

Validity and Reliability of Sport Diving Basic Skill Instrument for Beginner Diver

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Abstract The aim of this study was to validate the instrument used to assess the students' basic knowledge and skills in sports diving. Currently, many training programs are offered by agencies and coaches, and the need for assessment tools to be more objective assessments for beginner diving that meet the requirements for learning achievement in terms of student knowledge and skills. This research uses mixed methods. This study combines two approaches, namely qualitative and quantitative. The six experts' participation was determined by criteria of sport diving and Sport aquatic expert. The qualitative stage for data collection uses the Delphi technique. This research was conducted with content validity with Aiken's V index. Reliability test using Cronbach's Alpha Reliability Test. Aiken's analysis results on the instrument of knowledge and basic diving skills. Based on research results, Aiken's V index stated that the instrument for assessing basic diving knowledge and skills compiled is valid. Furthermore, Cronbach's Alpha reliability test on an interrater assessment of 6 raters, it was found that the overall Cronbach's Alpha value on the test subjects was declared reliable or consistent. Based on the research that has been done and the discussion that has been described, an instrument of knowledge and basic diving skills have high content validity and reliability between raters. It can be concluded that the instrument tool can be used by dive trainers or diving sports teachers in ensuring sufficient skills provision for the safety and comfort of diving in the future and an overview of further self-development

regarding the branch of diving expertise through professional training, especially for students of the UNY sports science faculty.

Keywords SCUBA Diving, Basic Knowledge and Basic Skills, Instrument, Validity, and Reliability

1. Introduction

SCUBA diving involves diving underwater while using equipment that allows the diver to breathe independently of the surface supply. With the use of their own source of breathing gas, typically compressed air, SCUBA divers enjoy greater freedom of movement than divers who rely on surface-supplied equipment. Additionally, SCUBA divers can remain underwater for longer periods compared to those who practice freediving or breath-holding dives [4]. The underwater environment is inherently unsuitable for human beings due to various factors. Water is denser than air, which results in poor sound and visibility underwater. Additionally, as depth increases, pressure rises while temperature drops. To mitigate the risks associated with diving and the need for a respiratory support system, it is essential to understand the physical characteristics of the underwater environment [17]. It is essential to have a solid understanding of the fundamental skills in diving because it poses significant risks, especially when performed

carelessly or without adequate mental and physical stamina, as well as diligent education and training.

As far as the authors' knows, there have been studies on the Incremental validity of Personality Measures in Predicting Underwater Performance and Adaptation as shown [5], and the assessment of diving skill is carried out by the criteria of a diving agent. Based on a recent study, recreational divers encounter the most difficulties during on-land activities and transitional stages between the water and the land. Diving involves several challenging stages, such as carrying equipment onshore, underwater orientation, exiting from the water onto the boat or reef, surface swimming, and donning the wetsuit. Safety and reliability, individual adjustment, performance, and simplicity are deemed the most crucial features of diving equipment, whereas design/style and brand name are considered the least important according to divers. The study recommends that adapting the task, equipment, and environment to suit the current profile of recreational divers can increase their enjoyment, reduce fatigue and related accidents, enhance safety, and attract more dedicated and active divers to the sport [22]. Sports Science curricula quite often use problem-based learning models by diving coaches or sports teachers to improve students' basic diving knowledge and skills [12]. Regrettably, the current learning model lacks adequate support from qualified assessment instruments. There is a pressing need for assessment tools that can evaluate aquatic skills and learning, and further development is required to create assessment instruments that can accurately measure student knowledge and skills in a more objective manner, meeting the requirements for learning achievement [21].

This Research is conducted to develop and test the validity and reliability of Scuba Diving basic skills and basic knowledge for beginner diver-based theoretical studies. To enable beginner divers to acquire a basic understanding of diving knowledge and skills, it is essential to provide them with appropriate teaching materials. Teaching materials refer to a set of facilities or learning tools that systematically and attractively present learning materials, methods, limitations, and evaluation methods to achieve the intended learning objectives [1].

