DIVING SKILLS AS A PANACEA FOR UNDERWATER WELDING OPERATIONS FOR WEALTH CREATION AND ECONOMIC SELF-RELIANCE FOR TECHNICAL COLLEGE GRADUATES IN SOUTH-SOUTH NIGERIA

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ABSTRACT

This research explored diving skills as a panacea for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in south-south Nigeria. The focus of the study was to determine, the scuba-diving and surface supply-diving skills of technical college graduates in south-south Nigeria. The study adopted a descriptive survey research design. The population of the study was made up of 73 diving experts and underwater welding technicians. A sample size of 165 respondents—72 diving experts and 92 underwater welding technicians—was selected for the study through a simple random sampling technique. Data was collected through the instrument titled "Diving Skills for Underwater Welding Operations for Wealth Creation in Economic Self-Reliance Questionnaire" (DSUWOWCESQ). The instrument was validated by three lecturers in the Faculty of Education, University of Uyo, and adjudged reliable based on a reliability index of 0.84 for diving experts and 0.86 for underwater welding technicians. Mean and independent t-test statistics were used to analyze the data obtained. The findings from the study revealed that there was no significant difference between the responses of diving experts and underwater welding technicians in south-south Nigeria on scuba-diving and surface supply-diving skills. In view of the findings from this study, recommendations were made, among others, that the National Board for Technical Education should develop curricula that suit the needs of the environment where the institutions are sited in riverine areas. Also, private institutions in south-south Nigeria should offer courses like diving since diving is a crucial aspect of oil and gas exploration, especially when it is explored off-shore; underwater welding; and marine operations.

KEYWORDS: Diving Skills, Underwater Welding, Wealth Creation, Economic Self-Reliance.

Background of the Study

Diving is simply a process whereby individuals plunge headfirst into the water. Divers must first acquire the skills of swimming, and swimming is simply moving along in water by means of movement of the body or parts of the body, especially the arms and legs. All divers are required to put on a diving suit or dress before diving. A complete diving outfit consists of a waterproof suit with a heavy, detachable helmet and an air supply. Diving is also the practice of going underwater, either with breathing apparatus (scuba diving and surface diving) or without (breath-holding and free-diving). Atmospheric diving suits may be used to isolate the diver from the effects of high ambient pressure, or the saturation diving technique can be used to reduce the risk of decompression sickness after deep dives. The term "deep diving" refers to underwater diving, usually with surface-supplied equipment, and often refers specifically to the use of standard diving dress with the traditional copper helmet. Hard-hat diving is any form of diving with a helmet, including the standard copper helmet, other forms of free-flow helmet, and the lightweight demand helmet. Underwater diving without breathing apparatus or with breathing apparatus is specifically carried out as recreational diving, professional diving, commercial diving, and underwater sports diving. Klemens (2012) pointed out that diving skills, in addition to practical skills,

are very important for successful welds in underwater welding operations. It is a lot easier to take a good welder and teach him to dive than the other way round.

Diving is generally referred to as the inward and systematic movement of one's body in a pool of water such as streams, rivers, seas, and oceans. There are basically two types of diving: SCUBA diving and surface supply diving.

(a) The SCUBA Diving

SCUBA diving is a type of diving in which the air required to sustain the diver is only contained in a breathing system known as the bail out bottle as shown in Figure 1.

Figure 1: ***An underwater welder kited as a diver***

Source: ***Edmonds, Lowry and Pennefather (2002)***

SCUBA is an acronym which implies:

S - Self
C - Contained
U - Underwater
B - Breathing
A - Apparatus

The SCUBA diving equipment is: a face mask, fins, diving suit, booties (diving suckers), diving knife, bailout bottle, demand valve or breathing regulator, and hand clovers. SCUBA divers have a signaler on the surface, which helps give out useful signals to the diver. This signaler is referred as a tender. The diving or bailout bottle is charged to a maximum pressure of 200 bars (3000 psi). In SCUBA diving, an economy of air consumption is required.

