THE EFFECT OF USING GOGGLES AND SNORKELS FOR WATER ADAPTATION OF NON-SWIMMERS WITH FEAR OF WATER

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DOCTORAL DISSERTATION

Supervisor: Assis. prof. dr. Jernej Kapus

Ljubljana, 2021
I declare that the doctoral dissertation entitled **THE EFFECT OF USING GOGGLES AND SNORKELS FOR WATER ADAPTATION OF NON-SWIMMERS WITH FEAR OF WATER** is the result of my own research work.

Fatmir Misimi
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Objectives. The use of masks, goggles and snorkels has become popular in some swimming schools. Therefore, the aim of the study was to investigate the effect of the usage of goggles and snorkels during learn-to-swim program on aquatic skills of young non-swimmers with or without fear of water. The research objectives fall into a number of broad groupings:

- To discern differences in learning water adaptations skills (such as water entry skill, skill of open eyes underwater, breath-holding skill, blowing bubbles skill, prone gliding skill, back gliding skill) in young non-swimmers with and without fear of water between two learn-to-swim programs, i.e., using goggles and snorkels or without these swim aids.

- To look into the differences in learning swimming skills (such as prone swimming skill, breathing during prone swimming skill, back swimming skill, skills of changing position) in young non-swimmers with and without fear of water between two learn-to-swim programs, i.e., using goggles and snorkels or without these swim aids.
**Methods.** Eighty children (forty female and forty male) aged between 10 and 11 years voluntarily participated in the study. They were non-swimmers and had no previous experience of formal swimming lessons. According to the results of the Fear of Water Assessment Questionnaire, the participants were assigned to either the group with fear of water or the group without it. Moreover, each group was further randomly divided into a group that used goggles and snorkels and a group that did not use these aids during the learn-to-swim program. Thus, each participant was assigned to the one of four groups:

- F-GS (participants with fear of water who used goggles and snorkels during a learn-to-swim program),
- F-NGS (participants with fear of water who did not use goggles or snorkels during a learn-to-swim program),
- NF-GS (participants without fear of water who used goggles and snorkels during a learn-to-swim program),
- NF-NGS (participants without fear of water who did not use goggles or snorkels during a learn-to-swim program).

All four groups undertook five learning sessions per week for four weeks. Each session lasted 45 minutes. The learn-to-swim intervention was similar for all four groups. It follows an ordered pattern with beginners progressing from water entry, opening their eyes underwater, exhaling into the water, developing buoyancy, gliding, kicking, and finally arm stroke exercises. For F-NGS and NF-NGS, all of these take place without the use of a goggles or snorkel. This order was reversed for F-GS and NF-GS so that the goggles and snorkels were integrated and introduced after water entry exercises. Familiarization with wearing the goggles and breathing through the snorkel continued during exercises for improving buoyancy, gliding, kicking, and arm strokes. With this revised program, coordinating breathing with the natural stroke cycle and opening the eyes underwater followed only once participants mastered swimming with the face submerged while breathing ad libitum through a snorkel. The final goal was the same for all four groups: to swim the desired stroke without the goggles and snorkel, with
breathing integrated into the natural stroke cycle. Before and after the learn-to-swim intervention, we evaluated participants’ water skills by using scores on a 5-point scale.

**Results.** All four groups improved water competence skills with learn-to-swim interventions. The comparisons of the intervention effects between the groups with fear of water showed that the learning improvement in water entry (4 ± 0.68 at F-GS vs. 3 ± 1.38 at F-NGS; p = 0.02), back gliding (3 ± 0.96 at F-GS vs. 2 ± 1.09 at F-NGS; p = 0.02; p = 0.03), and prone swimming (3 ± 0.71 at F-GS vs. 3 ± 1.32 at F-NGS; p = 0.05) scores were bigger in F-GS than in F-NGS. At the contrary, the intervention effect was lower in the blowing bubbles scores in F-GS than in F-NGS (3 ± 0.83 at F-GS vs. 4 ± 0.56 at F-NGS; p = 0.04). The comparisons of the intervention effects between the groups without fear of water showed that the learning improvement in prone swimming (2 ± 1.86 at NF-GS vs. 1 ± 1.15 at NF-NGS; p = 0.01) scores was bigger in NF-GS than in NF-NGS. At the contrary, the intervention effect was lower in the blowing bubbles scores in NF-GS than in NF-NGS (2 ± 1.66 at NF-GS vs. 3 ± 0.70 at NF-NGS; p = 0.02).

**Conclusion.** The results of present study indicated that the usage of goggles and snorkels during learn-to-swim programs exerted positive and negative effects on participants' during aquatic skills improvement. The positive effects were shown for the participants with fear of water particularly. Goggles and snorkels helped them to decrease their hesitation upon water entry, back gliding and at the acquisition of prone swimming skills. Thus, using goggles and snorkels during learn-to-swim programs induced greater learning improvement in these skills compared to non-usage. On the contrary, there were no significant different effect on aquatic skills of young non-swimmers without fear of water. Moreover, participants' improvement in blowing bubbles was significantly smaller in the learn-to-swim program with the goggles and snorkels than program without them. These effects were confirmed for all participants, regardless of their fear of water. A similar but not significant influence was shown on acquisition of breathing during prone swim as well. These results illustrate the negative effects of the usage of goggles and snorkels during learn-to-swim programs.
Cilji. Cilj raziskave je bil ugotoviti učinke uporabe plavalnih očal in dihalke med začetnim učenjem plavanja na prilagojenost na vodo in na znanje ter sposobnosti plavanja neplavalcev z izraženim strahom pred vodo ali brez njega. Učinke poskusnega učenja smo primerjali z učinek učenja plavanja, pri katerem plavalnih očal in dihalke nismo uporabljali.

Metode dela. V raziskavi je sodelovalo 80 otrok (40 deklic in 40 dečkov), starih od 10 do 11 let. Bili so neplavalci, ki se pred raziskavo še nikoli niso udeležili plavalnega tečaja. S pomočjo vprašalnika smo preiskovance razdelili v dve glavni skupini: na tiste z izraženim strahom pred vodo in na tiste brez njega. Vsako od teh dveh skupini smo razdelili še na dve podskupini: na tiste, ki so se učili plavati s plavalni očali in dihalko ter na tiste, ki pri učenju teh dveh pripomočkov niso uporabljali. Raziskovalni program je torej potekal v štirih skupinah preiskovancev:

- skupina F-GS (preiskovanci z izraženim strahom pred vodo, ki so se učili plavati s plavalni očali in dihalko),
• skupina F-NGS (preiskovanci z izraženim strahom pred vodo, ki pri učenju plavanja niso uporabljali plavalnih očal in dihalke),
• skupina NF-GS (preiskovanci brez izraženega strahu pred vodo, ki so se učili plavati s plavalni očali in dihalko) in
• skupina NF-NGS (preiskovanci brez izraženega strahu pred vodo, ki pri učenju plavanja niso uporabljali plavalnih očal in dihalke).

Vse štiri skupine so se učile in vadile pet-krat na teden, štiri tedne. Ena vadbena enota je trajala 45 minut. Program učenja plavanja je bil za vse preizkušance podoben. Pri skupinah F-NGS in NF-NGS je program sledil običajnemu začetnemu programu učenja plavanja, torej: prilagajanje na upor vode (vstop v vodo), prilagajanje na potapljanje glave, prilagajanje na gledanje pod gladino, prilagajanje na izdihovanje v vodo, prilagajanje na plovnost, prilagajanje na drsenje, učenje udarcev, učenje zaveslajev, učenje gibanja glave in dihanja v koordinaciji z zaveslaji in učenje koordinacije celotne plavalne tehnike. Z uporabo plavalnih očal in dihalke smo pri skupinah F-GS in NF-GS ta vrstni red nekoliko spremenili. Po prvih dveh stopnjah (prilagajanje na upor vode (vstop v vodo) in na potapljanje glave), smo izpustili prilagajanje na gledanje pod gladino in na izdihovanje v vodo ter nadaljevali s prilagajanjem na plovnost in na drsenje ter učenjem plavalnih tehnik. Nato smo pripomočka postopoma odstranili, tako da smo preiskovance prilagodili še na gledanje pod gladino in na izdihovanje v vodo. Končni cilj programov je bil pri vseh štirih skupinah enak in sicer samostojno plavanje brez uporabe plavalnih očal in dihalke. Pred poukom plavanja in po njem, smo s pomočjo 11 testov ocenili prilagojenost preiskovancev na vodo in njihovo znanje ter sposobnosti plavanja.

Rezultati. Velika večina preiskovancev (izjema je le skupina NF-NGS pri testih vstopa v vodo, gledanja pod gladino in plavanja v prsnem položaju) je z učenjem plavanja napredovala v prilagojenosti na vodo ter v znanju in sposobnostih plavanja (p < 0.05 in p < 0.01). Primerjava učinkov pouka med skupinama z izraženim strahom pred vodo je pokazala, da je bil učni napredek pri testih vstopa v vodo, drsenja v hrbtnem in plavanja v prsnem položaju večji, pri testu pihanja mehurčkov pa manjši pri skupini F-GS, kakor
pri skupini F-NGS (p < 0.05). Podobno je pokazala tudi primerjava učinkov pouka med skupinama brez izraženega strahu pred vodo. Skupina NF-GS je v testu plavanja v prsnem položaju napredovala bolj, v testu pihanja mehurčkov pa manj v primerjavi s skupino NF-NGS (p < 0.05).

**Zaključki.** Rezultati raziskave so razgrnili pozitivne in negativne učinke uporabe plavalnih očal in dihalke pri začetnem učenju plavanja. Pozitivni učinki so se pokazali predvsem pri neplavalcih z izraženim strahom pred vodo. Pri tej skupini je uporaba plavalnih očal in dihalke pomembno pripomogla k večjemu učnemu napredku v zmožnostih vstopa v vodo, drsenja v hrbtnem položaju in plavanja v prsnem položaju. Pri neplavalcih brez izraženega strahu pred vodo, uporaba teh dveh pripomočkov ni imela pomembnih učnih učinkov. Negativni učinki uporabe plavalnih očal in dihalke pri začetnem učenju plavanja, so se pokazali pri osvajanju zmožnosti izdihavanja v vodo. Učni napredek je bil namreč pri testu pihanja mehurčkov, ob uporabi teh dveh pripomočkov, statistično pomembno manjši.
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1. INTRODUCTION

1.1 Drowning

Drowning is defined as “the process of experiencing respiratory impairment from submersion/immersion in liquid” (van Beeck et al., 2005). It causes a higher proportion of deaths worldwide, with relatively high drowning rates that have been reported in communities, regions, and nations across the globe (International Life Saving Federation, 2014). There were 372,000 total deaths because of accidental drowning worldwide in 2010 (Lozano et al., 2012). However, in recent years the rate of accidental drowning has slightly decreased, but many people still drown, making it a serious and neglected public health threat that has taken the lives of 320,000 people in 2019 worldwide (World Health Organization, 2020). In New Zealand, 87 people died while attempting to rescue others from 1980 to 2014 (Water Safety New Zealand, 2014). According to Gilchrist, 4000 people die every year in the United States (US) due to accidental drowning, and 800 of these are young children (MacKay et al., 2016). Indeed, drowning is the third leading cause of death worldwide (World Health Organization, 2020). In many countries like Australia, China, Bangladesh, etc., the leading cause of death in children aged one to fourteen is drowning (World Health Organization, 2014). The victims are younger, and drowning usually happens a short distance from the safe area, with approximately 40% of drownings happening inside a two-meter safe area and less than 1 meter deep, and most of them were fully or partially clothed (International Lifesaving Federation, 2010). However, in Bangladesh within a year, 43% of all deaths from drowning were children aged one to four (World Health Organization, 2014).

