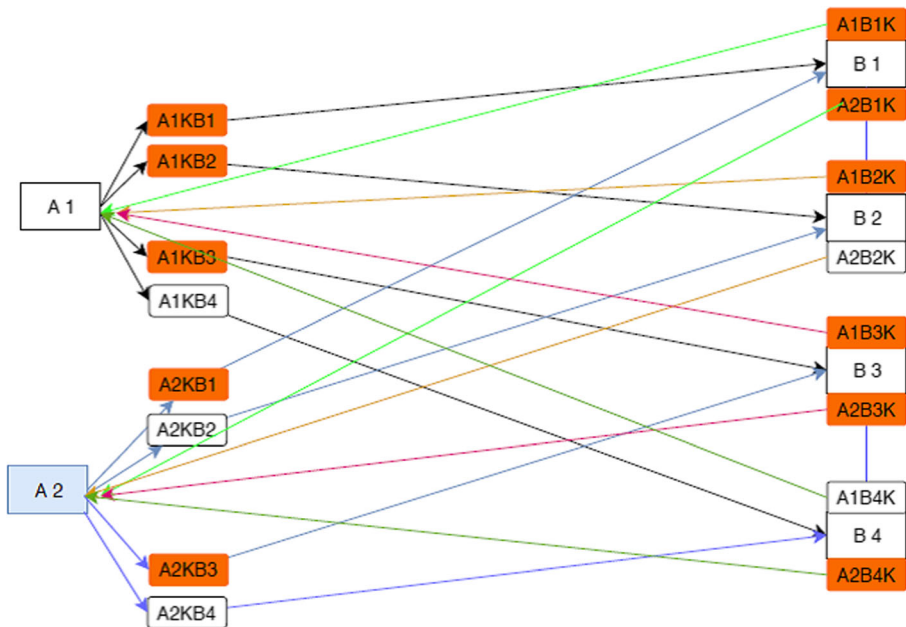


Fig. 2 Limited Trial Process, orange indicates communication that occurs, A initials of blind, B initials of deaf, the line shows the communication pair, line color to make it easier to see communication pairs so duplication does not occur

feelings (mutual interest) this is because tunenetra interested in hearing impaired children who have good character and likes help blind children.

2. Communication between the hearing impaired and the visually impaired occurs independently if the deaf as communicant or communicator can make sound with good articulation, and communication can also take place independently if using touch with short message. Communication with long messages can not be done independently, communication with long messages is assisted by an alert friend with physical impairment.
3. The existing message codes in the communication between Deaf and blind people are universal and usable codes, such as one radius to indicate the number of one, and one finger to give money given a thousand, and interesting to do something. Being long messages by others, there is no code to represent.
4. The content of messages that often appear in the communication between Deaf and blind is about buying and selling, friendship, feelings (happy, like, sad, dislike ...), time, money, day,
5. The form of the message in communication between the Deaf and the visually impaired is by touch, the touching gesture.
6. Feedback on communication between Deaf with blindness in the form of touch or nod, or in the form of tug the hand to the other person to touch or shown on something such as a call to go, or show what merchandise is taken.
7. The rules / protocols in communication between Deaf and blind people are rules that are not visible directly, but mutually agreed upon, and this rule is very simple ie the communication is done independently or with help, where

Table 3 Functional system in interpersonal communication

Question	A1 ^k B1	A1 ^k B2	A1B1 ^k	A1B2 ^k	A2B3 ^k	A2B4 ^k	A2B1 ^k	A2 ^k B1	A2 ^k B3	A1 ^k B3	A1B3 ^k
Communicators can send messages	√√	√√	√√	√√	√√	√	√	√	√	√	√
Message Code can be formed with communication system on communicator	√√	√√	√√	√√	√√	√	√	√	√	√	√
The contents of the message can be compiled with communication systems by communicators	√√	√√	√√	√√	√√	√	√	√	√	√	√
The shape of the channel on the communication system can be an appropriate medium in message delivery	√√	√√	√√	√√	√√	√	√	√	√	√	√
The form of messages received communicator in accordance with the communicator submitted	√√	√√	√√	√√	√√	√	√	√	√	√	√
Communicator can receive the message delivered	√√	√√	√√	√√	√√	√	√	√	√	√	√
The form of response sent by the communicator according to message communicator	√√	√√	√√	√√	√√	√	√	√	√	√	√
Barriers to communication between the deaf and the visually impaired by using a communication system	Direction and position, wrong question mark code	Direction and position, dozens	Fast and pause, incorrect code of eating	Forget morse password, word already	–	–	–	Write Address	Fast	Fast	The word “now”