The two most fundamental and essential features in assessing any measurement instrument or tool for a research study are reliability and validity. Validity refers to what the instrument measures and how accurately it does so, while reliability refers to the consistency of data obtained from the use of the instrument and the degree to which the measuring tool controls for random error. In this context, a review has been conducted to examine the reliability and validity of specific measurement instruments, as well as the potential threats to these features [14]. The preparation of good assessment instruments and basic skills is carried out through the validity and reliability test methods used to ensure strength based on the validity and reliability of the research [15]. Measurement instruments of high quality are essential for research purposes. To

evaluate whether an instrument is of high quality, its measurement properties, including reliability and validity, should be assessed using standardized criteria. These properties ensure that the instrument can effectively and accurately measure the intended construct or variable.

Reliability pertains to the consistency and stability of an instrument's measurements over time and across different populations or settings. In contrast, validity concerns the accuracy and relevance of the instrument in measuring the construct of interest. Both reliability and validity are crucial components in assessing the quality of an instrument and should be rigorously evaluated before it can be used in clinical or research settings [23].

This study aims to develop and test the validity and reliability of the instrument the aspects of assessing knowledge and skills that must be possessed By beginner divers and can be used by dive trainers or diving sports teachers in ensuring sufficient skills provision for the safety and comfort of diving in the future.

2. Materials and Methods

This study is a theoretical research project that focuses on developing basic diving teaching materials to improve the knowledge and fundamental sports skills of 20 students from the Faculty of Sports Science at Yogyakarta State University. The students are aged between 18-24 years and have not received any previous scuba diving training. Recruitment for the study is done openly using a G-Form, and potential participants undergo a medical examination by a doctor to determine their suitability as research subjects.

This research adopts a mixed-methods approach that combines both qualitative and quantitative methods to obtain comprehensive and valid data [18]. Mixed methods research is an approach that combines both qualitative and quantitative research methods. It is regarded as the third paradigm in educational research, as it integrates both quantitative and qualitative approaches. The quantitative paradigm is founded on positivism, while the qualitative paradigm is influenced by hermeneutics, critical theory, and post-structuralism. The philosophical basis of mixed methods research is pragmatism. By merging the strengths of both qualitative and quantitative research, educational researchers can gain numerous benefits from mixed methods research. It enables a more comprehensive comprehension of intricate educational phenomena by triangulating different types of data. Moreover, it provides the opportunity to explore research questions from different perspectives, resulting in more nuanced and robust findings. Mixed methods research is a versatile approach that can be adapted to fit various research contexts and questions [24].

Alternatively, the studies will be studied in detail sequentially or step by step [9]. The first stage of the research procedure involves a qualitative approach using a literature review method, specifically a narrative review

technique. In this approach, the researcher conducts a thorough and systematic review of the existing literature on the topic of interest, synthesizing and analyzing the findings to identify key themes, trends, and knowledge gaps. The narrative review technique involves a more subjective and interpretive approach to analyzing the literature, with a focus on developing a coherent narrative that integrates and contextualizes the available evidence. This stage is crucial in establishing a solid theoretical foundation for the research and identifying potential research questions or hypotheses to be tested in the subsequent quantitative stage [7]. It is added based on Open Water Diver certification materials according to research needs and then used to develop a conceptual assessment instrument which is further validated by expert judgement [16]. Participants at this stage are six experts with qualifications: one diving evaluation expert, one aquatics lecturer, 2 internationally certified diving instructors, and two practicing divers. Six experts were asked for their opinion regarding the design of the instrument developed using the Delphi method [10]. The process typically starts with an open-ended questionnaire or survey, where experts are asked to provide their views and ideas on the topic. The responses are then analyzed, and a second round of questions is created, based on the responses from the first round. The experts are then asked to rate the items in the second round, and the results are analyzed again. This process is repeated until a consensus is reached on the topic being studied. The Delphi technique is often used in fields such as healthcare, business, and education to gather expert opinions and make informed decisions based on those opinions. The process continues until the group reaches a consensus or a predetermined level of agreement. In this case, it appears that the Delphi technique was used to assess the construction design of sport diving basic knowledge and skills by obtaining the opinions of multiple experts separately [8].

The rating scale used in the questionnaire ranged from 1 to 5 and included indicators such as Very Good, Fine, Enough, Less, and Very Fewer. The input from expert judgment was analyzed and revised until no further improvements were needed. This process was part of the qualitative analysis stage. The instrument items are arranged to measure the achievement of diving skills mastered by students after being given teaching materials [6,16]. The item instrument used as an observation guide will be tested for validity.