Children most at risk of drowning live closer to open water spaces such as canals, bathtubs, ponds, irrigation canals, or swimming pools (World Health Organization, 2020). The rate of accidental drowning in bathtubs was extremely high in Japan (65% deaths per 100,000 population), followed by the USA (11% deaths per 100,000 population) and Canada (11% deaths per 100,000 population). The ratio of drownings occurring in swimming pools was high in the USA (18% deaths per 100,000 population), Australia (13% deaths per 100,000 population), and New Zealand (7% deaths per 100,000 population). The rate of accidental drowning in natural water was
Loss of life in water could be due to a lack of swimming skills (Irwin et al., 2015). Unfortunately, there is little empirical data on the swimming skills of children and adolescents, and the available data are inadequate and difficult to compare between different countries due to varying methodological approaches. By using an interview and examination survey, the data illustrated that 14.5% of 5- to 17-year-olds in Germany were unable to swim (Kuntz et al., 2016). Moreover, in the United Kingdom, approximately half of children aged from 7 to 11 years were unable to swim 25 meters (Amateur Swimming Association, 2013). The United States Association Swimming Foundation (2017) reported that nearly 64% of African-American children, 45% of Hispanic children, and 40% of Caucasian children had little or no swimming ability. Data from the Ministry of Education, Science and Sport of the Republic of Slovenia indicated that 7% of people 12 years of age cannot swim 50 meters; thus, they are classified as non-swimmers (Grujić, 2018).

1.2 Fear of water as one common barrier to swimming skills acquisition

Emotional well-being is fundamental to human life (Kvajo, 2016), the leading causes of medical disability treatments are bipolar and depressive disorder as well as other psychiatric disorders of emotional imbalance. Dimensional theory and basic emotion theory are two determinants of affect studies over the last twentieth century (Gu et al., 2019). Both theories have been inconsistent to each other, and have been reported as engaging in a “100 years war” within one another (Barrett and Russell, 2015; Lindquist et al., 2013). The distinguish stand if emotions are described as an independent dimension or discrete entities (Bestelmeyer et al., 2017). However, more than half of the twentieth century has been important in the basic emotion theory that provides guidance in psychopathology (Celeghin et al., 2017; Williams, 2017; Vetter et al., 2018; Wang et al., 2018; Hutto et al., 2018; Saarimaki et al., 2015; Song & Hakoda, 2018). The basic emotions as a concept has arisen from ancient China and Greece (Russell, 2003); which began with Darwin (1872), Tomkins (1962), Izard (1977) and later followed by Ekman (1984) (Scarantino & Griffiths, 2011; Ortony & Turner, 1990; Saarimaki et al., 2015; Hutto et al., 2018; Gu et al., 2018; Panksepp, 2018).
2007; Gu et al., 2016). The basic emotions theory suggests that people restrict a variety of feelings (i.e., sadness, joy, anger, fear), which are psychologically and biologically basic (Wilson-Mendenhall et al., 2013). Every emotion is shown in a particular periodic sequence of associated behavioural traits (Russell, 2006). Furthermore, researchers provide evidence that six basic emotions exist: fear, anger, sadness, disgust, happiness and surprise (Ekman, 1994; Russell, 1994). The development of basic emotions helps to leverage necessary emotions, such as anger and fear, could help in survival by impacting an organism by initiating a flight or fight response (Gu et al., 2019).

Fear is an ordinary manifestation in everyday life as well as a usual reaction around threatening situations. When our life is in any dangerous circumstances our body will produce a natural response to fear. The biological functions in preparing our minds and bodies for the flight or fight response and activates the autonomic nervous system, this pushes these circumstances among the numerous significances of fear, overexcited, alertness to more risks, elevated muscular tension, elevated cardiac rate and inhibition of digestive and other inessential vegetative functions (Ayers et al., 2007, p. 56).

While fear grows more than what is assured by the situation, or starts to happen in improper situations, there may exist fear or anxiety disorder (Öhman, 1993; Marks 1987). In the beginning of the twentieth century hypothalamus has been identified as a key structure of the control of autonomic nervous system (Karplus & Kreidl, 1927). According to Cannon and Bard, they suggest a hypothalamic theory of emotion that contains some important ideas, like: 1) the hypothalamus evaluates the emotional relevance of environmental events; 2) the emotional responses expression is mediated by the discharge of impulses from the hypothalamus to the brainstem; 3) projections from the hypothalamus to the cortex mediate the conscious experience of emotion (Bard, 1928; Cannon, 1929).

Beginning in 1937, Papez supplements his idea of anatomical circuits in the forebrain to the theory, but maintains the basic role of ascending and descending connections of the hypothalamus. Part of the theory of the limbic system by MacLean’s has been the amygdala. The amygdala did not appear as an especially important limbic area until 1956 when Weiskrantz indicated that the
emotional elements of the so-called Kluver and Bucy syndrome (Kluver & Bucy, 1937). With Weiskrantz’s publication in the coming years, a lot of studies pursued the role of the amygdala in fear by using a multiplicity of different ideas. Additionally, the amygdala is crucial for storage, retention, and expression of learned fear relationships through extensive widespread relation with sensory regions, and output connections with areas involved in defensive behaviour (LeDoux, 2000). All the differences come in the early eighties, when scientists started to study fear networks by using a simple behavioural task such as Pavlovian fear conditioning. Furthermore, according to many scientific laboratories they have infer that damage of amygdala interferes with acquisition and expression of conditioned fear (Maren, 2001; LeDoux, 2000). The amygdala sensory inputs terminate mainly in the lateral nucleus (LeDoux et al., 1990a; Amaral et al., 1992; McDonald, 1998; Romanski & LeDoux, 1993; Turner et al., 1980; Mascagni et al. 1993; Turner & Herkenham, 1991), and lateral nucleus injury interferes with fear conditioning (LeDoux et al., 1990b; Campeau & Davis, 1995). From teamwise of auditory cortex and auditory thalamus goes to auditory inputs in lateral nucleus (Romanski & LeDoux, 1993; McDonald, 1998; Mascagni et al., 1993; LeDoux et al., 1990a), and each of these pathways can be mediated fear conditioning to a simple auditory conditioned stimulus (Romanski & LeDoux, 1992).

The fear-conditioning way of functions is because it links within a process named associative learning than is a trait of circuit in the nervous systems of most animals (Carew et al., 1981; Dudai et al., 1976; Lau et al., 2013; Rescorla & Holland, 1982) also could be present in single-cell organisms (Fernando et al., 2009; Hennessey et al., 1979). While associative learning occurred in the circuit involved by the fear conditioning procedure, this process itself is called fear conditioning. The process of fear-conditioning allows the unconditioned stimulus to adjust the effectiveness of the conditioned stimulus in activating circuits that control defense responses in anticipation of harm (LeDoux, 2014). This procedure includes offering a biologically conditioned stimulus, often a tone, with a noxious or harmful unconditioned stimulus, usually a gentle electric shock. As an outcome, the conditioned stimulus includes elicit distinctive species-typical behavioral responses (i.e., freezing behavior) and supporting physiological modifications composed by the autonomic nervous system (i.e., changes in vital sign and respiration) or by the endocrine system (i.e., corticotropin, cortisol, epinephrine) (Schneiderman et al., 1974; Sakaguchi

Overall, fear is seen as a response to a specific and noticeable risk versus anxiety that is seen as a kind of objectless, indistinct, future-oriented fear (Barlow, 2002). Therefore, fear is an anxiety that is attached to a circumstance or specific thing (Horwitz, 2013). The model surrounding fear has been revealed in the numerous types of anxiety disorders, such as social anxiety disorder (Prater et al., 2013; Schneier et al., 2011; Warwick et al., 2008), panic disorder (Goddard et al., 2004; Gorman et al., 2000; Windmann, 1998), generalized anxiety disorder (Cha et al., 2014; Hettema et al., 2012; McClure et al., 2007) and specific phobia (Lueken et al., 2011, 2014; Schienle et al., 2013). Specific phobia is described by the notable and irrational fear of perceived situations or surrounding objects (Davey, 1998; APA, 1994). Regardless of evidence that specific phobia is among the usual of all psychiatric disorders (Kessler et al. 2005; Grant et al. 2004) and is linked with considerable impairment (Wells et al. 2006). According to the American Psychiatric Association (2000), the fear of water or aquaphobia is considered to be a “specific phobia”, which means “a marked and persistent fear that is cued by circumscribed clearly discernible objects or situations”. The prevalence rate of aquaphobia (fear of water) in the general population is between 2 and 3% (Stinson et al., 2007) and is more common in children than adults. The etiology of a specific phobia such as fear of water typically originates during childhood and intensifies throughout adulthood (Becker et al., 2007). The origin of fear of water during childhood has been examined, and the most common belief is that it is usually linked to a previous bad experience (Shank, 1987; Whiting & Stembridge, 1965). According Graham, J., & Gaffan, E. A. (1997) that fear of water can be heightened by a previous sinking experience, however not that it commonly arises that way. This could have been a terrifying swimming lesson, an accidental fall into deep water, or even a near drowning. In contrast, it has also been suggested that the origins of the fear of water can best be explained by non-associative processes (Menzies & Clarke, 1993; Graham & Gaffan, 1997). There are several fears that are believed to be innate, such as the fear of heights, strangers, loud noises and fear of water (Poulton & Menzies, 2002). Nevertheless, fear response to these stimuli can have some evolutionary superiority such as avoiding threatening situations or objects, they are commonly outgrown as people mature and develop more adaptive responses.
(Mineka & Öhman, 2002). This means that it mainly reflects a biological fear that often manifests without averse experiences (Poulton et al., 1998).

A broad range of situations may inspire a fear of water, such as being or swimming in water that is dark or opaque (i.e., without clear vision of what is in the water), submerging one’s head below the water, being near fountains, or traveling on a boat. Rarely, even bathing may provoke a fearful response to water (Milosevic & McCabe E., 2015). Considering this, the fear of water can disrupt activities carried out in or near water. Some individuals never learn to swim due to their complete avoidance of water, whereas others might have difficulty learning because they cannot sufficiently relax their body to facilitate floating or swimming (Milosevic & McCabe E., 2015). However, fear of drowning is a very common barrier (Berukoff & Hill, 2010; Pharr et al., 2018). Indeed, it is the strongest predictor of no or low swimming ability (i.e., even stronger than family finances or access to swimming facilities) (Irwin et al., 2010; Ziara, 2005).