Shows communication partner, show questions about processes in communication, √ show questions answered in communication that occur

- the content is if the short message communication done independently, but if the message long required third person as translator.
8. Communication between Deaf and blind people does not take place independently, or delivered by the research subject, that communication is not going on or disconnected, this is because the encoding-receiver-decoding process is not working properly due to the inactivity of the recipient or recaiser.
 9. The medium used in communication between the Deaf and the visually impaired is the touch, the touch of the number of fingers used to express the amount of money given, two fingers for Rp. 2000.00
- B. Formulation of communication system between blind and deaf through modification of morse code

Alternative and augmentative communication system formulated in this study aims to realize independent communication between deaf and blind in the school environment. The formulation of this communication system is based on the results of the field findings analysis as follows:

1. The design of a communication system between the Deaf and the visually impaired should be designed to meet three things in a frequent communication situation i.e play, trade and express feelings.
2. The design of a communication system between the hearing and the blind should be designed using a touch that can contain long messages, if it is dependent on the ability of a deaf that has good articulation, then communication with other deaf does not occur, because the conditions exist not all children deaf have good articulation
3. The design of a communication system between the Deaf and the visually impaired should be designed with a code that uses a finger, and can contain a long message. And understood and known by both parties. And the code can be hinted at by touch. The code must be learned by both parties, the code learned is the code taught on the scouting activity, and the code that can be touched is Morse code
4. Design of communication system between Deaf and visually impaired can realize the feedback that want to be given both blind and deaf, and can be understood both sides, and communications opponents can feel the feedback given, resulting loop communication
5. The design of communication systems is expected to reduce the role of a third person as a tongue or translator, so communication between Deaf and blind can take place independently, but can communicate with long messages.

Based on the description of communication needs between Deaf and blind, the following logic gate for the preparation of the Communication System (Fig. 3):

Important things in the preparation of the system is:

1. The use of morse is not just a letter alone, it adopts the Indonesian language signaling system in which one movement represents the word. Why adopt Indonesian language signaling system because if the morse is directly used and when writing the word should be a series of letters from Morse code, then it is very ineffective because it takes a long time.

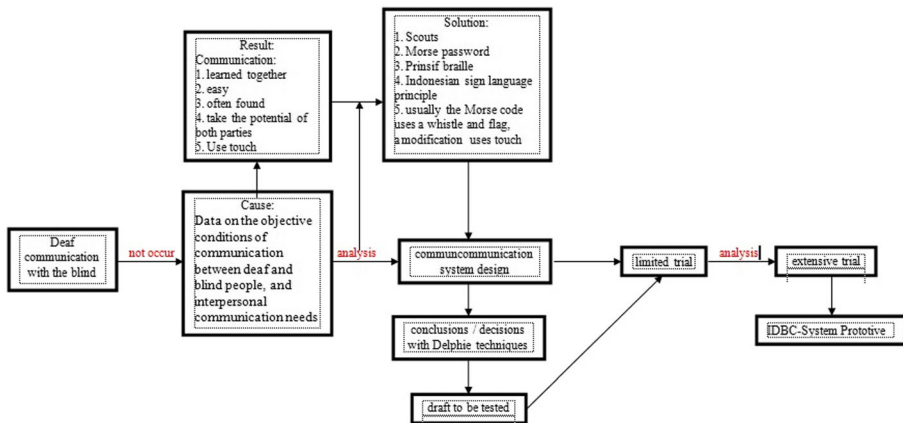


Fig. 3 Logic gate Communication System, arrow shows the direction of the process performed, red writing shows what happened or was being done,