One of the main procedures used in the validation of measuring instruments is using content validity. Content validity is carried out from the beginning of the preparation of the test, not after the test is designed. Validity pertains to the degree to which the test items accurately represent

the content area components that are being measured, as well as the extent to which the items align with the behavioral indicators of the attributes that are being measured [2]. Just as an item is determined by the results of the assessment carried out by the expert/appraiser based on the logic of this Judgment, it can increase its objectivity if it is carried out by many people.

This research used content validity, which was assessed using two methods: Lawshe's Content Validity Ratio (CVR) and Aiken's V Index. These methods rely on expert judgments to evaluate the extent to which each item accurately represents the construct being measured. Aiken described these methods in his 1985 paper titled "Three Coefficients for Analyzing the Reliability and Validity of Ratings", explained the formula for calculating the validity coefficient of Aiken's V

$$V = \sum s / [n(C-1)]$$

$$S = r - l_0$$

l_0 = lowest rating score

C = highest rating score

r = the score given by the assessor

Reliability test using Cronbach's Alpha Reliability Test with IBM Statistic SPSS Version 26, The reliability concerns about the faith that one can have in the data obtained from the use of an instrument, that is, the degree to which any measuring tool controls for random error [14]. The reliability calculation technique used in this study is the internal consistency reliability method using the reliability coefficient alpha Cronbach (α), this is in accordance with the intended purpose of the test consistency of the items in the study [19], with the basis of the decision:

1. If the value of Cronbach's Alpha > 0.60 then the questionnaire or questionnaire is declared reliable or consistent.

2. Meanwhile, if the value of Cronbach's Alpha < 0.60 then the questionnaire or questionnaire is declared unreliable or inconsistent.

3. Results

The result of the first qualitative approach the Instrument design of Basic Skill Scuba Diving design for assessing Basic Skill of Scuba Divers including knowledge and good basic diving skills, with the following aspects:

Tables regarding information on Basic Skills Aspects and Assessment Criteria are shown in Table 1:

Table 1. Basic Skill Aspects

No.	Basic Skill Aspects	Assessment Criteria
1	<p>Snorkeling is an underwater exploration activity by staying on the surface of the water, looking down through the mask, and breathing through the snorkel without lifting the head to breathe, using fins to move.</p> <p>Advanced movement exercises (Fins swimming) with the flutter kick model without the assistance of hand movements. For breathing assisted by using a side snorkel. This type of swimming technique that is used in diving sports, does not use hand movements and only legs with the support of movement from the groin</p>	<p>Installing the Snorkeling set</p> <p>Mask (diving goggles)</p> <p>Snorkel (breathing tube) attached to the left side of the mask</p> <p>Fins (frog shoes) for swimming</p> <p>The movement of swimming on the surface (fins swimming), using a crawl style with the head still facing down and breathing using a snorkel. Able to cover a minimum distance (300 meters)</p>
2	<p>The Duck dive/Headfirst is a movement that can be performed using a stroke prefix or without a stroke prefix. Make preparations before holding your breath.</p>	<p>Able to carry out the movement of diving (duck dive) / head first</p> <p>When entering the water:</p> <p>Use the help of hand strokes to enter the water.</p> <p>Body position bent 90 degrees</p> <p>The fins are pedaled when the fins are fully in the water</p> <p>Continued movement up to the surface with the head up and hands holding the bottom of the snorkel</p> <p>Remove water that enters the snorkel when diving by spouting through the snorkel</p>
3	<p>Clearing Mask is a technique in diving that serves to balance the pressure in the face area during diving activities and is also useful for cleaning dewy masks.</p>	<p>Able to carry out the clearing mask movement well:</p> <p>Prepare to dive by taking a deep breath through your mouth</p> <p>Continued movement of diving by loosening the rubber of the upper mask until the water enters the mask</p> <p>Exhale through the nose with the mask slightly loosened until all the water in the mask comes out</p> <p>The mask is completely clean and there is no residual water trapped in it</p>
4	<p>Back Roll entry is a diving entry technique with the back side touching the water first</p> <p>Able to do back roll movement well:</p> <p>Sit on the edge of the pool with the left hand behind the head to hold the valve tip from injuring the back of the head when rolling. right hand holding mouthpiece/snorkel</p> <p>The back roll motion signals the hand Ok first before falling backward with the back falling first</p> <p>Roll motion in the water while rising to the surface</p> <p>Came to the surface signaling hand Ok</p>	<p>Able to do back roll movement well:</p> <p>Sit on the edge of the pool with the left hand behind the head to hold the valve tip from injuring the back of the head when rolling. right hand holding mouthpiece/snorkel</p> <p>The back roll motion signals the hand Ok first before falling backward with the back falling first</p> <p>Roll motion in the water while rising to the surface</p> <p>Came to the surface signaling hand Ok</p>
5	<p>Giant stride is a diving entry technique with entering the water in a way like stepping in the air. This technique can be used when learning to dive in a swimming pool or rescue from a boat</p>	<p>Able to carry out the Giant Stride entry movement well:</p> <p>Standing on the edge of the pool with the left hand positioned behind as if holding the tube, and the right hand holding the mask and snorkel so that it doesn't come off during entry</p> <p>Stepping with your feet wide with your left hand protecting the bottom of the tube and your right hand holding the snorkel/mouth fish mask from falling off</p> <p>The position of the head is slightly tilted forward to prevent possible collision of the back of the head with the upper tube when landing in the water giving a hand signal Ok before jumping</p> <p>Entry with the feet first touching the surface of the water</p> <p>Continued movement by lightly pedaling the fins to keep the head above the water and then giving the hand signal Ok</p>