Children which have low confidence in the water they have high fear and they could be considered a high risk for drowning (Irwin et al., 2015). Also the fear of drowning could originate with a broadly common fear of water (Shank, 1987; Whiting & Stembridge, 1965). Children which have survived from a sinking experience have reported a stronger fear of swimming, deep water and other related stimuli (Yule et al., 1990). These children are the most possible to panic if they find themselves in a threatening situation, which is a key determinant of fatal and nonfatal drowning (Grenfell, 2003). Children with high fear of water would like to improve their swimming competence more than children with low fear of water (Irwin et al., 2015).

There are many other reasons why many children and adolescents cannot swim (Pharr et al., 2018). In children and adults who avoid swimming lessons, there are barriers that make them avoid swimming. Such barriers may include access to pools, cultural issues of not wanting to learn to swim, racial and ethnic factors such as hair care, discomfort at being seen in swimsuits, parents whose fear of water could discourage their children from learning to swim, injuries to family and friends, illness, and/or other negative experiences (Lachocki, 2012). Also, children with fear of water they have slow progress of learning in swimming skills (Ziara, 2005).
2. BACKGROUND AND CONTEXT

2.1 Learning swimming as drowning prevention

Well-developed swimming skills are essential for drowning prevention. Indeed, it has been suggested that “the concept of swimming ability be replaced by the more encompassing notion of water competence with regards to drowning prevention” (Brenner et al., 2006). In low- and mid-income countries, during daily living activities where locations with water and therefore the risk of unintentional immersion is omnipresent, acquisition of survival swimming and associated water competencies (i.e., 18 competencies) has reduced fatal drowning among young children in a large cohort trial in rural Bangladesh (Linnan et al., 2011). A case control study in rural China on drowning among children aged from 1 to 4 years has found that swimming instruction provided a protective effect (Yang et al., 2007). Moreover, research also has shown that in high income countries (USA), there was a positive association between swimming lessons and lower drowning risk in children under five years of age (Brenner et al., 2009). It was suggested that children who participated in formal swimming instruction programs reduced their odds of drowning by 88%. It is therefore not surprising that learn-to-swim programs for both beginners and advanced swimmers form part of the physical education curricula at different levels of education in many European countries (Jurgec et al., 2016).

2.1.1 Water-competent swimmers as the main goal of learn-to-swim programs

Modern learn-to-swim programs focus more on skills that are key to drowning prevention rather than maintaining a more traditional focus on swimming techniques and covering distance (Quan et al., 2015). Therefore, acquisition of water competence has become the major aim of learn-to-swim programs. Water competency means being able to anticipate, avoid, and survive common drowning situations, as well as being able to recognize and provide assistance to those in need. It includes water safety awareness, basic swimming skills, and helping others (Water Safety USA, 2015). Stallman et al. (2017) presented water competence as an inclusive and comprehensive multi-faceted construct that provides the foundation for the teaching of water safety. By analysing
the most common drowning scenarios, several essential competencies were proposed: Safe entry competence, Breath control competence, Stationary surface competence, Water orientation competence, Propulsion or swim competence, Underwater competence, Safe exit competence, Personal flotation device competence, Clothed water competence, Open water competence, Knowledge of local hazards competence, Coping with risk competence, Assessing personal competence, Rescue competence, and Water safety competence.

### 2.2 Learn-to-swim programs

“Learning to swim is an important drowning prevention strategy” (Quan et al., 2015). Swimming is achieved through coordinated movement of the limbs, the body, or both. It relies on the natural buoyancy of the human body. The first and perhaps most obvious specific difference in swimming activities compared to other sports is that the whole body is a water substance due to immersion in swimming water, and it is exposed to physical effects that cannot be applied to other activities (Counsilman, 1968). Therefore, the learn-to-swim process for non-swimmers starts with adjustment to water. This initial step involves exercises in the acquisition of several water competence skills:

- **Water entry.** The level of risk while entering the water changes depending on the individual (e.g., body size, body proportions, experience), the task (e.g., head vs. foot entry, goal of entry, angle of entry), and the environment (e.g., water depth, entry height) (American Red Cross, 2009; Langendorfer, 2010). The causes of drowning in open water frequently lie in unintentional falls; however, unexpected immersion events can occur with breath holding reorientation, reaching the surface, regaining breath, stopping to float and rest, and/or levelling off in preparation for moving in a certain direction (Stallman et al., 2017). Water entry skills as one of five important components of aquatics should be part of a swim program, but unfortunately, water entry skills is often not included in an assessment instrument (Murray, 1981). However, elements such as the feet-first entry or head-first entry into water should be part of any learn-to-swim program for beginners.

- **Open eyes underwater.** Keeping your eyes open underwater is an essential skill during swimming and especially in the event of an accidental fall into the water. (Stallman et al., 2008). Sometimes, keeping your eyes open underwater can irritate the mucous membranes
Breath control is a very important skill for non-swimmers (American Red Cross, 2014). The swimming peculiarity in relation to dry land activities is strictly technique-dependent breathing, which is hindered by hydrostatic pressure. Thus, learning breathing during swimming is a long-lasting process. It starts with exercises exhaling through the mouth in the water. These basic exercises should be performed in the bathtub or in shallow water. In addition, students should learn to control their breathing to make it fit with their stroke patterns. However, well-skilled swimmers should pay attention to precise and dynamic regulation of breathing with respect to high-intensity swimming. Skills in breath control competence should be taught to young children to tolerate and control water in and around the mouth, nose, and face (Langendorfer & Bruya, 1995).

Floating control. Floating is closely connected with breath control and is considered to be the determinant element in the teaching of water competence. (American Red Cross, 2014; Junge et al., 2010; Langendorfer & Bruya, 1995; Stallman et al., 2008). However, flotation is determined by the relationship between volume (density) and body mass. During breathing, the volume of the thorax increases and decreases, and this process changes body density. Moreover, floating can be maintained through breath control by inflating the dormant alveolar space and increasing respiration rate (Stallman et al., 2017). It is a crucial step for non-swimmers to realize that water will bear them if they lay back on the surface and breath normally.

Water orientation. One of the key determinants in drowning situations is to be able to change position to get out of the water (Stallman et al., 2017). This competence combines the skill of changing direction when swimming and skill of changing body position in the water. The latter could be done by sagittal or transversal rotation. Sagittal rotation, or rolling from front to back and back to front, is rotational movement around an axis passing from the front to the rear of the body. Control of this rotation is incredibly important when standing in the water and is involved when walking sideways or simply maintaining an upright position with turbulent water on one side. A swimmer must learn that if falling sideways, they can side-flex the pinnacle and reach an arm out, removed from the direction of the body. This could be hard for a few swimmers to learn, as on land one usually reaches
an arm out on the side when falling toward the ground. In water, this movement will speed up the fall instead of helping prevent it (Gresswell, 2015). Transversal rotation, or horizontal changing position, is rotational movement around an axis passing from one side of the body to another. It is the rotation involved when leaning forward or gaining an upright position from being supine. Movement around this axis is often caused by changing the form of the body and changing the rotation of the center of gravity in reference to the center of buoyancy. For example, a swimmer lying on their back can reach the upright position by looking to the toes, lifting the head, and reaching forward with the arms (Gresswell, 2015).

After the water adjustment step, the learn-to-swim program is preceded by acquisition of propulsion competences, i.e., learning swimming techniques. There are different approaches around the world to which swimming technique should be taught first. In many European and Asian countries, swimming teachers begin with the breaststroke (Langendorfer, 2013), which involves symmetrical arm and leg movements and a simple forward rhythmic breathing with face submerged during the glide. However, it adapts very easily to a semi-vertical position with the head held up to allow the swimmer to see, breathe, and converse with others. On the other hand, the critical aspect of the breaststroke is the challenge of turning both feet outward during the kick. In Canada, the US, Australia, and the Netherlands, learn-to-swim programs primarily emphasize teaching and learning the front crawl (Langendorfer, 2013). When beginners master the correct breathing technique, (i.e., head rotation synchronized with arm strokes), the front crawl is much easier for beginners than the breaststroke, as it is based on simple alternating movements and flutter kicks. Recently, Langendorfer (2013) and Stallman (2014) considered that the question of which technique to teach first is the wrong question. Moreover, they argued against focus on only competitive swimming techniques beside the breaststroke and front crawl, the competitive swimming techniques being the backstroke and butterfly (or dolphin) as well. Stallman (2014) speculated about possible variations in strokes with five different kicks (i.e., flutter kick, breaststroke kick, scissor kick, dolphin kick, and egg-beater kick) that could be coordinated with five different arm strokes (i.e., alternating with over water recovery, alternating with underwater recovery, simultaneous with over water recovery, simultaneous with underwater recovery and alternating with one arm recovering over water, the other underwater). Some of these combinations
occur in three different body positions (prone, supine, and side). Therefore, it was suggested that many different strokes should be introduced to beginners (Stallman, 2014) due to several reasons:

- No stroke suits everyone. Individualized teaching requires swim teachers to teach several techniques simultaneously.
- Starting with several strokes at the same time gives the chance to acquire a variety of skills. It opens the way for possible transfer of learning one skill to another skill.
- Beginners should master the stroke that suits them best, i.e., which they would use in case of unintentionally falling into water.

There are some learn-to swim programs that adhere to the principle of individualizing acquisition of propulsion competences, as mentioned above:

- The final tenth point in the Hallwick program is learning simple progression on the water’s surface. Swimmers learn to propel themselves through the water, usually in a supine position. The movements may consist of clapping both hands on the side of the thighs, a sculling movement, or a figure-eight movement (Gresswell, 2015).
- Acquiring dog paddling, human stroke, or frog swimming could be used as a progressive approach to the front crawl and breaststroke (Langendorfer & Bruya, 1995).

Regardless of swimming techniques or strokes, the teaching and learning process usually follows a similar order (Amateur Swimming Association, 1977; Thomas, 2005):

- Body position. The student should acquire and be able to maintain a flat, steady, and streamlined position. This offers minimum resistance and therefore allows maximum forward movement.
- Leg action or kicking. The main function of the leg action in most swimming techniques is to obtain and maintain a horizontal body position. For this reason, it is important to acquire an effective leg action in the early stages of learning swimming techniques. Once the horizontal position has been achieved, the legs can then take on their role as a possible aid to the arms for propulsion. The legs also act as a means of balancing arm action and of making the whole technique more effective.
- Arm action or arm stroking. The main propulsion force in almost all techniques comes from arm movements.
• Breathing coordinated with arm strokes. The swimming specificity in relation to dry land activities is strictly technique-dependent breathing. Respiration in swimming mechanics and frequency is synchronised with arm strokes. In all swimming techniques except the backstroke, expiration takes place under water and thus against greater resistance than with air.

• Timing refers to the relationship or coordination between leg action, arm action, and breathing. Ideally, perfect coordination of the arms and legs will produce smooth forward progress with almost constant propulsion and minimal alteration in pace.