2. This system adopts a brief episode system in braille to compose or modify letters to represent words.
3. Communication must be initiated by anyone, therefore the system is organized so that the blind or deaf can be the person who invites communication
4. This communication system is easy to understand and quickly learned because it is a whole puzzle of the potential that is owned by both parties.
5. This system is arranged so that both the visually impaired and deaf can access it, which is in the form of dictionary 3 in 1 where there is braille, morse modification and Indonesian language sign system
6. The first communication system design consists of 200 words divided into several classifications, verbs, basic words (26 words beginning with a-z letters by taking from a short braille writing system), animal names, names of items around children, question words. Based on expert opinion with the Delphi 200 technique, the word is not effective if it is not arranged based on the words that are most necessary in the initial conversation between deaf and Tuannetra, therefore the researcher looks for functional words by interviewing students, then formulated into 26 words can form daily conversations at school. This can be seen in Tables 4 and 5.

Explanation Indonesia Deaf and Blind Communication System:

IDBC-System is used by means of the communicator writing the Morse code code on the palm of the communicant. IDBC-system consists of 26 words, which consists of: what, buy, like, from, eat, already, home, drink, name, now, go, class, how, not, for, when, where, who, yes and age. IDBC-System already has punctuation ie Punctuation marks (.) By touching all the middle fingers at the end of a sentence, a question mark (?) By touching the entire thumb of the palm at the end of the sentence, and an exclamation point (!) By touching the entire finger of the palm at the end sentence.

The number on IDBC-System is the same as the number in the morse code, to determine the larger number is determined in the following way: writing the teen number is to write down the number of morse code terminated by sticking the thumb

Table 4 Functional words

A1 ^k B1	You, class, how much, again, what, how, age, you
A1 ^k B2	Name, you, who, 20,
A1B1 ^k	Name, you, who, you, have, eaten, yes, 14,
A1B2 ^k	This, who, you, class, how,
A2B3 ^k	I, love, you, your, name, have, eaten,
A2B4 ^k	Where, you, come from,
A2B1 ^k	House, you, in, where,
A2 ^k B1	in, name, you, who,
A2 ^k B3	yes, you, too, already, eat,
A1 ^k B3	you, return, when, house, to, where
A1B3 ^k	now, you, return,

The first column shows the communication partner, the second column shows the words that are often used in conversation

and index finger, the number of dozens by writing the morse code number ends by putting the finger forefinger and cent, the number of hundreds by writing the morse code number concluding by putting the ring finger and the number thousands by writing the morse code number terminated by sticking the ring finger and little finger.

Communicating using IDBC-System is not much different from communicating using oral or gestures, the rules that apply to oral and signaling communications apply also to IDBC-System.

Table 5 Number of functional words

Word	Amount	Word	Amount
What	1	Name	4
Buy		Rest	
Love	1	Go	
From	1	Class	2
Eat	3	How Many	3
Why		I am	1
Again	1	No	
House	1	For	
This	1	When	1
Watch		Where	2
You	14	Who	3
Return	2	Yes	2
Dring		Age	1
Words that are not found in 26 words			
Already	3	To	1
In	2	Now	1
To	1		

Word shows the words idb-system, the gray color refers to a word that is not used and the amount shows the use of the word in the conversation

1. The order of the message determines the meaning to be conveyed.
 2. Pause between generated code, eg me / eat / bread and set writing speed
 3. Writing IDBC-System is horizontal, following the suggested writing directions (Fig. 4)
 4. Here's how to use IDBC-System dictionary (Fig. 5):
 - a. The first person to use IDBC-System must memorize the alphabet and code number morse code,
 - b. Once the Morse code is memorized, read the system components, and the scope of the system
 - c. After memorizing search for the required words on the vocabulary of IDBC-System
 - d. After finding the word, to send a message write a letter on the IDBCS-M column, where the form is morse code. The example of your word is represented by the letter K, if you want to show the word then just write IDBCS-M code on the blind palm, but if K want to be written as a hurup then start the conversation by sticking the index finger, as well as on the conversation.
- C. Limited Trial of Communication System between Deaf and Blind People through Modified Morse Password in Interpersonal Communication