Table 1 continued

6	<p>Exit procedure is a technique to rise to the surface from diving activities, this technique requires calculations and is well-planned to avoid risks</p>	<p>Able to carry out exit procedures properly: Rise to the surface (ascent) slowly, and control at a speed of not more than 9 meters per minute. protects the head when rising to the surface, and is able to inflate the BC inflator and swim towards the stairs going up the pool Always with a dive partner Keep diving equipment in a safe place before climbing stairs Remove the mask first, remove the fins, weigh the belt Close the air valve in the tube then remove all diving equipment Tidy up diving equipment</p>
7	<p>Equalizing technique with The Valsalva maneuver is a technique in which you exhale forcibly, but keep your nose and mouth closed. This technique will force the air to flow into the Eustachian tube. The Eustachian tube is the tube that connects the nose and the ear</p>	<p>Able to carry out the movement of the Valsalva equalizing maneuver well: Performing the duck dive/head first. technique When the ears and sinuses start to feel uncomfortable, immediately squeeze the nose while straining/exhaling through the squeezed nose so that the air pressure in the ears will adjust Characterized by the sensation of pain in the sinuses disappearing and there is a sensation of sound coming out of the ear Divers can explain the equalizing process experienced correctly</p>
8	<p>Water trappen is a technique of floating in the water without moving from place to place. movement Vertical position in the middle of the pool, leg movement frog style/breaststroke by pushing the body upwards by setting feet down starting from both knees bent then straightened down until the body is pushed up. with both hands paddling at waist level in a vertical position, the legs "whip" in a circle while the hands are at waist level</p>	<p>Able to carry out the Water Trappen movement well: Water trappen is a movement to maintain as long as possible on the surface of the water without sinking by pushing the body up and putting the feet down starting from both knees bent and then straightening down until the body is pushed up efficiently Foot movement followed by efficient upward rowing of hands Implementation time reaches a minimum of 15 minutes Divers can explain the process of Water trappen movement experienced correctly</p>
9	<p>Neutral buoyancy is a diving technique by maintains neutral buoyancy when the diver's body is in a fluid density of water. By adjusting the air balance for buoyancy and weight for gravity strive to achieve the body trim position</p>	<p>Able to do Buoyancy technique well: Divers install scuba sets and use weight belts as needed to create neutral buoyancy. The diver enters the water and lies back and the head is up, and the body is facing up all the way to the desired depth. Divers are able to adjust the air in BC by pressing the air out button and the air intake button BC Maintain the body to have a neutral and balanced buoyancy with several tests including hovering stably by maintaining the body trim position Divers are able to explain the correct mechanism of buoyancy regulation</p>
10	<p>Air Sharing is a procedure of sharing oxygen supply with diving partners and is used in an emergency when a scuba diver "runs out of gas". This is done by giving an out-of-air emergency code.</p>	<p>Able to carry out the practice of water sharing well: Divers use a scuba set and use a weight belt according to their needs to create a neutral buoyancy The diver enters the water and with his back down and the head-up position and the body facing up all the way down begins to slowly descend to the depths and set a balanced neutral buoyancy Divers understand emergency air request codes in dive communications Diving Buddy (diving partner) approaches the diver and then gives a code asking for air The donor diver then first performs a recovery regulator, a technique of quickly finding where the second stage is located with the "hand position straight ahead then rotated closer to the body and in a circle The diver gives a second stage to his dive buddy and then breathes in unison Divers can explain the practice of water sharing correctly</p>