Several factors influence the organization of teaching and therefore determine their effectiveness (Zuo, 2004). These factors could be related to students (different ages, swimming knowledge and skills) or to the environment. The main environmental factors that should be taken into account in teaching swimming are:

• Water temperature. This is a key factor that influences students' well-being. If the water is cold or warm, this may lead to their discomfort in water. Thus, time spent in the water will be limited. The water temperature for teaching swimming to beginners is recommended to be younger than 5 years 32°C, and from 6 to 15 years 29°C (American Red Cross, 2014).

• Water depth. Ideally, the beginner should have a chance to learn to swim at a swimming pool with at least two depths: the shallow for the initiation process (usually from 0.65 to 1.00 meter deep) and deep for advanced (usually from 1.00 to 2.00 meters). However, it is suggested that shallow water lessons are preferable for the development of basic water skills for preschool non-swimmers (Costa et al., 2012; Rocha et al., 2018).

2.3 The use of swim aids

The use of various types of swim aids in learn-to-swim programs is widespread. They are usually used for:

• increasing non-swimmer’s buoyancy (flotation devices like inflatable arm bands, styrofoam floats, life jackets, swim bar floats, kicking boards, pull buoys, and foam noodles),
• adjusting non-swimmers to water and increasing their motivation for learning (various floating and dive toys, balls, egg-flips, underwater rings),
• improving swimming technique (fins, paddles) and
• unobstructed vision and normal breathing (goggles, masks, and snorkels).

The scientific basis for using different swim aids in instructional settings are limited to only a few studies (Kjendlie, 2009; Kjendlie & Mendritzki, 2012; Scurati et al., 2006). Bitenc (2014) stated that among different swim aids, teachers in Slovenia mainly used foam noodles, kicking boards, goggles and floating toys. There are only few previous studies that consider the effect of the use of swim aids during learning swimming (Parker et al., 1999), compared to the final swimming knowledge between a group that learned by using many swim aids (kicking boards, fins) and a group that used only kicking boards during learning. They concluded that the swimming knowledge of the front crawl was on the same level in both groups. Moreover, they noted that some teachers used swim aids for better horizontal body positions, which enabled learning arm stroking and kicking with greater ease. On the other hand, for some teachers it was more important that students were able to float independently without swim aids. Kjendlie and Mendritzki (2012) observed differences in movement patterns of children during free play in water. One group was taught by using flotation vests and another without them. During free play, children who learned with swim aids requested flotation toys more often than the children who did not use them during the learning process. However, confidence in water, especially in flotation skills, was lower in children who used swim aids compared to the children who did not. Moreover, children who used swim aids tended to move more horizontally during free play (Kjendlie & Mendritzki, 2012).

Most previous studies were concerned with floating aids only. Recently, the use of masks, goggles, and snorkels has become popular in some swimming schools because these swim aids provide important advantages for non-swimmers such as unobstructed vision, normal breathing, and consequently easier face submersion (Kapus et al., 2018). The face submerged during floating assists buoyancy and may help to increase a beginners’ confidence, allowing them to break contact with the bottom of the pool floor or the side of the pool. Moreover, they will help to place swimmers in the proper horizontal body position, thereby simplifying the complex coordination of arms, legs, and breathing (Parker et al., 1999). This could give beginning swimmers additional
motivation to try more challenging learning exercises. Furthermore, the mask or goggles and snorkels could make learning in deep water less frightening and more relaxing. A learning program based on swimming with participants in a prone position could be more effective by using masks, goggles, and snorkels (Kapus et al., 2018a).
3. THE AIM OF THE STUDY

The aim of the study was to investigate the effect of the usage of goggles and snorkels during learn-to-swim program on aquatic skills of young non-swimmers with or without fear of water. The research objectives fall into a number of broad groupings:

- To discern differences in learning water adaptations skills (such as water entry skill, skill of open eyes underwater, breath-holding skill, blowing bubbles skill, prone gliding skill, back gliding skill) in young non-swimmers with and without fear of water between two learn-to-swim programs, i.e., using goggles and snorkels or without these swim aids.
- To look into the differences in learning swimming skills (such as prone swimming skill, breathing during prone swimming skill, back swimming skill, skills of changing position) in young non-swimmers with and without fear of water between two learn-to-swim programs, i.e., using goggles and snorkels or without these swim aids.

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1 We used the term aquatic skills, which gathers water adaptation skills and swimming skills.
4. HYPOTHESES

According to the aim of the study, we proposed several hypotheses. In some of them, more observed skills are grouped based on their similarities.

H1: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in water entry skill in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H2: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in water entry skill in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H3: The usage of goggles and snorkel during learn-to-swim programs will induce greater learning improvement in skill of open eyes underwater in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H4: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in skill of open eyes underwater in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H5: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in breath control skills in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H6: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in breath control skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.
H7: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in gliding skills in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H8: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in gliding skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H9: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in water orientation skills in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H10: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in water orientation skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H11: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in swimming skills in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

H12: The usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in swimming skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.
5. METHODS

5.1 Participants

Eighty participants (female (n = 40), male (n = 40), age between 10 and 11 years (M = 10.5, SD ± 0.5)) voluntarily participated in the study. They were selected from the fifth class of the elementary schools in the city of Mitrovica, Republic of Kosovo. Parental approval was obtained because participants were under 16 years of age, so parents signed a written consent form as permission for measurement, taking photos, and recording and using results for interpretation. Their general swimming performance as assessed by two qualified swimming teachers was classified as “beginner” or “non-swimmer”, and they had no previous experience of formal swimming lessons.

As well as age and swimming knowledge, the next selection criterion was presence of fear of water. For this selection, we used the Fear of Water Assessment Questionnaire, which was confirmed to be a valid scale that effectively identifies people with fear of water (Misimi et al., 2020). It gathers twenty items (Table 1 in the Appendix). We asked the participants to complete it, rating each item according to their degree of agreement or disagreement by using a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree). According to the results of the questionnaire, the participants were assigned to either the group with fear of water (n = 40) or the group without it (n = 40). The participants who were recognized with fear of water scored most of the items from number 1 to 16 (the first and the second factor) rated with scores 4 and 5, and the items from number 17 to number 20 (the third factor) with scores 1 and 2 (Table 1 in the Appendix). Vice versa, the participants without fear of water rated these items 1 and 2 or 4 and 5, respectively, to the first second factors and the third factor. Additionally, each group was randomly divided into the group that used goggles and snorkels and the group that did not. Thus, each participant was assigned to one of four groups:

- F-GS (participants with fear of water who used goggles and snorkels during a learn-to-swim program),
- F-NGS (participants with fear of water who did not use goggles or snorkels during a learn-to-swim program),
- NF-GS (participants without fear of water who used goggles and snorkels during a learn-to-swim program,
- NF-NGS (participants without fear of water who did not use goggles or snorkels during a learn-to-swim program).

All experiments were conducted in accordance with the Helsinki-Tokyo Declaration. The ethics committee of the University of Ljubljana approved the experiment.

5.2 Learn-to-swim intervention

After initial testing, all groups undertook five learning sessions per week for four weeks. Each session lasted 45 minutes. There were two swimming instructors responsible for learn-to-swim intervention. They had appropriate academic qualifications (FINA Coach level two L2) and at least ten years experiences of teaching swimming. To avoid the influences of possible different approaches and methods, both instructors taught all four groups and were asked to do so in similar ways.

The learn-to-swim intervention was similar for all four groups and followed the typical swimming learning curriculum of many European countries (Jurgec et al., 2016; Kapus et al., 2002). It follows an ordered pattern, with beginners progressing from water entry, opening their eyes under water, exhaling into the water, developing buoyancy, gliding, kicking, and finally arm stroke exercises. For F-NGS and NF-NGS, all of these took place without the use of goggles or snorkel. This order was reversed for F-GS and NF-NGS so that the goggles and snorkels were integrated and introduced after water entry exercises. Familiarization with wearing the goggles and breathing through the snorkels was continued during exercises for improving buoyancy, gliding, kicking, and arm strokes. With this revised program, coordinating breathing with the natural stroke cycle and opening the eyes underwater followed only once participants mastered swimming with the face submerged while breathing ad libitum through a snorkel. The final goal was the same for all four groups: to swim the desired stroke without the goggles or snorkel, with breathing integrated into the natural stroke cycle. All four groups learned three swimming techniques: front crawl, breaststroke, and backstroke.
The programs for each group are summarized in Figure 1 and 4 and presented in detail in Tables 2, 3, 4, and 5 in the Appendix.

- Adaptation with wearing the goggles and breathing through snorkel on land
- Water entry
- Putting the head under the water
- Buoyancy
- Gliding
- Flutter kicks crawl
- Arm stroking crawl
- Open eyes underwater
- Breath control (blowing bubbles, breath holding)
- Back gliding
- Backstroke
- Breaststroke - leg kicking
- Breaststroke - arm movement
- Crawl/Breaststroke without breathing
- Diving
- Crawl/Breaststroke with stroke coordinated breathing

Figure 1. Program for F-GS and NF-GS.

F-GS and NF-GS used goggles and snorkels presented in Figures 2 and 3.

Figure 2. Goggles.  
Figure 3. Snorkel.
The swimming course was carried out in a 25-meter-long swimming pool with shallow (120 cm) and deep water (180 cm) areas with a water temperature of 28ºC.

### 5.3 Testing protocol

Assessment of participants' water skills was based on Harrod and Langendorfer (1990). Water skills were evaluated before and after the intervention with the following tests:

**Water entry test**

Participants were asked to enter the water any way they wanted. Their water entry skill was marked by five scores:
• Score 1 denoted that participant refused to enter the water.
• Score 2 denoted that participant entered the water with teacher assistance.
• Score 3 denoted that participant voluntarily entered the water with little hesitation.
• Score 4 denoted that participant voluntarily entered the water without hesitation.
• Score 5 denoted that participant jumped feet first into the water.

**Test of opening eyes underwater**
Participants stayed in shallow water. They were asked to recognize and count the fingers that the teacher showed under the water three times. Their skill of open eyes underwater was marked by two scores:

• Score 1 denoted that participant was not able to do the task successfully.
• Score 2 denoted that participant was able to do the task successfully.

**Breath holding test**
Participants stayed in shallow water. They were asked to take a breath, submerge the face, and hold the breath as long as possible. Their breath holding skill was marked by five scores:

• Score 1 denoted that participant refused to try the breath holding task.
• Score 2 denoted that participant executed breath holding with quick face submersion and with hesitation.
• Score 3 denoted that participant executed the breath holding task while holding the nose.
• Score 4 denoted that participant executed the breath holding task for 7 seconds.
• Score 5 denoted that participant executed the breath holding task for more than 7 seconds.

**Blowing bubbles test**
Participants stayed in the shallow water. They were asked to repeatedly take a breath, submerge their heads, and blow bubbles. They repeated this task as long as they were able to do it. Their blowing bubbles skills were marked by five scores:

• Score 1 denoted that participant was not able to do the blowing bubbles task.
• Score 2 denoted that participant was able to repeat the blowing bubbles twice.
• Score 3 denoted that participant was able to repeat the blowing bubbles three or four times.
• Score 4 denoted that participant was able to repeat the blowing bubbles five times.
• Score 5 denoted that participant was able to repeat the blowing bubbles six or more times.