There are approximately nine different makes of scuba diving equipment on the market. The various manufacturers employ air as their breathing medium. Other forms of breathable gas compounds are used to allow divers to descend to a depth of 30,480 cm. There are several types of rebreathers available on the market. In some phases of the diving business, the rebreather unit has proven more effective than the compressed air unit. However, compressed air is the most widely used breathing medium for SCUBA diving throughout the world.

(b) The Surface Supply Diving

Surface supply diving is the type of diving in which the necessary air, communication, direction, tools, and all the equipment come from the surface to the underwater diver or welder. The surface supply diving equipment include: umbilical system (main air supply hoist, pneumo hoist, camera and lighting cable, marine robe and diving cable), diving helmet (purge button – for testing if the air is

sufficient for the period of operation. Exhust – for release of carbondioxide out of the helmet. Spindle – for adjusting of the volume of air the diver and welder needs depending on the diver's lungs. Check valve – this has two outlets; the first is used for main air supply while the other is used for emergency purpose. Communication guard – this is mainly for communication. Seals – it prevents water from entering the system and oral nasal) Divers compressor (this is used for pumping of air (oxygen) for diver's consumption) and communication equipment.

Lunching and Recovery System (LARS) is surface supply diving equipment that is used by the divers in deeper waters to reduce the stress in diving as shown in Figure 2.

Figure 2: Launching/Recovery System (Diving Basket)

Source: **SMP Twin Basket Diver Launch and Recovery System (LARS) – Diving... www.smp-ltd.com**

It is made up of the winches that are used to lower the diving basket to the bottom of the sea for safe diving. The Lunch and Recovery System (LARS) is designed to get professional and commercial divers and subsea equipment in and out of the water quickly and safely. It has a frame design with winches and hydraulic arms for use with a diver's basket or wet bail. The diver's basket contains two bailout bottles for emergency purposes.

Cayford (2004) opined that divers can count themselves lucky if they have never suffered a diving accident. Because some simple safety rules have been disobeyed, a diver may suffer a serious injury or even forfeit his life while below. When such things happen, it reflects on all divers and diving in general. Cayford added that since divers would continue to overlook the simple safety precautions of diving, the more serious types of diving accidents such as air embolism, bleeding from the nose and lungs, compressed air illness, ear pains (bleeding from the ears), and exhaustion do occur.

The diver decompression chamber is a mechanism where the diver is decomposed after diving. Figures 3 and 4 show the external and internal features of the diver's decompression chamber, respectively. The decompression of a diver is the reduction in ambient pressure experienced during ascent from depth. It is referred as the process of elimination of dissolved inert gases in the ascent known as decompression stops and after surfacing until the gas concentration reach equilibrium. No decompression stops are necessary for the first 120 minutes between the surface and 1,219.2 cm.

When a diver descends into the water, the hydrostatic pressure and ambient pressure rise due to the fact that breathing gas is supplied at the same ambient pressure as the surrounding water, and some of this gas dissolves into the diver's blood, from where it is transferred to other tissues. Inert gas continues to be taken up until the gas dissolved in the diver is in the state of equilibrium with the breathing gas in the diver's lungs; at this point the diver is saturated. On ascent, the ambient pressure is

reduced, and the inert gas dissolved in the tissues is then at a higher concentration than the bubbles, which may lead to decompression sickness and possibly form a life-threatening condition. It is essential that divers carefully manage their decompression to avoid bubble formation and decompression sickness. A mismanaged decompression usually results from reducing the ambient pressure too quickly, allowing the dissolved inert gases such as nitrogen or helium to form bubbles in the blood and tissues in a manner similar to the fizzing of a carbonated beverage. When opened, these bubbles may block the arterial blood supply to tissues or cause tissue damage if the decompression is effective. The asymptomatic venous microbubbles present after most dives are eliminated from the diver's body in the alveolar capillary beds of the lungs. If the divers are not given enough time or more bubbles are created than can be eliminated safely, the bubbles grow in size and number, causing the symptoms and injuries of decompression sickness.