Table 1 continued

11	SCUBA Diving Equipment Assembling Practice is a scuba equipment assembly technique that divers need to understand	<p>Able to properly Assemble SCUBA Diving Equipment: Divers are able to recognize each component of the diving equipment to be used and understand its function</p> <p>Able to explain the connection mechanism of the diving tube, valve with console regulator, and BC so that the air is connected to each component correctly</p> <p>Able to install SCUBA SET containing diving tube, connect valve with console regulator and BC so that air is connected to each component correctly, install tightly and not loose, test scuba set by lifting it up and not falling</p> <p>Divers are able to read the indicators in the regulator console properly (amount of air in the tube, depth indicator)</p>
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Tables regarding information on Basic Knowledge Aspects and Assessment Criteria are shown in Table 2:

Table 2. Basic Knowledge Aspects

No.	Basic Knowledge Aspects	Assessment Criteria
1	History of Diving	<p>Able to explain the early history of diving well</p> <p>Mention technological developments that accompany humans to work underwater effectively</p> <p>Mention more than 3 international diving organizations/agencies</p> <p>Be able to name the parent dive organizations that exist according to the location in this case in Indonesia</p>
2	Basic Knowledge of Diving Equipment Introduction	<p>Able to explain the main functions of the diving flag</p> <p>Able to distinguish snorkeling, freediving, skin diving and scuba diving</p> <p>Able to mention the equipment needed for snorkeling activities and understand its function?</p> <p>Able to name the equipment needed for SCUBA Diving activities and understand its function?</p> <p>Understand the basic conversion of air pressure units psi and bar</p>
3	Basic Knowledge of Physics and Biology Aspects in Diving	<p>Be able to briefly explain the effect of pressure on the diver's body</p> <p>Able to mention ABCDH physics law (Archimedes, Boyle, Charles, Dalton, Henry) with the concept of science for diving activities</p> <p>Able to recognize and mention the potential of marine organisms for divers and the steps to anticipate them</p>
4	Basic Knowledge of Fundamentals of Human Physiology in Diving	<p>Able to explain at least 6 physiological changes in the diver's body:</p> <p>Able to briefly explain the concept of the influence of the environment in water on the lungs and respiratory function, new traumatic diseases</p> <p>Be able to explain briefly the concept of the influence of the environment in water on the Heart & Circulatory Function</p> <p>Able to briefly explain the concept of the influence of the underwater environment on the sinuses and ears of divers</p> <p>Able to explain the concept of the Squeeze mask and Gigi to divers</p> <p>Be able to explain the concept of the cause of Decompression Sickness</p> <p>Able to explain the concept of Arterial Gas Embolism to divers</p>
5	Dive Planning	<p>Able to explain well the 11 concepts Pre-dive briefing must cover the following aspects:</p> <p>Diving Aim</p> <p>Diving Conditions</p> <p>Dive Plan (Dive Plan)</p> <p>Communication (Sign language in diving)</p> <p>Buddy Checklist</p> <p>Familiarization with equipment</p> <p>Entry and Exit Procedure</p> <p>Lost Buddy Procedure</p> <p>Emergency procedures</p> <p>Go / No-Go Diving Decision</p> <p>Able to read diving tables</p>

Validity test is stated by Lawshe with CVR and Aiken with Aiken's V index. These two indices are based on the results of an expert panel of 6 people on the assessment of basic diving knowledge and skills and the extent to which the items represent constructs with the following results:

Tables regarding information Results of Analysis of Aiken's Diving Basic Knowledge Assessment Instruments are shown in Table 3.

Table 3. Results of Analysis of Aiken's Basic Knowledge Assessment Instruments

Knowledge Aspect Instrument	item	V1	V2	V3	V4	V5	V6	$\sum(r - lo)$	$n*(c-1)$	$V = \frac{\sum(r-lo)}{n*(c-1)}$
Diving History	Item 5	4	5	5	5	5	4	22	24	0.917
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Diving Equipment Introduction	Item 5	4	5	5	5	5	4	22	24	0.917
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Physics and Biology Aspects in Diving	Item 5	4	5	5	5	5	4	22	24	0.917
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Fundamentals of Human Physiology in Diving	Item 5	4	5	5	5	5	4	22	24	0.917
	item 4	4	5	5	5	5	5	23	24	0.958
	Item 3	4	5	5	5	5	5	23	24	0.958
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Dive Planning	Item 5	4	5	5	5	5	5	23	24	0.958
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	4	22	24	0.917

Tables regarding information Results of Analysis of Aiken's Diving Basic Skill Assessment Instruments are shown as Table 4.