Prone gliding test
Participants stayed in the shallow water. They were asked to push off from the wall and to prone glide on the surface as long as possible. They tried to extend the body in a streamlined position with face submerged during the gliding. Theirs prone gliding skill was marked by five scores:

• Score 1 denoted that participant refused to push off from wall and to prone glide.
• Score 2 denoted that participant was able to push off from wall in prone position but was not able to glide.
• Score 3 denoted that participant was able to prone glide in an inclined position.
• Score 4 denoted that participant was able to prone glide with face submerged less than 4 seconds.
• Score 5 denoted that participant was able to prone glide with face submerged more than 4 seconds.

Back gliding test
Participants stayed in the shallow water. They were asked to push off from the wall and to back glide on the surface as long as possible. They tried to extend the body in a streamlined position during the gliding. Theirs back gliding skill was marked by five scores:

• Score 1 denoted that participant refused to push off from wall and to back glide.
• Score 2 denoted that participant was able to push off body from wall in back position but was not able to glide.
• Score 3 denoted that participant was able to back glide in an inclined position.
• Score 4 denoted that participant was able to back glide with face submerged less than 4 seconds.
• Score 5 denoted that participant was able to back glide with face submerged more than 4 seconds.
Roll from front to back and back to front test
Participants stayed in shallow water. They were asked to float in a prone position, move to the supine position by lateral roll, and move vice versa. They should not touch the bottom during this task. They should change body position by using arms and legs motion only. Their skill in the horizontal changing position was marked by five scores:

- Score 1 denoted that participant was not able to do the horizontal changing position task.
- Score 2 denoted that participant was able to do the task with minimum changing position and without control.
- Score 3 denoted that participant was able to do the task with quick transition from one position to another position.
- Score 4 denoted that participant was able to do the task in an inclined body position.
- Score 5 denoted that participant was able to do the task with relaxed and extended body position.

Horizontal changing position test
Participants stayed in shallow water. They were asked to float in prone position for three seconds, move and stay in the vertical position for three seconds, and finally move and stay in the supine position for three seconds. They should not touch the bottom during the task. They should change body position by using arm and leg motion only. Their skill with the horizontal changing position was marked by five scores:

- Score 1 denoted that participant was not able to do the horizontal changing position task.
- Score 2 denoted that participant was able to do the task with minimum change in position and without control.
- Score 3 denoted that participant was able to do the task without maintaining the stationary positions.
- Score 4 denoted that participant was able to do the task while maintaining the stationary positions for less than three seconds.
- Score 5 denoted that participant was able to do the task while maintaining the stationary positions for three seconds or more.
**Prone swim test**

Participants were asked to swim in the prone position as long as they could without the use of any floating aids. They could choose any stroke they wanted while they swam in the prone position. The test was started from water with push off from the wall and was terminated when they were unable to continue and grabbed a support line to stop, or after completing the fixed distance of 10 meters, whichever was sooner. The duration of swimming was evaluated by converting swim time in seconds to a score on a 5-point scale:

- Score 1 denoted that participant was not able to swim.
- Score 2 denoted that participant swam from 1 to 7 seconds.
- Score 3 denoted that participant swam from 8 to 14 seconds.
- Score 4 denoted that participant swam from 15 to 21 seconds.
- Score 5 denoted that participant was able to swim 10 meters or longer.

**Breathing during prone swim test**

Beside prone swimming skills, we analysed participants' breathing during the test, which was described above. Their breathing during prone swimming was marked by five scores:

- Score 1 denoted that participant was not able to swim.
- Score 2 denoted that participant was able to swim with breath holding.
- Score 3 denoted that participant was able to swim with head up or face submerged, however, with exhalation out of the water.
- Score 4 denoted that participant was able to swim with exhalation in the water, but without proper coordination between head movements and arm strokes.
- Score 5 denoted that participant was able to swim with breathing coordinated with the arm strokes.

**Back swim test**

Participants were asked to swim in a supine position in the deep water for as long as they could without the use of floating aids. They could choose any stroke they wanted while they swam in supine position. The test was started from water with push off from the wall and was terminated when they were unable to continue and grabbed a support line to stop, or after completing the fixed
distance of 10 meters, whichever was sooner. The duration of swimming was evaluated by converting swim time in seconds to a score on a 5-point scale:

- Score 1 denoted that participant was not able to swim.
- Score 2 denoted that participant swam from 1 to 7 seconds.
- Score 3 denoted that participant swam from 8 to 14 seconds.
- Score 4 denoted that participant swam from 15 to 21 seconds.
- Score 5 denoted that participant was able to swim 10 meters or longer.

The testing procedure was performed over two days before and after the intervention in the same swimming pool where the learning intervention was carried out. All tests were recorded for further video analysis.

### 5.4 Statistical analyses

Two swimming experts evaluated participants' water skills by using video analysis. Most of the data were non-parametric; therefore, we used Kruskal–Wallis tests to search for baseline differences in obtained variables between F-GS and F-NGS as well as NF-GS and NF-NGS. Time effects from pre- to post-intervention testing were analysed with Friedman tests and post hoc Wilcoxon-signed rank tests. To analyse the intervention effect, we calculated the delta (Δ), i.e., the difference between post- and pre-intervention data for each variable (post intervention - pre intervention).

Due to the aim of the study and large differences between groups with fear of water and groups without it in the aquatic skills at the initial testing (Figures 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 and 25), we analyzed and compared the groups separately according to presence of fear of water. Thus, one-way analysis of variance (ANOVA) was used to compare Δ variables between F-GS and F-NGS as well as between NF-GS and NF-NGS. Homogeneity of variance was assessed with the Levene's Test, and Welch adjusted ANOVA was carried out if variances were unequal. All statistical analyses were conducted using IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA).
6. RESULTS

Most participants successfully finished both testing and a minimum of 17 learning sessions. Due to several reasons (illness, too cold water, aversion to swim aids, etc.) two participants from F-GS, one participant from F-NGS, four participants from NF-GS, and two participants from NF-NGS left the learn-to-swim course before final testing. Thus, we did not use their data in further analysis.

There were overall significant differences in scores between in pre-intervention and post-intervention testing in all four groups (Friedman test; at F-GS: \( \chi^2(2) = 373.74, p = 0.01 \), at F-NGS: \( \chi^2(2) = 369.64, p = 0.01 \), at NF-GS: \( \chi^2(2) = 256.89, p = 0.01 \), at NF-NGS: \( \chi^2(2) = 342.15, p = 0.01 \)). To examine where (in which water skill) the differences actually occur, we used the Wilcoxon signed-rank tests. These results are presented in the following figures.
6.1 Water entry test

Figure 5. Box plot summarising scores obtained at water entry test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between groups in scores at pre-intervention testing (Kruskal-Wallis H test) # p < 0.05. Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test): ** p < 0.01.

There was no significant difference in scores at the pre-intervention water entry test between F-GS and F-NGS ($\chi^2 = 1.14$, $p = 0.22$; Figure 5a). On the contrary, scores in NF-NGS were at pre-intervention testing significantly higher than in NF-GS ($\chi^2 = 3.87$, $p = 0.04$; Figure 5b). Scores at the post-intervention water entry test were significantly higher in F-GS ($Z = -3.87$, $p = 0.01$), F-NGS ($Z = -3.69$, $p = 0.01$), and in NF-GS ($Z = -2.53$, $p = 0.01$), but not in NF-NGS ($Z = 1.34$, $p = 0.18$) compared with pre-intervention scores.
The improvement in water entry scores was bigger in F-GS than in F-NGS (Welch’s F = 5.8, p = 0.02; Figure 6a). By contrast, there was no difference in Δ of water entry scores between NF-GS and NF-NGS (Welch’s F = 0.62, p = 0.42; Figure 6b).
6.2 Test of opening eyes underwater

There was no significant difference in scores at the pre-intervention test of opening eyes underwater between F-GS and F-NGS ($\chi^2 = 0.08, p = 0.76$; Figure 7a) and between NF-GS and NF-NGS ($\chi^2 = 0.97, p = 0.32$; Figure 7b). Scores at the post-intervention test of opening eyes underwater were significantly higher in F-GS ($Z = -2.44, p = 0.01$), F-NGS ($Z = -2.82, p = 0.01$), and in NF-GS ($Z = -2.23, p = 0.02$), but not in NF-NGS ($Z = -1.73, p = 0.08$) compared with pre-intervention scores.
There was no significant difference in intervention effects on scores obtained at the test of opening eyes underwater between F-GS and F-NGS (Welch’s F = 0.16, p = 0.68) or between NF-GS and NF-NGS (Welch’s F = 0.94, p = 0.33).

Figure 8. Intervention effects on the skill of open eyes underwater presented as Δ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program.
6.3 Breath-holding test

![Box plot summarising scores obtained at breath-holding test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test)** p < 0.01.](image)

There was no significant difference in scores at pre-intervention breath holding test between F-GS and F-NGS ($\chi^2 = 0.06$, p = 0.80; Figure 9a) and between NF-GS and NF-NGS ($\chi^2 = 1.96$, p = 0.16; Figure 9b). Scores at post-intervention breath holding test were significantly higher in F-GS ($Z = -3.47$, p = 0.01), F-NGS ($Z = -3.68$, p = 0.01), NF-GS ($Z = -2.99$, p = 0.01) and in NF-NGS ($Z = -2.75$, p = 0.01) compared with pre-intervention scores.
There was no significant difference in intervention effects on scores obtained at breath-holding test between F-GS and F-NGS (Welch’s $F = 0.05$, $p = 0.81$) or between NF-GS and NF-NGS (Welch’s $F = 1.7$, $p = 0.19$).

**Figure 10.** Intervention effects on the breath-holding skill presented as $\Delta$ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program.
6.4 Blowing bubbles test

**Figure 11.** Box plot summarising scores obtained at blowing bubbles test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test): ** p < 0.01.

There was no significant difference in scores at pre-intervention blowing bubbles test between F-GS and F-NGS ($\chi^2 = 3.15$, p = 0.07; Figure 11a) and between NF-GS and NF-NGS ($\chi^2 = 2.93$, p = 0.08; Figure 11b). Scores at post-intervention blowing bubbles test were significantly higher in F-GS ($Z = -3.69$, p = 0.01), F-NGS ($Z = -4.06$, p = 0.01), NF-GS ($Z = -3.10$, p = 0.01) and in NF-NGS ($Z = -3.81$, p = 0.01) compared with pre-intervention scores.
Figure 12. Intervention effects on the blowing bubbles skill presented as ∆ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant difference exists between groups (One-way ANOVA): $ p < 0.05.$

The improvement in blowing bubbles scores was bigger in F-NGS and NF-NGS in comparison with F-GS (Welch’s F = 4.39, p = 0.04) and NF-GS (Welch’s F = 6.39, p = 0.02), respectively.
6.5 Prone gliding test

There was no significant difference in scores at pre-intervention prone gliding test between F-GS and F-NGS ($\chi^2 = 2.09, p = 0.14$; Figure 13a) and between NF-GS and NF-NGS ($\chi^2 = 0.23, p = 0.63$; Figure 13b). Scores at post-intervention prone glide test were significantly higher in F-GS ($Z = -3.69, p = 0.01$), F-NGS ($Z = -3.89, p = 0.01$), NF-GS ($Z = -3.44, p = 0.01$) and in NF-NGS ($Z = -3.79, p = 0.01$) compared with pre-intervention scores.
There was no significant difference in intervention effects on scores obtained at prone gliding test between F-GS and F-NGS (Welch’s F = 1.82, p = 0.18). Δ of prone gliding scores tended to be higher in NF-NGS than in NF-GS (Welch’s F = 3.01, p = 0.09).