Based on the experimental results of the use of alternative and augmentative communication systems between the blind and deaf through modification of morse codes, both experimental communication test and natural communication test, this system can be used in communication between hearing impaired with visually impaired, it can be seen from the conclusion of communication result where the message can be accepted and delivered, which means that messages can be understood by both parties despite the obstacles. Here is a chart of communication results where messages can be delivered (Table 3).

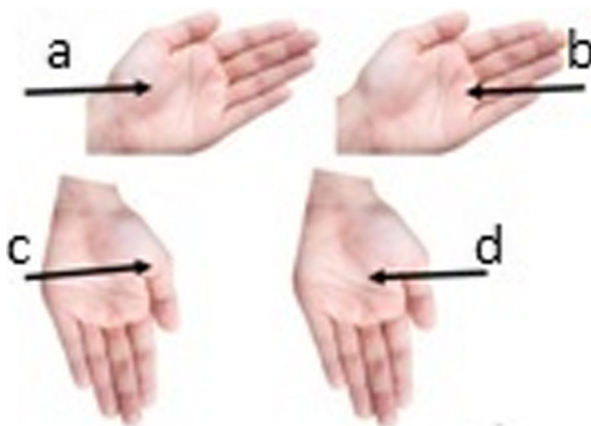


Fig. 4 IDBC-System writing direction: **a** from left to inside, horizontal direction hand, **b** from right to inside, horizontal direction hand, **c** from left to inside, vertical direction hand and **d** from right to inside, vertical direction hand, the direction of writing the correct IDBC system, write down the morse code in the direction, for example the letter a, which is the point and strip, then the point is written then the forward strip is in the direction of the arrow. Source hand picture www.wisegeek.com

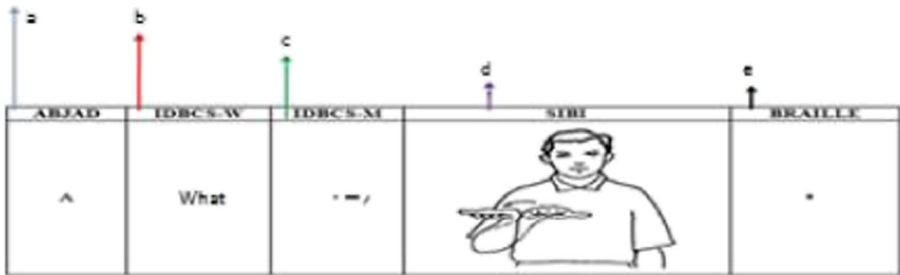


Fig. 5 How to use IDBC-System. (a) Showing letter, (b) Showing the word IDBC-System, (c) Showing Te Writing IDBC-System, (d) Indonesian Sign Language, and (e) braille

Based on the above table the message can be submitted and accepted if the speed, position and pause is set, the intention is when writing communicator write the message is not too fast and there must be a pause, if communicant deaf position and direction of writing can determine whether or not fast message received. Based on the above table can be concluded that the system can function in interpersonal communication between Deaf with the visually impaired.

In communication A2B3k, A2B4k, and A2B1k no significant obstacles occur, it is because the subject A2 memorize the morse code well, in the conversation subject A2 as a communicant can capture the message quickly although communicators vary. However, when the subject A2 as a communicator occurs obstacles where the speed of writing DDBC-System code is too fast, while the old communicant capture due to less memorized Morse password. In the trial also carried out the registration of words functional done in the conversation. The following tables are functional words (Tables 4 and 5).

Based on the above table there are 7 words that are not used, this can be due to the short chance of communicating given so that 7 words does not appear in the conversation. The word that often appears is the word “you”, appears almost every conversation, the number of words that appear is 14, this word appears because the conversation is often in the form of a question that begins your word.

