

Underwater Communication Strategy For Diver Safety : "Analysis on Gapi Dive Center Ternate"

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Abstract

Underwater communication or underwater communication is a nonverbal communication practice used by divers to convey messages while underwater. This study aims to analyze the form of underwater communication used by divers at Gapi Dive Center Ternate and interpret the symbols, hand gestures, and communication culture that is formed. The research used a descriptive qualitative method, through direct observation and in-depth interviews with instructors and licensed divers. The findings of the study show that underwater communication is dominated by *hand signals*, body movements, and the use of visual aids. The symbols used not only technically function to maintain safety, but also strengthen group togetherness and solidarity. This research contributes to the study of nonverbal communication in extreme environments and emphasizes the importance of consistency in the application of underwater communication.

Keywords: Strataegi communication, Diver safety, Gapi Dive Center Ternate.

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INTRODUCTION

Social interaction and the exchange of information between humans are built through communication, which is an important foundation in life. In general, this process occurs orally or through gestures by utilizing various media. However, there are environmental situations that limit the methods of communication that can be used, such as in activities below the surface of the water.

Scuba diving is an activity that requires specific skills, not only in terms of diving techniques, but also skills in interaction. Various factors in the depths of the sea, such as water pressure, limited oxygen supply, visibility, and the use of diving equipment, make verbal communication difficult. As a result, divers switched to using nonverbal communication systems, such as hand signals, body language, and visual aids.

PADI (2019) emphasizes that underwater communication plays a vital role in supporting safety during diving. Mistakes in interpreting signals can be fatal and life-threatening. Therefore, an understanding of international standards of hand signals is a must for every diver before diving into the high seas. Data from the Divers Alert Network (DAN), the British Sub-Aqua Club (BSAC), and various global studies show that the main cause of diving incidents is human error, followed by technical and natural factors. Some examples of human error include panic,

wrong decision-making, lack of training and experience, and physical exhaustion exacerbated by inadequate preparation (PADI, 2019).

An illustration of an incident occurred in the city of Ternate, North Maluku, where a diver from the United States, Sarah, 32 years old, experienced an incident that resulted in minor injuries and exceeded the decompression limit, causing paralysis and requiring her to be hospitalized. This accident was triggered by the duration of the dive exceeding the provisions and insufficient rest time between dives.

The case underscores how crucial underwater communication is for divers, including at the Gapi Dive Center in Ternate. As one of the active diving training and tourism centers in Ternate waters, this location offers a variety of diving terrains, from shallow areas to deep diving, with dynamic environmental conditions such as strong currents and frequently changing visibility. In such a context, effective underwater communication is essential to mitigate the risk of accidents and support the success of any diving activity, whether for recreational, educational, or underwater research purposes.

Diving activities demand more than just technical skills and good physical condition; The ability to communicate effectively in the water is also absolutely necessary. The role of communication is to ensure safety, coordinate the movement of team members, convey information about the environment, and ensure that all instructions are understood correctly. To overcome the existing obstacles, divers use various nonverbal communication methods, such as hand signals, light signals, slates, and touch. Although international cues such as "OK", "up", or "stop" have been standardized, in practice many dive centers develop additional codes tailored to local conditions and needs.

An interesting phenomenon to study is how the underwater communication patterns are implemented by divers at the Gapi Dive Center, which combines global standards with local adaptations. In addition, it is also important to identify communication barriers such as visual impairments, differences in sign comprehension, and equipment limitations. Through this analysis, it is hoped that a comprehensive picture of the underwater communication practices that apply at Gapi Dive Center Ternate can be realized.

LITERATURE REVIEW

Nonverbal Communication

Nonverbal communication is the delivery of messages without using words, but rather symbols, movements, facial expressions, and body language (Knapp & Hall, 2013). In diving, nonverbal is the main channel that determines the success of team coordination. Previous research has shown that the effectiveness of nonverbal communication is highly dependent on the uniformity of the codes used and the common understanding between divers Alo Liliweri (1994)

Navarro (2014) has proven by researchers that those who are able to effectively read and interpret nonverbal communication, and regulate how others will feel about themselves, will enjoy greater success in life than those who lack this ability. Mehrabian (1972) argues that 93 percent of all social meanings in face-to-face communication are derived from nonverbal cues, and Birdwhistell (1970)

estimates that 65 percent of such communication is nonverbal (Tubbs & Moss, 2008).