**Figure 14.** Intervention effects on prone glide skill presented as Δ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program.
6.6 Back gliding test

Figure 15. Box plot summarising scores obtained at back gliding test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences between groups in scores at pre-intervention testing (Kruskal-Wallis H test) # p < 0.05. Significant differences exist between pre- and post-intervention scores (Wilcoxon signed-rank post hoc test) ** p < 0.01.

There was significant difference in scores at pre-intervention back gliding test and were higher in F-NGS than F-GS (χ² = 6.52, p = 0.01; Figure 15a). On the contrary, there was no significant difference in scores at pre-intervention between NF-GS and NF-NGS (χ² = 0.57, p = 0.44; Figure 15b). Scores at post-intervention back glide test were significantly higher in F-GS (Z = -3.66, p = 0.01), F-NGS (Z = -3.76, p = 0.01), NF-GS (Z = -3.43, p = 0.01) and in NF-NGS (Z = -3.44, p = 0.01) compared with pre-intervention scores.
The improvement in back gliding scores was greater in F-GS than in F-NGS (Welch’s F = 5.35, p = 0.02), and there was no significant difference between NF-GS and NF-NGS (Welch’s F = 2.08, p = 0.15).

Figure 16. Intervention effects on back gliding skill presented as Δ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant difference exists between groups (One-way ANOVA) $ p < 0.05.$
6.7 Roll from front to back and back to front test

**Figure 17.** Box plot summarising scores obtained at roll from front to back and back to front test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences existed between pre- and post-intervention score (Wilcoxon signed-rank post hoc test) **p < 0.01.

There was no significant difference in scores at pre-intervention roll from front to back and back to front test between F-GS and F-NGS ($\chi^2 = 3.04, p = 0.08$; Figure 17a) and between NF-GS and NF-NGS ($\chi^2 = 1.20, p = 0.27$; Figure 17b). Scores at post-intervention at roll from front to back and back to front test were significantly higher in F-GS ($Z = -3.57, p = 0.01$), F-NGS ($Z = -3.14, p = 0.01$), NF-GS ($Z = -3.24, p = 0.01$) and in NF-NGS ($Z = -2.98, p = 0.01$) compared with pre-intervention scores.
There was no significant difference in intervention effects on scores obtained at roll from front to back and back to front test between F-GS and F-NGS (Welch’s F = 3.30, p = 0.07) as well as between NF-GS and NF-NGS (Welch’s F = 0.56, p = 0.46).
6.8 Horizontal changing position test

There was no significant difference in scores at pre-intervention horizontal changing position test between F-GS and F-NGS \( (\chi^2 = 1.89, p = 0.16; \text{Figure 19a}) \) and between NF-GS and NF-NGS \( (\chi^2 = 1.13, p = 0.28; \text{Figure 19b}) \). Scores at post-intervention prone glide test were significantly higher in F-GS \( (Z = -3.66, p = 0.01) \), F-NGS \( (Z = -3.75, p = 0.01) \), NF-GS \( (Z = -3.09, p = 0.01) \) and in NF-NGS \( (Z = -3.59, p = 0.01) \) compared with pre-intervention scores.

*Figure 19.* Box plot summarising scores obtained at swim horizontal changing position test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test) **p < 0.01.**
Δ of horizontal changing position scores tended to be higher in F-GS than in F-NGS (Welch’s F = 0.80, p = 0.37). There was no significant difference in intervention effects on scores obtained at horizontal changing position test between NF-GS and NF-NGS (Welch’s F = 0.01, p = 0.46).
6.9 Prone swim test

Figure 21. Box plot summarising scores obtained at prone swim test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between groups in scores at pre-intervention testing (Kruskal-Wallis H test) ## p < 0.01, # p < 0.05. Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test) ** p < 0.01.

Scores at pre-intervention prone swim test were higher in F-NGS than F-GS ($\chi^2 = 3.82$, $p = 0.05$; Figure 21a) and in NF-NGS than NF-GS ($\chi^2 = 5.88$, $p = 0.01$; Figure 21b). Scores at post-intervention swim prone swimming test were significantly higher in F-GS ($Z = -3.72$, $p = 0.01$), F-NGS ($Z = -3.68$, $p = 0.01$) and in NF-GS ($Z = -2.73$, $p = 0.01$) but not in NF-NGS ($Z = -1.73$, $p = 0.08$) compared with pre-intervention scores.
The improvement in prone swimming scores was greater in F-GS and NF-GS in comparison with F-NGS (Welch’s $F = 4.38$, $p = 0.04$) and NF-NGS (Welch’s $F = 7.75$, $p = 0.01$), respectively.
6.10 Breathing during prone swim test

There was no significant difference in scores at pre-intervention breathing during prone swim test between F-GS and F-NGS ($\chi^2 = 0.62$, $p = 0.42$; Figure 23a). On the contrary, scores in NF-NGS were at pre-intervention testing significantly higher than in NF-GS ($\chi^2 = 4.38$, $p = 0.03$; Figure 23b). Scores at post-intervention breath during the prone swim test were significantly higher in F-GS ($Z = -3.32$, $p = 0.01$), F-NGS ($Z = -3.75$, $p = 0.01$), NF-GS ($Z = -2.91$, $p = 0.01$) and in NF-NGS ($Z = -3.78$, $p = 0.01$) compared with pre-intervention scores.
Δ of breathing during prone swimming scores tended to be higher in F-NGS and NF-NGS in comparison with F-GS (Welch’s F = 3.25, p = 0.08) and NF-GS (Welch’s F = 3.06, p = 0.09), respectively.

Figure 24. Intervention effects on the breathing during prone swim skill presented as Δ scores for participants with fear of water (a) and without it (b). Data are shown as the mean ± standard deviation. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program.
6.11 Back swim test

There was a significant difference in scores at pre-intervention swim; the back swim test was higher in F-NGS than in F-GS ($\chi^2 = 5.03$, $p = 0.02$; Figure 25a). On the contrary, there was no significant difference in scores at pre-intervention between NF-GS and NF-NGS ($\chi^2 = 0.71$, $p = 0.39$; Figure 25b). Scores at post-intervention back swim test were significantly higher in F-GS ($Z = -3.77$, $p = 0.01$), F-NGS ($Z = -3.86$, $p = 0.01$), NF-GS ($Z = -2.85$, $p = 0.01$) and in NF-NGS ($Z = -3.31$, $p = 0.01$) compared with pre-intervention scores.

Figure 25. Box plot summarising scores obtained at the back swim test in participants with fear of water (a) and without it (b) pre- and post-intervention. Median score (-), interquartile range (box), and range between minimum and maximum scores (⊥T) are displayed for each group. F-GS – participants with fear of water who used goggles and snorkels during a learn-to-swim program, F-NGS – participants with fear of water who did not use goggles or snorkels during a learn-to-swim program, NF-GS – participants without fear of water who used goggles and snorkels during a learn-to-swim program, NF-NGS – participants without fear of water who did not use goggles or snorkels during a learn-to-swim program. Significant differences exist between groups in scores at pre-intervention testing (Kruskal-Wallis H test) # $p < 0.05$). Significant differences exist between pre- and post-intervention score (Wilcoxon signed-rank post hoc test) ** $p < 0.01$. 
There was no significant difference in intervention effects on scores obtained at the back swimming test between F-GS and F-NGS (Welch’s $F = 1.11$, $p = 0.29$) as well as between NF-GS and NF-NGS (Welch’s $F = 0.15$, $p = 0.69$).
7. DISCUSSION

This study was the first to investigate the effect of the usage of goggles and snorkels during learn-to-swim program on aquatic skills of young non-swimmers with fear of water or without it. There were two major findings of the present study:

1. Regardless of fear of water, the usage of goggles and snorkels during learn-to-swim intervention in comparison with non-usage induced greater and smaller learning improvement in prone swimming skill and blowing bubbles skill, respectively;
2. There were significant greater learning improvements in water entry skill, and back gliding skill in participants with fear of water when the goggles and snorkels were used during learn-to-swim interventions.

Water entry skill

Drowning or injury can occur with intentional water entry as well as unintentional falls. It could be a result of poor technique, failure to check depth, underwater hazards, or sudden immersion. Therefore, safe water entry is considered as one of the basic skills of water competence (Stallman et al., 2017). The results presented in Figure 6a supported the hypothesis H1, that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in water entry skill at young non-swimmers with fear of water in comparison to learn-to-swim programs that do not use these two swim aids. The reason for this could be the fact that the usage of goggles and snorkel facilitated submerging the face during the learning process. Specifically, vision was unobstructed because of the goggles, and breathing occurred ad libitum. This made this trial easier for beginner swimmers who were averse to putting their face in the water. Submerging the face is a skill that is closely connected to buoyancy and ability to float on the surface (Kapus et al., 2018). By using goggles and snorkels, F-GS had more opportunities to experience and accept the fact that submerging the face enables easier surface flotation and swimming (due to several reasons explained by Kapus, Moravec, & Lomax, 2018) in comparison to F-NGS. These experiences and knowledge are especially important for more complex water entries like different diving. Indeed, most participants in F-GS scored 5 at post-intervention water entry test—i.e., they were able to dive feet first into the water and to surface. Feet first dive requires another important
water competence skill, like surfacing. This skill combines the ability and knowledge of breath holding, buoyancy control, and propulsion to the surface (Stallman et al., 2017).

On the other hand, there was small significant improvement in water entry skill in NF-GS, which was not different from improvement in NF-NGS (Figure 6b). Thus, these results did not confirm the hypothesis H2 that the usage of goggles and snorkels will significantly induce greater learning improvement in water entry skill for young non-swimmers without fear of water in comparison to learn-to-swim programs that do not use these two swim aids. Different effects on water entry skill of usage of goggles and snorkels for participants with fear of water or not were in the line of results of Misimi and co-workers (2020). By using factor analysis of answers to the fear of water questionnaire, they revealed three meaningful factors. Two of them—i.e., *Water environment contact* and *Motion control in water*—could be connected with water entry skill. The results presented in Figure 5 showed that the most participants in F-GS and F-NGS scored 1 on the pre-intervention water entry test. On the contrary, participants without fear of water (NF-GS and NF-NGS) had much higher scores. Therefore, it is reasonable to believe that larger or smaller hesitations at water entries depend on fear of water or not (Misimi et al., 2020). According to the results of the present study, we could conclude that the usage of goggles and snorkels could be appropriate way to overcome fear of water at water entry exercises, which are usually placed at the beginning of learn-to-swim programs.