In a conversation, words that are not listed in the IDBC-System list are, also, in, to, and now. The effect arises when the visually impaired becomes a communicator, visually impaired because it adapts to the ordinary Indonesian language, while in the deaf it does not matter, the hearing impaired can understand the sentence. This is due to the deaf with communication barriers so as to use the natural cues rule instead of SIBI. As Tarmansyah (1996: 2) argues that:

"In children with hearing impairment is often found to be distorted from the correct Indonesian language, so it takes a discussion of the deaf children from an early age to support their communication skills. Difficulties in language acquisition are also seen when children are invited to communicate. For example: if we show a glass and we ask "what is this?", Then the child will answer "drink" both gestures and verbal speeches, as well as for example our children show the clock or alarm, he will give a voice gesture or pointed wrist cue watches "

The ability of the language of the blind child to be the same as the average person is caused by a stimulus that hears the same, so that the blind grammar will be in

accordance with the oral conversation. Here is the opinion of Kiparsky (Tarigan 1988: 243) children learn to speak by imitating sound patterns that he heard from the environment, through stimuli and responses, reinforcement and reward. In that way, he will reach the stages of the ability to produce a language like the adult language model he hears.

Another obstacle is the pause of writing, at the time of writing the sentence, the subject immediately wrote all the code morse that represents the sentence without pause, so that the deaf and visually impaired always ask repeated. The pause in question is pausing between letters to be written. Example is as follows: the writing of the phrase “your age what?” If written with IDBC-System then age = z, you = k and how = r, if written zkr = zkr subject write directly without time lag, so there is no boundary between letters and make the confusion, pause is required, and jedapun not too long, when finished writing the letter z stop about 2 s and lift the index finger from the palm of the communicant’s hand, then continue with the letter k pause back, and continue with writing the letter f. When wearing a break the communicant can quickly understand the contents of the message.

In addition to pauses, when communication between hearing impaired with visual impairment using IDBC-System writing direction becomes important because if one can block the message conveyed. Here is a picture of writing that is not understood by the Deaf as a communicant. The direction of writing with a purple arrow makes the deaf confusion because the form of the strip becomes standing, the understandable direction is the direction of the black arrow, where the shape of the strip corresponds to the perception of the watch, the writing can be reversed from the finger towards the wrist or vice versa depending on the position of the hand when held (Fig. 6).

The direction of writing is only for the writing of deaf for the deaf as a communicant. The direction of writing is not an obstacle when the visually impaired becomes a communicant, although the Deaf write like a purple arrow, blind people still perceive that it is a form of stripes. Direction disturbance occurs in the Deaf caused by the influence of visual perception, as according to Frostig, Lefever & Whitlessy (in Widyana 2009) aspects of visual perception one of them is position of shape, in the form of recognition of inverted or rotated images. So the deaf feel disturbed perceptions when visually impaired write upside down, because deaf recognize the shape of the strip standing as another form such as the letter l or I large visually. Blind people are not disturbed because they do not have visual perception, which is visually impaired when the shape of the strip is touched with the direction wherever it remains a strip.

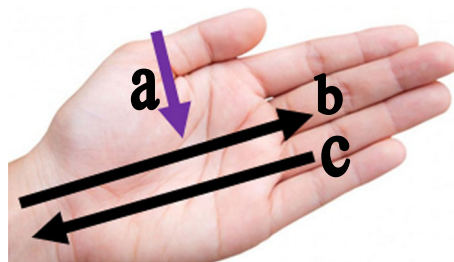


Fig. 6 Direction of Writing IDBC-System (a) purple arrow shows wrong writing (b) correct direction of writing from left to right (c) correct direction of writing from right to left. Source hand picture www.wisegeek.com

In addition to the directions that may affect whether or not fast messages are delivered to the Deaf is the position of writing the morse code, along with other visual perception barriers (Fig. 7):