Figure 3: External Decompression Chambers

Source: www.smp-ltd.com

Figure 4: Inner Room of Decompression Chamber

Source: www.dailymail.co.uk

Kraji (2015) noted that diving is an activity that requires an understanding of the physiology of the human body, of medicine, physics, and engineering, and the exercise of special skills, procedures, and rules. The concept of safety is primarily in diving, and the dangers that are derived from diving are crushing, sudden emergency of the welder/diver onto the surface, high pressure oxygen toxicity, carbon dioxide toxicity, the narcotic effect of nitrogen, hypoxia, decompression sickness, barotraumatic gas embolisms, drowning, contamination of the diver's air, infection risk, and hypo- and hyperthermia (Kraji, 2015).

Hazards during underwater welding can be divided into those that are consequences of welding and those that are consequences of diving. The welding hazards include dangers from electrical current,

explosions, and electric arc flashers (Khan, 2007). Diving hazards are dangers that are possible in any dive, such as the sudden emergence of the diver onto the surface, the toxic effect of pressurized oxygen, the toxic effect of carbon dioxide, the narcotic effects of nitrogen, hypoxia, depression sickness, barotrauma, drowning contamination of the diver's air, injuries during the dive, and the risk of infection, among others.

Cayford (2004) enumerated the physical requirements for divers as follows:

1. An excessively overweight person should not attempt deep diving.
2. Vision should be at least 20/30 bilaterally, not much lower, and correctable to 20/20. Color vision should be normal by the standards of an American optical company.
3. Teeth should be of high standard in oral bridges, and dentures should not be such as to interfere with effective gripping of the mouthpiece.
4. Ears should be normal and clear; no acute or chronic disease should be present. Ear drums should be intact, Eustachian tubes should be freely patent for equalization of pressure changes and hearing on each ear should be normal.
5. The nose and throat passages should be clear and have adequate ventilation. Chromic diseased tonsils and sinusitis are hazards, and people with such trouble should not be allowed to dive.
6. The lungs should be clear and normal, as determined by a physical and X-ray examination.
7. The cardiovascular (heart, veins, and arteries) system should be free of significant abnormalities as determined by physical examination. Varicose veins and marked or symptomatic haemorrhoids are hazards.
8. The sustrointestinal system should be normal. No chronic, acute, or recurrent disease or condition should exist.
9. There should be no chronic, acute, or recurrent genitourinary disease or condition present.
10. There should be no active, acute, or chronic disease of the skin.
11. Temperament should be normal. Persons with any abnormal emotional or temperamental condition, epilepsy, personality disorder, neurotic trends, emotional immaturity, instability, or associated traits should not be allowed to dive.
12. ability to equalize pressure. This is checked in a recompression chamber to determine the ability to clear the ears effectively and to withstand the effect of pressure otherwise.
13. Oxygen tolerance under pressure. This is very necessary in case treatment is needed in a recompression chamber for any of the diving illnesses or injuries.
14. A complete annual physical examination should be given all diving personnel.

Cayford (2004) disclosed that there are many swimmers who cannot meet such physical requirements but who use SCUBA a great deal with no resultant ill effects, though some will get in by neglecting safety, thereby defying the law of averages and taking a foolhardy risk. Diving is a strenuous undertaking, and for this reason, the diver or welder must be in good health. The following excellent list of safety rules is given for divers:

1. Swim with a buddy at all times. Use a buddy line under especially unfavorable conditions.
2. Do not dive if tired or if not feeling well.
3. Make a preliminary check of your equipment prior to entering the water.
4. When embarking on an underwater task, make complete plans prior to submerging. Incomplete planning for each dive causes most of the hazardous situations in which swimmers find themselves.
5. Know how to use the standard Navy decompression tables and stay within the decompression limits, unless there is some reasonable necessity for doing otherwise. Use a wearable watch and depth gauge on deep swims.
6. Enter the water feet first.
7. Do not use oxygen in scuba designed for compressed air.
8. If weights are used, attach them to the scuba so that they may be released independently or with the scuba.
9. Do not use wrenches on value handles not designed for such use.
10. If contact is lost with a buddy, it is usually best to surface and look for bubbles. Listening for bubbles is of questionable value since your hearing underwater is non-directional.
11. Know the location of the nearest decompression chamber.
12. Be proficient in the back pressure-arm lift method of artificial respiration.
13. Carry a sharp knife, preferably one that has a saw-tooth edge.
14. High-pressure air can be hazardous. Do not leave a charged scuba in the hot sun. Use vigilance during maintenance. Conduct routine hydrostatic testing of high pressure parts.
15. After initial physical examination, undergo periodic re-examinations.
16. Be able to recognize the symptoms of diver's illnesses.
17. Conduct routine maintenance on your equipment.
18. Charge your scuba only where you know there is good breathing air.
19. Use a scuba harness with quick-release features.
20. Do not charge cylinder above rated pressure
21. Avoid kinks in the flexible charging hose.
22. Use safety line when current in requiring near maximum propulsive effort.
23. Never use goggles or ear plugs.
24. Do not rush your descent or ascent; place yourself at the rate of your exhaust bubbles on ascent and breathe continuously.
25. Use a life jacket or floatation device when conditions warrant.

26. Do not continue to dive after the reverse device has been activated.
27. Be able to relieve cramped muscles, both your own and your buddy's.
28. When visibility is poor, ascent with your arm or arms extended above your head and listen for propeller noise.
29. Do not continue decent, it pains in ears as sinus continues
30. Know your own overall ability and use it to guide your actions (Cayford, 2004).

Cayford (2004) further stressed that observing these safety rules will help to ensure that we live to re-enter the blue kingdom many times over to work, study, observe, and play.

Beside underwater welding, there are many other jobs for a diver. Divers are employed by federal, state, country, or local authorities and civil agencies, working at such jobs as fisheries science research, cleaning public swimming pools and beaches, recovering drowned victims and vessels, and inspecting water tanks, bridges, piers (a structure built out into the sea, used as a landing stage or promenade), pilings, and docks. Divers equally carry out salvage work. Salvage is the compensation given or due salvors for their work, time, and efforts in saving a ship's cargo and/or the vessel. Material salvaged from a wreck or a derelict is classified as salvage, as is the saving of a ship and its cargo from loss.

Insurance companies often call upon a diver to locate articles that have fallen below and check various items on damaged or wrecked automobiles that have been involved in accidents by going over bridges, docks, or pliers. Removing variable commercial metals and inspecting boat hulls are known as the functions of a diver. Cleaning and scraping hulls is a job that divers can perform while the vessel remains in the water. This work saves the boat owner from having his vessels tied up in a dry dock for several days. Two divers can clean a 1,066.8-meter ship's hull in one day.

Purpose of the Study

The study was set to achieve the following objectives:

1. Determine the scuba-diving skills need for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria.
2. Determine the surface supply-diving skills need for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-South Nigeria.

Research Questions

The following research questions guided the study.

1. What are the scuba-diving skills need for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria?
2. What are the surface supply-diving skills need for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria?

Hypotheses

In line with the slated objectives and research questions, the following null hypotheses were formulated for the study.

Ho_1: There is no significant difference between the responses of diving experts and underwater welding technicians on scuba-diving skills for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria.

Ho_2: There is no significant difference between the responses of diving experts and underwater welding technicians on surface supply-diving skills for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria.

Methodology

The study adopted a descriptive survey research design using a questionnaire. Ndiyo (2005) emphasized that a study of this nature where large samples are involved is better carried out with a descriptive survey design. Ojo (2001) stated that descriptive survey design is a technique for obtaining data from people through the use of a questionnaire, observation, and interview. According to Osuala (2005), the descriptive design is the design suitable for the collection of data based on the opinions of people. A descriptive survey design calls for ascertaining information about existing events or circumstances from a wide array of subjects (Shittu, 2010). The study was conducted in south-south Nigeria, covering six states. The South-South Nigeria is one of the six geo-political zones in the country comprising of six states namely; Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers. This geopolitical zone is located in the Niger Delta region of the country, with the popular River Niger emptying through its tributaries. The zone as it is located is the richest and most famous in the country because of the crude oil and other natural resources like clay, rubber, palm fruits, periwinkle, fish, crayfish, fruits of various kinds, and herbs for medication. The major occupations of the people are fishing, petty trading, craft-making, boat-making, carving, and weaving. The people from the South-south are friendly and hospitable, with a very rich culture. The dominant tribes are mainly the Ibibio, Ijaw, Efik, Ikwere, Isoko, Urubo, Isekiri, Esan, Akoko-Edo, and Etsako. The researcher prefers south-south Nigeria because of its closeness to the Atlantic Ocean.