**Skill of open eyes underwater**

Keeping eyes open underwater can irritate mucous membranes (Erdinger et al., 1998). However, it is a necessary skill for orientation during swimming and in the case of accidentally falling into the water. Thus, clearly opening eyes under water is a fundamental skill for becoming familiar with water (Stallman et al., 2008). The results in Figure 7 show that scores at post-intervention test of opening eyes underwater were significantly higher in Groups F-GS, F-NGS, and NF-GS but not in NF-NGS compared with pre-intervention scores. However, these changes did not differ between groups (Figure 8). Accordingly, we cannot confirm the hypotheses H3 or H4, in which we stated that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in skill of open eyes underwater in young non-swimmers with or without fear of water in comparison to learn-to-swim programs that do not use these two swim aids. According to
our observations, during learn-to-swim interventions, the participants who wore goggles went underwater more easily because they realize how clear the water is compared to its fuzzy look without the goggles. At this point, we should emphasise that these participants took the goggles off during the final 5 minutes (play time) at each learning session (Tables 4 and 6 in the appendix). It seems that this was an appropriate duration for improving the skill of open eyes underwater as well as it did for F-NGS and NF-NGS. Unfortunately, the skill of open eyes under the water was defined at two levels only: i.e. the participants recognizing the number of fingers the teacher showed under the water or not recognizing it. Almost all participants were able to do this after the learn-to-swim intervention. More discriminant tests like retrieving submerged toys in shallow water should be used in further studies.

**Breath control skills**

The American Red Cross has suggested that breath control is the key element in learning to swim (American Red Cross, 1961, 2014). It is usually considered to be the most important of all personal physical survival competencies and foundational skills for further learning. Indeed, Lanoue (1963) noted that people do not drown primarily because they cannot swim, but because they cannot get air into their lungs. It is therefore, most commonly placed first in any teaching progression (American Red Cross, 1961, 2014; Junge et al., 2010; Langendorfer & Bruya, 1995; Stallman, Junge, & Blixt, 2008). Effective breathing is the key to economic movement (Stallman, Junge, & Blixt, 2008). In the present study, we evaluated learning improvement in breath control by changes in three skills: breath-holding, blowing bubbles, and breathing during the prone swimming.

The breath control skill is the ability to submerge as well as hold breath and take new breath in a timely manner (Langendorfer & Bruya, 1995). All four groups significantly improved breath-holding skill during the learn-to-swim program (Figure 9). However, these improvements did not differ among the groups (Figure 10). Upon contact with water, we spontaneously hold our breath (Poulton et al., 1998). Thus, this element is easy to learn regardless of usage of goggles and snorkels.

In comparison to dry land activities, swimming presents some unique challenges to breathing. The first lies in the aquatic environment itself. Immersion increases the hydrostatic compression around
the chest, which hinders inspiration (Lomax & McConnell, 2003). Moreover, in all swimming techniques except the backstroke, expiration takes place under water and, accordingly, against greater resistance than in air. At learn-to-swim programs, swimming beginners should learn how to powerfully exhale through the mouth. Indeed, blowing bubbles is a fundamental skill for effective breathing during swimming. All four groups significantly improved blowing bubbles skill during their learn-to-swim intervention (Figure 11). Unexpectedly, these improvements were greater in F-NGS and NF-NGS in comparison to Groups F-GS and NF-GS, respectively (Figure 12). The snorkel enables ad libitum breathing.Expiration occurs in air against much lower resistance than water in usual breathing during swimming. According to the present results, we could suggest that F-NGS and NF-NGS had more opportunity during swim learning to acquire blowing bubbles skill in comparison to F-GS and NF-GS. Therefore, we conclude that regardless of fear of water, the usage of goggles and snorkels during learn-to-swim programs had a smaller effect on blowing bubbles skill in comparison with non-usage of this aid.

The next challenge for breathing during swimming is the fact that breathing is synchronised with arm strokes (Holmér and Gullstrand, 1980). Breathing in breaststroke usually occurs in time with the natural stroke-induced body lift, providing a natural breathing point during each arm stroke. Specifically, inhalation takes place at the end of the in sweep, and the head should be lifted enough for the mouth to clear the surface and inhale. The head then returns to the water to exhale as the arms stretch forward to begin their recovery phase (Maglischo, 2003). The face is kept above the surface at the backstroke. Therefore, there is no need for breathing restriction. Nevertheless, a swimmer usually inhales during one arm recovery and exhales during the other (Maglischo, 2003). The most challenging in breathing for beginning swimmers is the front-crawl. During front-crawl, the swimmer rotates the face towards the surface as the arm on a breathing side sweeps up at the end of its underwater arm stroke. The swimmer takes a breath during the first half of recovery phase (arm is out of the water) and returns the face to the water to exhale during the second half (Maglischo, 2003). There is a connection between the ability to adequately coordinate breathing action in time with front-crawl stroking and the skill level of swimmer (Cardelli et al., 2000; Lerda & Cardelli, 2003). The results in Figure 23 show that learn-to-swim intervention improved breathing during prone swim test in all four groups. However, these improvements did not differ due to using goggles and snorkel or not (Figure 24). Interestingly, these tended to be higher in F-
NGS and NF-NGS in comparison to F-GS and NF-GS, respectively. As mentioned above, the snorkel enables ad libitum breathing—i.e., free breathing without synchronisation with arm strokes. According to the presented results, it seems that F-GS and NF-GS had too much practice with snorkels (Tables 2 and 4 in the Appendix). It could be suggested that this aim should be removed earlier in the learn-to-swim program.

According to these findings, we cannot confirm the hypotheses H5 and H6 that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in breath control skills in young non-swimmers with fear of water as well without it in comparison to learn-to-swim programs that do not use these two swim aids. Even more. Some of results were in contrast to our expectations. The usage of goggles and snorkels during learn-to-swim intervention induced smaller learning improvement in blowing bubbles skill in comparison with non-usage.

**Gliding skills**

Gliding is the concept of floating through the water, either on the surface or underwater, without assistance or movement from the arms or legs (Kapus et al., 2002). It usually begins with a forceful push from the poolside or from the bottom in order to generate some propulsion. The thought of gliding can be scary for a beginning swimmer due to unbalanced feeling, unaided and without using arms and legs. In the present study, we evaluated the learning improvement in gliding skill by changes in scores on the prone as well as on the back gliding test.

The results in Figure 13 show that learn-to-swim intervention improved prone gliding skill in all four groups. However, these improvements did not differ due to usage of goggles and snorkel or not (Figure 14). The results presented in Figure 14a shows, that the usage of goggles and snorkel during learn-to-swim programs induced greater learning improvement in back gliding skill in young non-swimmers with fear of water in comparison to learn-to-swim programs that do not use these two swim aids. On the other hand, they do not show similar effect at young non-swimmers without fear of water (Figure 14b). The key element at learning back gliding is acquisition of proper streamlined body position on the surface. Swimming teachers and coaches mark mistakes such us holding the head too high and sitting position as the biggest mistakes in body position.
backstroke swimming (Stibilj, Košmrlj, & Kapus, 2020). The reason for these mistakes is usually non-swimmer fear of water. Indeed, people who were recognized as having a fear of water strongly disagreed and agreed with items such as “I am able to push from the wall and glide on the surface” and “When I am in a pool, I am afraid when I am not in contact with floor”, respectively (Misimi et al., 2020). It seems that the usage of goggles (snorkels were not used during back gliding exercises) helped young participants with fear of water to place the head, especially in the proper horizontal position, with greater ease. Thus, F-GS had more opportunities during learn-to-swim intervention to acquire a proper body position and develop back gliding skill more in comparison with F-NGS. On the other hand, this was not a big learning challenge for participants without fear of water. Therefore, there were no significant differences in improvement in back gliding skill between NF-GS and NF-NGS.

These findings supported the hypothesis H7 that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in gliding skills in young non-swimmers with fear of water in comparison to a learn-to-swim program that does not use these two swim aids. On the other hand, they did not support the hypothesis H8 that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in gliding skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.

**Skills of changing position**

Skills of changing position (sagittal or transversal rotation) are classified as a skill of orientation in the water and are essential for drowning prevention (Stallman et al., 2017). It is therefore not surprising that changing position from front to back and back to front is part of almost all learn-to-swim programs (ARC, 1961; 2014; Junge, 1984; 2010; Stallman, 2008). Participants in all four groups improved skills of changing position during learn-to-swim interventions (Figures 17, 19). However, these improvements in both skills did not differ due to usage of goggles and snorkels or not (Figures 18, 20). These findings did not confirm the hypotheses H9 and H10 that the usage of goggles and snorkel during learn-to-swim programs will induce greater learning improvement in water orientation skills in young non-swimmers with fear of water as well as without it in comparison to learn-to-swim programs that do not use these two swim aids.
Swimming skills

Prone and back swimming by using different swimming techniques offers several potential protective benefits (Stallman et al., 2017) in different situations in the water. The results presented in Figure 22a shows that the usage of goggles and snorkels during learn-to-swim programs induced greater learning improvement in prone swimming skill at young non-swimmers with fear of water as well as without it in comparison to learn-to-swim programs that do not use these two swim aids. Kapus et al. (2018) maintained that young non-swimmers as beginners were able to swim longer when the face was submerged (by using a mask), and breathing occurred ad libitum through a snorkel compared with holding the head above water or when breathing in time with the breaststroke. According to this, they suggested that masks and snorkels:

- may assist buoyancy and may help to increase a beginner’s confidence, allowing them to break contact with the bottom of the pool floor or the side of the pool.
- help to place swimmers in the proper horizontal body position, thereby simplifying the complex coordination of arms, legs, and breathing (Parker et al., 1999).
- make learning in deep water less frightening and more relaxing.

The usage of goggles and snorkels during learn-to-swim interventions facilitated submerging the face during the learning process. Thus, we could suggest that F-GS had opportunities to experience and to accept the facts mentioned above in comparison to F-NGS. Similar conclusion could be suggested for non-swimmers without fear of water. However, it seems more likely that the difference of improvement in prone swimming scores between NF-GS and NFNGS was consequence of the low-test sensitivity. There was significant difference in scores between groups obtained at pre-intervention prone swim test (Figure 21b). Indeed, most participants in NF-NGS scored 4 or 5 at this test—i.e., they achieved the highest scores even before intervention. Therefore, we could not detect their improvement in prone swimming skill with this test completely (Figure 22a). The scale, which we used at this test, was more appropriate for evaluation prone swimming skill at non-swimmers with fear of water than at non-swimmers without it.