Table 4. Results of Analysis of Aiken's Diving Basic Skill Assessment Instruments

Basic Skill Aspects Instrument	item	V1	V2	V3	V4	V5	V6	$\sum(r - lo)$	$n*(c-1)$	$V = \frac{\sum(r-lo)}{n*(c-1)}$
Snorkeling	Item 5	5	5	5	4	5	5	23	24	0.958
	item 4	4	5	5	4	5	4	21	24	0.875
	Item 3	4	5	5	4	5	4	21	24	0.875
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
The Duck dive/Head first technique	Item 5	4	4	5	4	5	5	21	24	0.875
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Clearing Mask Technique	Item 5	5	4	5	5	5	5	23	24	0.958
	item 4	4	5	5	4	5	5	22	24	0.917
	Item 3	4	5	5	4	5	4	21	24	0.875
	Item 2	4	5	5	4	5	4	21	24	0.875
	Item 1	4	5	5	5	5	5	23	24	0.958
Back Roll entry	Item 5	4	5	5	4	5	5	22	24	0.917
	item 4	4	5	5	4	5	4	21	24	0.875
	Item 3	4	4	5	4	5	5	21	24	0.875
	Item 2	4	4	5	4	5	5	21	24	0.875
	Item 1	4	5	5	5	5	5	23	24	0.958
Giant Stride entry	Item 5	4	5	5	5	5	5	23	24	0.958
	item 4	4	5	5	5	5	4	22	24	0.917
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Exit Procedure	Item 5	4	5	5	4	5	4	21	24	0.875
	item 4	4	5	5	4	4	5	21	24	0.875
	Item 3	4	5	5	4	5	4	21	24	0.875
	Item 2	5	5	4	4	5	4	21	24	0.875
	Item 1	4	5	5	5	5	5	23	24	0.958
Equalizing technique (Valsava Maneuver)	Item 5	5	4	5	4	5	5	22	24	0.917
	item 4	4	4	5	4	5	5	21	24	0.875
	Item 3	5	4	5	4	5	4	21	24	0.875
	Item 2	4	4	5	4	5	5	21	24	0.875
	Item 1	4	5	5	5	5	5	23	24	0.958

Table 4 continued

Watter Trappen	Item 5	4	5	5	5	5	5	23	24	0.958
	item 4	4	5	5	5	5	5	23	24	0.958
	Item 3	4	5	5	5	5	4	22	24	0.917
	Item 2	4	5	5	5	5	4	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Neutral Buoyancy	Item 5	4	4	5	4	5	5	21	24	0.875
	item 4	4	4	5	4	5	5	21	24	0.875
	Item 3	4	5	5	4	5	4	21	24	0.875
	Item 2	4	5	5	4	5	5	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958
Air Sharing	Item 5	4	5	5	5	5	4	22	24	0.917
	item 4	4	4	5	4	5	5	21	24	0.875
	Item 3	4	5	5	4	5	5	22	24	0.917
	Item 2	4	4	5	4	5	5	21	24	0.875
	Item 1	4	5	5	5	5	5	23	24	0.958
SCUBA Diving Equipment Assembling Practice	Item 5	4	5	5	5	5	5	23	24	0.958
	item 4	4	4	5	4	5	5	21	24	0.875
	Item 3	4	4	5	4	5	5	21	24	0.875
	Item 2	4	5	5	4	5	5	22	24	0.917
	Item 1	4	5	5	5	5	5	23	24	0.958

From Aiken's analysis results on the instrument of knowledge and basic diving skills, the lowest score is 0.875 and the highest is 0.958 with an average value of 0.91775. To assess the validity of the test items assessed, the results of the V score must be compared with the value of the V table in the evaluation using 6 expert judgments with 5 alternative scales at a significance level of 5%. Aiken Result V Score (0.875 to 0.958) V table 0,79, it can be stated that the instrument for assessing basic diving knowledge and skills compiled is valid.