The population of this study comprised 282 respondents, including 90 diving experts and 192 underwater welding technicians. This population was chosen by the researcher since diving experts and underwater welding technicians can give us accurate information about diving.

The sample size that participated in the investigation was 165 respondents, broken down as follows: 73 diving experts and 92 underwater welding technicians The sample size was obtained using the Yaro-Yamanese formula since the population is finite. The formula is stated as follows: $n = \frac{N}{1+N(e)^2}$

where n = the sample size

N = the finite population

e = level of significance

1 = unity (a constant)

A proportionate sampling technique was equally used to get the two groups, i.e., diving experts and underwater welding technicians.

Data were collected through an instrument developed by the researcher and titled "Diving Skills for Underwater Welding Operations for Wealth Creation in the Economic Self-Reliance

Questionnaire" (DSUWOWCESQ). This instrument was designed by the researcher and validated by three experts in the Faculty of Education, University of Uyo, and was adjudged reliable based on the reliability index of 0.84 for diving experts and 0.86 for underwater welding technicians. The researcher ensured accurate distribution and collection of the filled questionnaire by means of personal administration of the instrument to the respondents in their various offices. The descriptive statistics of mean and standard deviation was used to answer research questions, while the hypotheses raised were tested using an independent t-test at the 0.05 level of significance.

Data Analysis, Result and Discussion

The following tables show the summary of the analysis carried out based on the data collection using mean, standard deviation and independent t-test.

Research Question One

What are the scuba-diving skills needed for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria?

Table 1: Mean and Standard Deviation Analysis of SCUBA-Diving Skills Needed for Underwater Welding Operations for Wealth Creation and Economic Self-reliance for Technical College Graduates in South-south Nigeria

N = 165 n1 = 73 n2 = 92

S/N	Item	Diving Experts		Underwater Welding Technicians		Difference in Mean	Remark
		$\overline{X}_1$	SD	$\overline{X}_2$	SD		
1	Swimming with a buddy at all times.	1.46	0.71	3.15	0.82	-1.69	*
2	Using a watch and depth gauge on deep sweep swims.	1.63	0.80	3.00	0.83	-1.37	*
3	Knowing the location of the nearest recompression chamber.	1.65	0.82	2.08	0.75	-1.43	*
4	Being proficient in the back pressure arm lift method of artificial respiration.	1.51	0 .71	2.59	0.92	-1.08	*
5	Conducting routine maintenance of equipment.	1.46	0.80	3.20	1.11	-1.74	*
6	Using a life jacket when condition warrant.	1.57	0.82	3.11	0.74	-1.54	*
7	Being able to swim against water current.	1.54	0.60	3.16	0.82	-1.62	*
8	Using safety line when occasion demand.	1.69	0.91	3.15	0.61	-1.46	*
9	Having the ability to read pressure gauge of charged cylinder.	3.67	0.75	3.10	0.79	0.57	**
10	Being able to perform saturation diving technique (reduces the risk of decompression sickness after deep dive).	1.60	1.60	3.15	1.10	-1.55	*

* = needed; ** = not needed; N = total number of sample size; n1 = number of diving experts, n2 = number of underwater welding technicians, mean for diving experts and = mean for underwater welding technicians.

Data analysis in Table 1 reveals that the differences between mean for the responses of diving experts and underwater welding technicians in South-South Nigeria for items 1, 2, 3, 4, 5, 6, 7, 8 and 10 are negative while that of item 9 is positive value. The results show that the technical college graduates need training in those skills with negative difference in mean and also need little or no training in the skills with the positive difference in mean for wealth creation and economic self-reliance for technical college graduates in South-South Nigeria.