Part a is a writing by a blind subject not understood because the rest of a strip below, when written in b, the subject of the deaf can understand. Deaf people assume when writing as picture a, one strip is a series of different morse code. So the deaf is confused. But for the visually impaired it does not affect it. The following table affects the communication using IDBC-System (Table 6):

Pause and speed affect Deaf and blind, pause and speed at IDBC-System is equal to the intonation and speed of verbal communication, this can affect the message delivered, as according to Nelson (in Wahyuni 2013 aspects of communication skills there are three, among others: verbal skills, including formal language, informal language, content of material. Vocal skills related to sound include articulation, intonation (high-low), tempo (speech speed), accentuation (right-pen) and volume.

The obstacles that occur in natural trials are not much different from engineered trials, but some of the obstacles are as follows: Morse code numbers and how to write numbers dozens, tens, hundreds and thousands. Subjects are not memorized by mistakes that do not provide an understanding of numbers. So when the natural conversation was needed writing IDBC-System number. The obstacles that occur in this conversation is the lack of a morse password.

In addition to the above other obstacles is the confusion of writing the word “already” and also the address because it is not contained in the words IDBC-System, finally the authors convey that words that are not contained in IDBC-System written according to abbreviation generally accepted either used in SMS messages, WA or daily note writing. For example yesterday = kmrn, with = with, path = jl and so on. It becomes a solution because as the basis of the development of the next system, the system is developed by using the abbreviation commonly used to represent the word.

Another obstacle is the speed of writing, when communicators write messages too fast, communicant difficulty understanding the contents of the message conveyed, so that communicant often ask to be repeated. This happens because of the lack of a Morse password, if the Morse password is memorized then the message is easily received or delivered, as happened on subject A2, subject A2 has memorized the entire Morse password so it is easy to understand the contents of the message delivered.

The barriers to the broad test are not much different from the limited tests, the obstacles are the memory of morse code and writing speed, IDBC-System can be easy

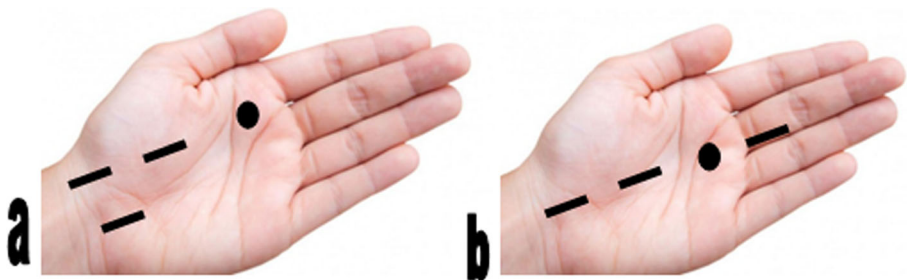


Fig. 7 Writing Morse Code on IDBC-System (a) wrong writing and (b) right writing writing must be straight should not be partially moved. Source hand picture www.wisegeek.com

Table 6 Effect of space, direction, position, and speed in use of IDBC-system

Item	Space	Direction	Position	Speed
Deaf	√	√	√	√
Blind	√			√

Column shows the factors that influence communication, raw shows communicant or communicator, and √ shows that what is listed in the column affects communication

to use for students who have memorized Morse passwords, because the primary key of IDBC-System is Morse code. But on the broad test there are other obstacles that is the stiffness and pressure of writing, the rigor of writing inhibits the understanding of the message, this rigidity is the way or technique of writing, when communicators write with rigid hands hamper the message. Writing pressure is the same as in pencils with pencil or pen, if the writing is floating then the streaks are left thin so it is not readable, as well as in the use of IDBC-System when the pressure or scratches on the hand is too light then the message delivered so blurred, therefore in writing IDBC-System must be with the right pressure, because the pressure determines the feeling of communicators.