Nonverbal communication messages consist of, kinesic, proxemic, paralinguistic, artifactual and haptic. Jalaludin Rakhmat (1999) classifies nonverbal messages as follows:

- a. Kinesic message. Nonverbal messages, which use meaningful body movements, consist of three main components: facial messages, gestural messages, and postural messages.
- b. Facial messages use facial expressions to convey certain meanings. Studies have shown that faces can convey at least ten groups of meanings: joy, surprise, fear, anger, sadness, relief, condemnation, interest, amazement, and determination.
- c. Gestural messages show the movement of parts of the body such as eyes and hands to communicate various meanings.
- d. Postural messages are with respect to the whole limb, the meaning of which can be conveyed.

Mark L. Knapp (Jalaludin, 1999), mentions five functions of nonverbal messages that are associated with verbal messages:

- a. Repetition, which is repeating the idea that has been presented verbally. For example, after saying my rejection, I shook my head.
- b. Substitution, which is replacing verbal symbols. For example, without saying a word, we show our agreement by nodding our heads.
- c. Contradiction, rejecting verbal messages or giving other meanings to verbal messages. For example, you 'praise' your friend's achievements by sneering, saying "Great, you're great."
- d. Complementary, which is to complement and enrich the meaning of nonverbal messages. For example, your facial tears show a level of suffering that is not expressed in words.
- e. Accentuation, which is affirming the verbal message or underlining it. For example, you express how annoyed you are by hitting the table.

Underwater Communication Concept

Communication is a process of exchanging messages that allows individuals to understand each other. However, in extreme environments such as the sea, verbal communication cannot be carried out due to the limitations of sound that propagates quickly but is difficult to understand (PADI, 2019). Therefore, divers rely on nonverbal communication in the form of hand gestures, body movements, and visual aids (Rahardjo, 2020). Some studies emphasize that underwater communication is not just a technical tool, but part of the safety standards that divers must master (Henderson, 2018).

The underwater world is of course different from our daily lives, namely on land. In the sea we need extra adaptations so that we can dive safely. Underwater divers experience limited vision because water refracts light in a different way than air, causing objects to be seen unclearly when viewed with the naked eye, so divers must wear masks to see clearly. Masks can restore natural air conduction to the

space around the eyes, allowing the eye to see with focus (Open Water Diver, SSI manual book, 2006; 17).

Similarly, when we communicate underwater, underwater divers communicate using hand gestures, because hearing and talking cannot be done in the water. Human hearing underwater is affected by sound waves that travel about four times faster than sound waves moving on land, making it difficult for divers to know where the sound is coming from.

Hand gestures help divers to communicate with each other underwater, reminding each other to keep diving activities safe. Each hand gesture has its own meaning. Usually, before starting the activity, the divers talk about what is done underwater and what signals are used so that there is no misunderstanding in using the hand signals. Hand gestures used to communicate include asking the condition of other divers, how deep, how much air is left, and reminding each other not to touch the corals. "Ok" which means "Yes" or asks if your condition is safe and ready, usually the question starts by using the code Ok and if it is safe and agrees then it is replied with Ok as well. A boarding code is usually used when a diver wants to end the dive and come to the surface (end of dive), and Hold is defined as stop or stop. There are also cues used by divers to show numbers, and animals in the sea.

Safety in Diver Activities

Diving *safety* is a central issue in every training. The Divers Alert Network (DAN, 2020) reports that most diving accidents are caused by air exhaustion, panic, as well as the condition of the diver's media. Therefore, implementing the right communication strategy can minimize the risk of fatality. A study from BSAC (2023) also emphasizes that discipline in the use of international hand signals is directly proportional to the low incidence rate among licensed divers.

RESEARCH METHODS

Types of Research

This research is a qualitative descriptive research. According to Bogdan and Taylor (Moleong, 2005), a qualitative approach is a research procedure that produces descriptive data in the form of written or spoken words from people and observed behaviors. Qualitative research focuses on social phenomena, giving voice to the feelings and perceptions of the participants under the study. It is based on the belief that knowledge is generated from social settings and that the understanding of social knowledge is a legitimate scientific process.

Data Collection Techniques

- a. Participatory Observation (Direct observation). Namely data collection by participating directly and taking notes, meaning that the researcher records what signs are used and the context includes diving, the signals used, and the communication.
- b. In-Depth **Interviews**. Conducted with instructors, licensed divers, and beginner divers to delve into experiences, perceptions, and depth in underwater communication.
- c. Documentation (Photo). In the form of training notes, taking photos or videos of diving activities and nonverbal signs used.