Research Question Two

What are the surface supply-diving skills needed for underwater welding operations for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria?

Table 2: Mean and Standard Deviation Analysis of Surface Supply-diving Skills Needed for Underwater Welding Operations for Wealth Creation and Economic Self-reliance for Technical College Graduates in South-south Nigeria

N = 165 n1 = 73 n2 = 92

S/N	Item	Diving Experts		Underwater Welding Technicians		Difference in Mean	Remark
		$\overline{X}_1$	SD	$\overline{X}_2$	SD		
1	Having the ability to lunch the surface supply system	2.08	0.96	3.36	0.67	-1.28	*
2	Being able to operate the purge button	1.81	0.88	3.22	0.81	-1.41	*
3	Having the ability to release carbondioxide out of the helmet	1.71	0.91	3.26	0.90	-1.55	*
4	Ability to identify and use check value for emergency purposes	1.42	.69	3.18	0.87	-1.76	*
5	Being able to communicate freely with members on board	3.61	0.72	2.98	0.87	0.63	**
6	Ability to make a preliminary check of equipment prior to entering the water	3.61	0.64	2.51	0.99	0.80	**
7	Being able to adjust the volume of air depending on the diver's lungs.	1.43	0.73	3.15	0.88	-1.72	*
8	Ability to prevent water from entering the system and oral nasal	2.65	0.72	2.74	0.96	-0.09	*
9	Ability to use divers compressors for pumping oxygen for divers consumption	1.49	0.82	3.93	0.83	-2.44	*
10	Having the ability to perform underwater hand signs in cases of emergency	1.40	0.72	3.17	0.72	-1.77	*

* = needed; ** = not needed; N = total number of sample size; n1 = number of diving experts, n2 = number of underwater welding technicians, mean for diving experts and = mean for underwater welding technicians.

Data analysis in Table 2 reveals that the difference in mean values between the responses of diving experts welding teachers and underwater welding technicians in South-South Nigeria for item number 1, 2, 3, 4, 7, 8, 9 and 10 are -1.28, -1.41, -1.55, -1.76, -1.72, -0.09, -2.44 and -1.77 respectively while those for item number 5 and 6 are 0.63 and 0.80 respectively. The results imply that the technical college graduates are lacking in those skills with negative difference in mean and therefore training in these areas while the skills with positive differences in mean are the ones the technical college graduates need little or no training for wealth creation and economic self-reliant for technical college graduates in South-South Nigeria.

Test of Hypotheses

Hypothesis One

There is no significant difference between the mean responses of diving experts and underwater welding technicians on scuba-diving skills for wealth creation and economic self-reliance for technical college graduates in South-south, Nigeria.

Table 3: Independent t-test Analysis of Difference between the Responses of Diving Experts and Underwater Welding Technicians on SCUBA-diving Skills for Wealth Creation and Economic Self-reliance for Technical College Graduates in South-south Nigeria

N = 165 (n1 = 73; n2 = 92)

Variable	$\overline{X}$	SD	df	tcal	tcri	Decision
Diving experts	17.78	8.52				
			214	-10.49*	1.96	Reject H_{01}
Underwater welding technicians	30.69	8.55				

*** = significant at 0.05 alpha level**

Data analysis in Table 3 indicates that the calculated t-value of -10.49 is greater than the critical t-value of 1.96 at df of 214 and 0.05 level of significance. Therefore, the null hypothesis is rejected. The result implies that there is a significant difference between the responses of diving experts and underwater welding technicians in South-South Nigeria on the scuba diving skills for technical college graduates. The negative independent t-value indicates that the technical college graduates need more training on scuba-diving skills for wealth creation and economic self-reliance in South-South Nigeria.

Hypothesis Two

There is no significant difference between the mean responses of diving experts and underwater welding technicians on surface supply-diving skills for wealth creation and economic self-reliance for technical college graduates in South-south Nigeria.