IDBC-System is quite difficult to use for deaf or blind students accompanied by other obstacles. This happens in the extensive test conducted, blind students with autistic behavior resulted in ineffective conversation because the child is just talking or just following his friends. IDBC-System is experiencing a significant obstacle that is not a Morse password, in the widespread test of students who have memorized Morse passwords more easily receive and send messages. With the event it is necessary to redo Morse password, in addition to the IDBC-System is useful with the Morse password can remember the child can use it in scout activities.

Extensive test results can show that IDBC-System can be used on other subjects, and messages delivered can be accepted by the communicant, but of course there are still obstacles. The obstacles that arise are not on the ineffectiveness of the system but rather the performance of the writing and receiving of messages, and it is very much dependent on the memorization of Morse codes.

4 Conclusions

Based on the results of research and discussion that has been done, it can be concluded that IDBC-System can be used in interpersonal communication interaction. This system is said to be suitable to be seen from the communication components of communicators, messages, media, communicants and obstacles.

IDBC-System is used in interpersonal communication based on research result and discussion that is from 11 conversations made by message can be sent by communicator and accepted by communicant, and media of message delivery through effective touch is used.

Based on the 11 conversations made by all messages can be understood by both parties, but there are significant obstacles that result in the rapidity of the message understood, the obstacles are the speed, direction, position and pause at time of writing. Speed and pause affect the hearing impairment and visually impaired, while the

direction and position of writing affects only the Deaf because of visual perception. Barriers occur when the communication process is more on technical communication rather than on the difficulty of the system used. It is the same as in verbal conversation that is intonation and punctuation.

IDBC-System contains only 26 words, numbers, dozens, dozens, hundreds, thousands and punctuation marks, based on the registration of functional words used there are 7 words in the DDBC-System list that are not appear in the conversation ie the word buy, rest, why, clock, go, not and for. And emerging new words that is said already, also and now, in addition to the word there are affixes that appear is in and to. But there is a word whose frequency of frequent appearance is the word “you”.

Seven words in the list that did not appear due to the short chance of a given conversation, while the affixes arise when visually impaired becomes a communicator, it is because the visually impaired affected with the commonly used Indonesian verbal language.

5 Recommendation

Based on the results of research conducted, the researchers recommend some things that can be used for future research development. The recommendations are as follows:

1. IDBC-System is tested in SLB Negeri Cinta Asih Soreang Kab.Bandung, the researcher recommends a wide-ranging test in other schools that have the same conditions as a limited trial site.
2. IDBC-System can be used as a reference for the development of communication system for deaf students with blind or other students who need alternative and augmentative communication system, for example deafblind children.
3. The researcher recommends an alternative and augmentative communication system between blind and deaf people through Morse code modification for deeper examination of broader functions such as system usage under certain conditions such as dark conditions for deaf students, can also be used in scout activities in habituation use of code.

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References

- Breuer, F. (2009). *Reflexive Grounded Theory*. Book of psychology. <https://doi.org/10.1007/978-3-531-91717-7>.
- Creswell, J. (1998). *Research Desig: Qualitative & Quantitative Approaches*. Thousand Oaks. CA: Sage Publications.
- Stremel, K., Bixler, B., Morgan, S., & Laton, K. (2002). *Communication fact sheets for parents*. New York: Helen Keller National Center.
- Tarigan, H. G. (1988). *Teaching of language acquisition*. Bandung: Angkasa..
- Tarmansyah. (1996). *Communication disorder*. Jakarta: Depdikbud Dikti.
- Ujjwala Pawar, D. P. (2015). Portable Communication Android System for Disable Person. *International Journal of Advanced Research*, 3(1), 1023–1029.

- Wahyuni, S. (2013). *Speaking strategies employed by Indonesian Efl tertiary students across proficiency and gender*. Canberra: A thesis submitted for the degree of Doctor of Philosophy at the University of Canberra Australia.
- Wuwungan, N. (2016). The role of interpersonal communication of teachers and deaf students in improving the self-reliance attitudes of children of special needs in East Kalimantan provincial supervisor school. *eJournal of Communication Science*, 294–304.: a longitudinal study. *Journal of Educational Psychology*, 89, 295