Data Analysis Techniques

Data analysis was carried out using the method of Miles and Huberman (1994), which includes:

1. Data Reduction. Filter out information relevant to the research focus, such as the shape of hand signals, communication strategies, and their relation to safety.
2. Data Presentation. Compile findings in the form of tables, narratives, and descriptions for easy interpretation.
3. Conclusion Drawn. Analyze the pattern of communication strategies and their contribution to diver safety.

RESULTS AND DISCUSSION

Underwater Communication at Gapi Dive Center

Underwater communication has limitations because divers cannot speak directly due to the use of regulators. Therefore, at Gapi Dive Center Ternate, instructors and divers develop effective nonverbal communication strategies to maintain coordination and safety.

Divers at the Gapi Dive Center use a combination of international standard hand signals, body movements, and the help of an underwater slate . Hand signals are the main means of coordination, such as:

a. Sinyal Tangan (Hand Signals)

The most dominant form of communication is hand signaling. Instructors at Gapi Dive Center use international standards that have been adapted to local needs. Some commonly used signals include:

- 1) OK: the index finger and thumb form a circle, used to ensure the diver's condition is good.
- 2) Rise to the surface : thumbs pointing upwards.
- 3) Down : thumbs pointing down.
- 4) Problem: the hand is moved to the side horizontally.
- 5) Danger or emergency: quick waving hand movements.

This hand signal is the main means of communicating self-condition, diving direction, and danger signs.

b. Gerakan Tubuh (Body Language)

In addition to using hand gestures, divers also rely on body language to communicate. For example, an instructor who slows down a leg kick gives a nonverbal message to another participant to slow down the speed of movement. Body language serves as an affirmation of the message or as a substitute option when the distance between divers is too far, so hand gestures are no longer effective.

c. Signals with Tools

In situations with limited visibility or when the information conveyed is more complex, aids such as underwater whiteboards (slate) and dive flashlights become vital means of communication. Slate allows the instructor to write down short messages, while flashlights are used to provide light signals, such as shining a light in a direction to provide navigational directions.

d. Sentuhan (Touch Signal)

For close-up interactions, methods of physical touch such as gentle pats on the shoulders or arms are often used to arouse attention. Although simple, these tactile cues are very efficient in conditions where visibility is very minimal

e. **Buddy System as a Communication Media**

At Gapi Dive Center, a buddy diving system is applied consistently. Each diver has a partner who is in charge of not only improving the safety factor, but also facilitating continuous communication through close surveillance and monitoring of each other's condition.

The above explanation shows that the underwater communication process at the Gapi Dive Center relies heavily on consistency in the use of nonverbal symbols. Hand signals serve as the main means of practicality, speed of understanding, and recognition globally. However, in less than ideal situations such as strong currents or low visibility, divers combine a variety of communication methods including underwater whiteboards, light cues, body movements, and physical contact.

This approach is in accordance with the principle of nonverbal communication according to Knapp & Hall (2010), which explains that nonverbal messages can function as a replacement, complement, or reinforcement of verbal messages. In the context of diving, nonverbal communication is even the most reliable channel of interaction. More than that, the implementation of a buddy system shows that communication is not just an exchange of information, but also a crucial element in the strategy to ensure security. Experienced divers are generally more responsive in understanding and responding to cues, while novice divers still need more intense training to prevent misinterpretation. Therefore, the underwater communication pattern at the Gapi Dive Center can be said to be a blend of international standards and adaptation to local conditions, with the main goal of ensuring safety and efficiency during diving activities.

Barriers in Underwater Communication

Divers at the Gapi Dive Center in Ternate experienced a variety of complex technical challenges in terms of underwater communication, which is essentially very different from communication on land. The core of the problem lies in the characteristics of water as a medium of signal propagation. Unlike on land that relies on radio waves, wireless communication in salt water is very ineffective because radio waves will weaken very quickly (attenuation) and can only travel very close distances. Therefore, sound waves (acoustic) are the main choice due to their wider range in aquatic environments. However, the quality of this signal is often compromised by background noise, whether from natural sources such as waves, rain, and marine animals, or man-made such as ship traffic. This interference results in a high error rate in data transmission.