Table 3: Independent t-test Analysis of Difference between the Responses of Diving Experts and Underwater Welding Technicians on Surface Supply-diving Skills for Wealth Creation and Economic Self-reliance for Technical College Graduates in South-south Nigeria

N = 165 (n1 = 73; n2 = 92)

Variable	$\overline{X}$	SD	df	tcal	tcri	Decision
Diving experts	17.60	7.78				
			214	-12.24*	1.96	Reject H_{02}
Underwater welding technicians	31.80	8.50				

*** = significant at 0.05 alpha level**

Data analysis in Table 4 reveals that the calculated t-value of -12.24 is greater than the critical t-value of 1.96 at df of 214 and 0.05 level of significance. Hence, the null hypothesis is rejected. The results show that a significant difference exists between the responses of diving experts and underwater welding technicians in South-South Nigeria on the surface supply-diving skills for technical college graduates. The negative independent t-value indicates that a lot of training is needed on the surface supply-diving skills for technical college graduates for wealth creation and economic self-reliance in South-South Nigeria.

Findings of the Study

1. There is a significant difference between the responses of diving experts and underwater welding technicians in south-south Nigeria. In addition, the technical college graduates need training in scuba-diving with a buddy at all times, using a watch and depth gauge on deep swims, knowing the location of the nearest pressure arm lift method of artificial respiration, conducting routine maintenance of equipment, using a life jacket when conditions warrant, being able to swim against water currents, using a safety line when occasion demands, and being able to perform saturation diving techniques.

2. There is a significant difference between the responses of diving experts and underwater welding technicians on surface supply-diving skills for technical college graduates in South-South Nigeria. The findings also indicate that the technical college graduates need training in latching the surface supply system, operating the purge button, releasing the carbon dioxide out of the helmet, identifying and using check values for emergency purposes, adjusting the volume of air depending on the diver's lungs, preventing water from entering the system, and oral and nasal breathing, as well as the ability to use diver's compressors for pumping oxygen for the diver's consumption and performing underwater hand signs in case of emergency.

Discussion of Findings

Findings of the study showed that there is a significant difference between the responses of diving experts and underwater welding technicians on the scuba-diving skills for technical college graduates in South-South. The negative t-value indicates that the technical college graduates need more training on scuba-diving skills for underwater welding operations. This finding is supported by the observation by Cayford (2004) that there are many swimmers who cannot meet some physical requirements but who use scuba a great deal with no resultant ill effects, though some will get in by neglecting safety, thereby defying the law of averages and taking a foolhardy risk. Cayford (2004) further stressed that diving is a strenuous undertaking, and for these reasons, the underwater welder must be in good health. Observing the safety rules will help ensure his or her survival. The evidence from the review of related literature and the results of data analysis indicate that the graduates of technical colleges need training in SCUBA-diving skills for underwater welding operations.

Results of data analysis also showed that a significant difference exist between the responses of diving experts and underwater welding technicians on the surface supply-diving skills for technical college graduates. The negative t-value indicates that a lot of training is needed on surface supply-diving cutting skills for technical college graduates in south-south Nigeria. Nwokolo (2010), in support of the findings of the study, observed that young graduates need broad based technical skills that can be adopted to rapidly change economic requirements, as well as appropriate basic skills that can enable them to be self-reliant or benefit from industrial organizations by way of employment. The study's findings indicate that graduates of technical colleges require training in surface supply diving and underwater cutting skills for underwater welding operations.

Conclusion

In view of the data analysed and the findings made, it can be concluded that a significant difference exists between the responses of diving experts and underwater welding technicians on SCUBA-diving skills and surface supply-diving skills. Therefore, the technical college graduates need SCUBA-diving and surface diving skills for underwater welding operations for wealth creation and economic self-reliance in south-south Nigeria. The findings indicate that the graduates of technical colleges need adequate training in the foregoing areas of diving.

Recommendations

Based on the findings of the study, the following recommendations are made.

1. The Federal Ministry of Education should encourage private investors by issuing licences to establish diving training institutions, especially in south-south Nigeria.
2. Curriculum developers, while modifying the curriculum of technical colleges in south-south Nigeria, should include diving experiences needed for underwater welding operations.
3. The Federal Ministry of Labour and Productivity should partner with interested individuals for the standardization and certification of competent divers after training.

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