Furthermore, Cronbach's Alpha reliability test with SPSS on assessment among 6 raters on assessment instruments and basic diving skills developed on 20 students as subjects, tests during small-scale trials, show result average value is 0.92275. It was found that the overall Cronbach's Alpha value on the test subjects was in the range (0.799 to 0.975) > 0.60 and according to the reference so the questionnaire or questionnaire was declared reliable or consistent

4. Results

This study is the first to report its validity and reliable instrument for assessing basic diving knowledge and skills in Indonesia. The overall findings of this study indicate validity and reliability test. Aiken's analysis results on the instrument of knowledge and basic diving skills, the lowest score is 0.875 and the highest is 0.958 with an average value of 0.91775, compared with the value of the V table in the evaluation using 6 expert judgments with 5 alternative scales at a significance level of 5%. Aiken Result V Score $0.958 \geq V$ table 0,79, it can be stated that the instrument for assessing basic diving knowledge and skills compiled is valid. Furthermore, Cronbach's Alpha value on the test subjects was in the range (0.799 to 0.975) > 0.60 with result average value is 0.92275, so the questionnaire was declared reliable or consistent. The results support content validity regarding clarity and accuracy by experts and professionals. Inter-rater scores were high and positive, justifying appraiser objectivity. We found a positive and significant association between test assessment and retesting; the scale shows the temporal stability for the total Sample. The results of the validity of the criteria show relevant evidence for practical impact and program strategies that are appropriate and easy to learn. According to Bajpai [3], a tool used to measure assessment is considered effective if it has validity and reliability values, assessing fundamental diving knowledge and skills demonstrated in research findings can serve as a valuable tool to evaluate students' proficiency levels across various cognitive domains, including factual, conceptual, procedural, and metacognitive knowledge, as well as low to high-level thinking skills. Assessing knowledge helps determine whether students have achieved the learning

objectives and also helps identify their strengths and weaknesses. This allows educators to promptly consider minimum safety standards for novice divers.

5. Conclusions

Based on the research that has been done and the discussion that has been described, an instrument of knowledge and basic diving skills have high content validity and reliability between raters. A measuring tool used for assessment can be deemed effective if it possesses values of validity and reliability [3]. The evaluation of fundamental diving knowledge and skills demonstrated in research findings can serve as a valuable tool for assessing students' proficiency levels across a range of cognitive domains, such as factual, conceptual, procedural, and metacognitive knowledge, as well as low to high-level thinking skills. Assessing knowledge not only helps ascertain whether students have mastered the learning objectives, but also allows for identification of their strengths and weaknesses, enabling educators to promptly consider minimum safety standards for novice divers.

A recent study conducted in Japan found that the number of divers has increased, resulting in negative ecological impacts on heavily-dived sites, where divers unintentionally harm live corals by physically contacting them. The study highlights the importance of buoyancy control training for divers as an essential element of coral reef conservation, in addition to environmental education [25]. This finding underscores the existence of divers who are able to use scuba diving equipment but have deficiencies in their basic diving knowledge and skills, this is the importance of assessing basic diving skills for beginners to reduce negative impacts on the environment. In addition, this research can be used to ensure that marine volunteers can carry out diving activities properly and do not damage the marine environment and actually cause marine problems and their safety [13]. On the part of the historical aspect, the diving with professional organization/agency item can be adapted to each country which is intended to provide guidance on options for further development of diving knowledge and skills towards professional licensure through professional training.

The outcomes of this review highlight the need for assessing basic diving knowledge and skills. To ensure that the results of data collection are valid, it is crucial to use the appropriate instrument to determine its validity and reliability [26]. Validity and reliability are essential prerequisites for ensuring the quality and accuracy of measurement tools [11]. Content validity involves testing the feasibility of an assessment with the help of a knowledgeable expert to ensure its appropriateness and relevance [20]. Interrater reliability refers to the degree of measurement error in a test that arises due to different scorers or raters assigning scores to the same event or phenomenon.

It can be concluded that the measurement tool for assessing knowledge and skills that must be possessed by beginner divers can be used by dive trainers or diving sports teachers in ensuring sufficient skills provision for the safety and comfort of diving in the future and an overview of further self-development regarding the branch of diving expertise through professional training, especially for students of the UNY sports science faculty.

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Conflicts of Interest

All authors declare no conflict of interest.

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