In addition to physical and acoustic constraints, marine conditions also present operational hurdles and serious system design challenges. The dynamic and unpredictable characteristics of the sea cause the performance of acoustic communication channels to fluctuate greatly depending on time and place, making it difficult to create a stable and reliable system for divers. Another challenge is the

limited power of underwater devices, such as sensors or autonomous vehicles, given that the process of transmitting acoustic signals is very energy-intensive. On the other hand, the bandwidth that is limited to acoustic channels also limits the data transfer rate (data rate), which ultimately limits the capacity and type of data that can be sent directly. Faced with this complexity, the development of underwater communication technologies requires a comprehensive multidisciplinary approach, including precise channel modeling, the design of modulators and cutting-edge fault correction techniques, and the implementation of energy-efficient network protocols to realize resilient and reliable systems in the midst of all these challenges

In addition to the above, the communication system has been standardized, there are several obstacles found, namely:

- a. Signal limitations, that not all complex messages can be conveyed by hand alone.
- b. Lack of Global Standardization. Although there is general agreement, sometimes groups of divers use different variations of signs.
- c. Environmental Conditions. Limited visibility, strong current, or minimal lighting can interfere with the delivery of messages.
- d. Faktor Human Error. A diver's physical fatigue or lack of concentration can lead to misinterpretation.

Communication Strategies for Safety

The underwater communication strategy implemented by Gapi Dive Center Ternate is specifically designed to anticipate potential hazards and manage emergency situations effectively. One of the key steps is the implementation of a briefing before diving, which aims to align the understanding of all team members regarding the signals to be used. This significantly reduces the chance of misinterpretation during the dive. Divers also regularly practice using hand signals in order to apply them consistently and uniformly in a variety of conditions.

To support the clarity of communication in less than ideal environmental situations such as strong currents or limited lighting, various aids such as waterproof whiteboards, dive lights and pointing sticks are used. In addition, a buddy system is strictly implemented to ensure that each diver has a partner to monitor, communicate, and maintain mutual safety.

Viewed from the perspective of communication theory, this approach is in line with Schramm's model which emphasizes the similarity of the field of experience between the sender and receiver of the message. The briefing process plays a role in creating an agreement on the meaning of the symbols, so that the message can be interpreted uniformly. In addition, the mechanism of rapid feedback through cue response reflects the principle of effective communication according to Lasswell (1948), which is to ensure that the message conveyed (who says what) is truly understood by the recipient (to whom) through the right channel (in what channel) and produces the desired impact (with what effect).

Thus, the approach taken by divers does not only focus on technical aspects, but also prioritizes communication practices that prioritize message accuracy, uniformity of perception, and the implementation of structured feedback mechanisms. This approach ensures that underwater communication can remain effective even in sub-ideal environmental situations, while increasing the level of

safety and solidarity between team members during diving activities. Ultimately, these strategies prove that underwater communication is not just about the exchange of symbols, but more broadly encompasses aspects of team management and commitment to safety procedures.

Factors Affecting Communication Effectiveness

The effectiveness of the underwater communication system at Gapi Dive Center Ternate is influenced by four main factors: the competence of the divers, the environmental situation, the level of discipline, and the use of assistive devices. In terms of competence, certified divers show better ability to understand and respond to communication cues compared to beginners. On the other hand, environmental factors such as strong currents and limited visibility often obscure the visibility of hand movements. Individual discipline also plays a crucial role; Often, new divers are less aware of the whereabouts of their dive partners, increasing the chances of communication errors. Beyond all these challenges, supporting equipment such as diving flashlights and slate boards have proven to be very instrumental in maintaining smooth interactions when underwater conditions are not ideal.

Based on the findings, it can be affirmed that underwater communication plays a central role in supporting safety during diving activities. Data from the Gapi Dive Center corroborates the Divers Alert Network report (2020) which shows that the main factors causing diving accidents are miscommunication, depletion of oxygen reserves, and panic. The approaches used, such as the preparation of standard signals and repetitive training, have been shown to reduce the risk of misinterpretation. The implementation of a buddy system also strengthens the sense of safety, in accordance with accident prevention guidelines that emphasize the importance of teamwork and coordination. Thus, it can be concluded that the safety of divers depends not only on the readiness of the equipment and technicalities, but also on the clarity, consistency, and standardization of the nonverbal communication used.

CONCLUSION

Based on the results of the research conducted, it can be concluded that the underwater communication pattern applied by divers at Gapi Dive Center Ternate takes place through an internationally standardized nonverbal communication system based on hand signals, and is strengthened by the use of body movements and additional equipment such as slates and diving lights. The communication pattern is in the form of two-way communication, where every message conveyed by the diver will be immediately responded to by other fellow divers through a reply signal as a form of feedback.

This communication pattern is not only technical, but also based on a buddy system that emphasizes interdependence and a sense of responsibility between divers. With clear, consistent, and interactive communication patterns, divers are able to maintain safety, improve coordination, and strengthen teamwork in every diving activity. Therefore, the underwater communication pattern at Gapi Dive Center Ternate can be understood as a combination of technical skills in the use of body language and social strategies that strengthen the culture of safety and solidarity among professional divers.

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