Failure to swim and float on the back was reported by drowning survivors who needed to be rescued (Stallman et al., 2008). Back swimming allows the swimmer to breathe easily; however, it gives a poor view (Stallman et al., 2017). According to Jung (2010) swim programs that placed
lesser value on back swimming showed that young non-swimmers who swam 25 meters on front half (49%) are not able to swim 12.5 m on the back side. However, this suggested that learning prone swimming does not automatically transfer to an ability for back swimming (Stallman et al., 2017). The results in Figure 25 shows that learn-to-swim interventions improved back swimming skill in all four groups. However, these improvements did not differ due to usage of goggles and snorkels or not Figure 26.

These findings supported the hypothesis H11 that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in swimming skills in young non-swimmers with fear of water in comparison of learn-to-swim programs that do not use these two swim aids. However, we should emphasize that this conclusion refers on prone swimming skill only and not on back swimming skill. On the other hand, they did not support the hypothesis H12 that the usage of goggles and snorkels during learn-to-swim programs will induce greater learning improvement in swimming skills in young non-swimmers without fear of water in comparison to a learn-to-swim program that does not use these two swim aids.
8. CONCLUSIONS

The results of the present study indicated that the usage of goggles and snorkels during learn-to-swim programs exerted positive and negative effects on participants' aquatic skills improvement. The positive effects were shown at the participants with fear of water particularly. Goggles and snorkels helped them to decrease their hesitation upon water entry, back gliding and at the acquisition of prone swimming skills. Thus, using goggles and snorkels during learn-to-swim programs induced greater learning improvement in these skills compared to non-usage. On the contrary, there were no significant different effects on aquatic skills of young non-swimmers without fear of water. Moreover, participants' improvement in blowing bubbles was significantly smaller in the learn-to-swim program with the goggles and snorkels than the program without using them. These effects were confirmed for all participants, regardless of their fear of water. A similar but not significant influence was shown on acquisition of breathing during prone swim as well. These results illustrate the negative effects of the usage of goggles and snorkels during learn-to-swim programs.

Furthermore, it could be suggested that it may also increase swimmers' dependency on those items, which in turn would hinder the acquisition of correct techniques and may in fact increase fear of swimming when the ergogenic aids are not available. With this in mind, it could be suggested that swimming with a snorkel, and to a lesser extent goggles, should be viewed solely as an aid to teaching correct body position and enhancing confidence. Controlling breathing so that inhalation, breath hold, and exhalation occur in coordination with the correct phases of the arm strokes is an essential skill that beginner swimmers must master (Stallman, 2017). Furthermore, beginners should be able to open their eyes underwater so that they can better orientate themselves when swimming, in the case of accidentally falling into the water without goggles. Thus, the end goal of the learn-to-swim program with the goggles and snorkels or without it should be the same: to swim the desired stroke without the snorkel with breathing integrated into the natural stroke cycle.

The results of the present study were in the line with the fact that there is no universal method for teaching swimming that would suit all students. Besides the present results, we should emphasize that some participants had problems using goggles and snorkels. These items provided additional stress for them. Thus, the teaching process for swimming in particular is creative work indeed. Teacher should try to individualize the learn-to-swim process by using different methods and swimming aids and teaching different swimming strokes. Ideally, a teacher tries to find the most appropriate way to acquire swimming skills for each student.
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# 10. APPENDIX

*Table 1*

Fear of Water Assessment Questioner (Misimi et al., 2020)

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Statements</th>
<th>Completely disagree</th>
<th>Disagree</th>
<th>Not sure</th>
<th>Agree</th>
<th>Completely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When I am in the pool, I am afraid to swim when I am alone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>When I am in the pool, I am afraid to swim when I see a lot of people</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>When I am in the pool, I am afraid to put my face in the water</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>I cannot swim without goggles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>When I start to swim in the pool, I am afraid to see how far the finish edge is</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>When I am in the pool, I am afraid to open my eyes in water</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I am afraid when I lift my legs and float on the surface</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>I need stairs or shallow water to enter the water</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>I did not learn how to swim because my home is far away from: swimming pool, lake, river, or sea.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>When I see waves, I get scared</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>When I see open water on the sea, I feel fear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>I think I could get lost in the sea during swimming</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>When I am in a pool, I am afraid when I am not in contact with the floor</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>I am afraid when the water is deep</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>I could not swim in the river because of flowing water</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>When my legs sink, I am afraid</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>I am able to jump legs first into the water from starting block</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>I am able to jump head first into the water from starting block</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>I am able to pick up things from the bottom of the shallow pool</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>I am able to push from the wall and glide on the surface</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
## Table 2

Learn-to-swim program for F-GS presented for each session

<table>
<thead>
<tr>
<th>Session number</th>
<th>Session aims</th>
<th>Practices</th>
<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 1              | To adapt participants to wear goggles and breathe through snorkel. | • Wearing goggles and breathing through snorkel on land.  
• Wearing goggles in water.  
• Wearing goggles and breathing through snorkel in water. | • It was enjoyable for all participants.  
• All participants were able to wear goggles and snorkel.  
• 17 participants of 20 were able to breathe through snorkel. |
| 2              | To adapt participants to float and concurrently breathe through snorkel. | • Wearing goggles and breathing through snorkel on land.  
• Prone position, holding the edge, breathing through snorkel.  
• Shallow water, walking with submerged face, breathing through snorkel.  
• Floating in the prone position, breathing through snorkel. | • It was enjoyable for all participants.  
• 15 participants of 20 were able to do float 1 min and concurrently breathe through snorkel.  
3 participants had small problems.  
2 participants had bigger problems with this exercise.  
3 participants were not able to do it.  
• Participants are able to do float kicks 23 seconds. |
| 3              | To introduce flutter kicks and concurrently breathing through snorkel. | • Dry land, flutter kicks.  
• Pool edge, sitting flutter kicks.  
• Pool edge, lying, flutter kicks.  
• Holding the edge, flutter kicks, breathing through snorkel.  
• Gliding in prone position, flutter kicks, breathing through snorkel.  
• Flutter kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• 10 participants of 20 were able to swim 10 m flutter kicks and concurrently breathe through snorkel.  
4 participants had small problems.  
3 participants had bigger problems with this exercise.  
3 participants were not able to do it.  
• Participants are able to do flutter kicks 23 seconds. |
| 4              | To improve flutter kicks and concurrently breathing through snorkel. | • Pool edge: lying; flutter kicks.  
• Holding the edge, flutter kicks, breathing through snorkel.  
• Gliding in prone position, flutter kicks, breathing through snorkel.  
• Flutter kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• 16 participants of 20 were able to swim 10 m flutter kicks and concurrently breathe through snorkel.  
2 participants had small problems.  
2 participants had bigger problems with this exercise. |
| 5              | To introduce front crawl arm strokes and concurrently breathing through snorkel. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, breathing through snorkel.  
• Shallow water: standing; half forward bend; catch up strokes, breathing through snorkel.  
• Gliding in prone position, front crawl arm strokes, breathing through snorkel.  
• Rolling horizontal position | • It was enjoyable for all participants.  
• 17 participants of 19 were able to do 5 m arm stroke and concurrently breathe through snorkel.  
2 participants had small problems.  
4 participants had bigger problems with breathing through snorkel. |
| 6              | To improve front crawl arm strokes and concurrently breathing through snorkel. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, breathing through snorkel.  
• Shallow water: standing; half forward bend; catch up strokes, breathing through snorkel.  
• Gliding in prone position, front crawl arm strokes, breathing through snorkel.  
• Rolling vertical position | • It was enjoyable for all participants.  
• 17 participants of 19 were able to swim 10 m front crawl arm strokes and concurrently breathe through snorkel.  
2 participants had small problems with this exercise. |
| 7              | To improve gliding and concurrently breathing through snorkel. | • Dry land, standing, imitation of streamlined position during gliding with extended hands.  
• Pool edge: lying; breathing through snorkel.  
• Push of from the wall and glide on the front in the streamline position, breathing through snorkel. | • It was enjoyable for all participants.  
• 16 participants of 20 were able to glide and concurrently breathe through snorkel. 85 % of them had good streamlined positions. 1 participant had small problems with this exercise.  
3 participants were not able to do it. |
<table>
<thead>
<tr>
<th>Session number</th>
<th>Session aims</th>
<th>Practices</th>
<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 8              | • To introduce the front crawl coordination and concurrently breathing through snorkel. | • One arm stroke, breathing through snorkel.  
• Crawl, one stroke on the third kicks, breathing through snorkel.  
• Catch up strokes, breathing through snorkel.  
• Semi catch up strokes, breathing through snorkel. | • It was enjoyable for all participants.  
• 12 participants of 20 were able to swim front crawl 10 m without stopping and concurrently breathe through snorkel. 4 participants had small problems and 2 participants had bigger problems with this exercise. 2 participants were not able to do it. |
| 9              | • To improve the front crawl coordination and concurrently breathing through snorkel. | • One arm stroke, breathing through snorkel.  
• Crawl, one stroke on the third kicks, breathing through snorkel.  
• Catch up strokes, breathing through snorkel.  
• Semi catch up strokes, breathing through snorkel. | • It was enjoyable for all participants.  
• 16 participants of 19 were able to swim 10 m front crawl and concurrently breathe through snorkel. 1 participant had bigger problems with this exercise. 2 participants were not able to do it. |
| 10             | • To improve front crawl coordination and concurrently breathing through snorkel. | • One arm stroke, breathing through snorkel.  
• Crawl, one stroke on the third kicks, breathing through snorkel.  
• Catch up strokes, breathing through snorkel.  
• Semi catch up strokes, breathing through snorkel. | • It was enjoyable for all participants.  
• 12 participants of 20 were able to swim 10 m front crawl and concurrently breathe through snorkel. 4 participants had small problems and 2 participants had bigger problems with this exercise. 2 participants were not able to do it. |
| 11             | • To improve making bubbles and prone position swimming without snorkel. | • Shallow water: standing; half forward bend, holding the edge; blowing bubbles from one to three repetitions.  
• Shallow water: standing; half forward bend, holding the edge; blowing bubbles.  
• Shallow water: standing; half forward bend; breathing with rotating the head.  
• Catch up strokes.  
• Semi catch up strokes.  
• Swimming crawl. | • It was enjoyable for all participants.  
• 17 participants of 19 were able to blow bubbles 6 times with ease. 2 participants had small problems with this exercise.  
• All participants had difficulties with exercise of breath to coordinate with stroke in crawl. |
| 12             | • To improve gliding in supine position.  
• To introduce backstroke. | • Dry land: sitting; backstroke kicks  
• Pool edge: sitting; making foam on the surface with backstroke kicks  
• Gliding face up.  
• Backstroke kicks with arms extended forward.  
• Catch up strokes.  
• Backstroke with gliding | • It was enjoyable for all participants.  
• 5 participants of 17 were able to push from the edge of the pool in back position and to lift the hips up to swim backstroke for two meters. 8 participants had small problems and 4 participants had bigger problems with this exercise. |
| 13             | • To introduce breaststroke kicks and concurrently breathing through snorkel. | • Dry land: sitting; breaststroke kicks.  
• Pool edge: sitting; breaststroke kicks  
• Pool edge: lying; breaststroke kicks.  
• Pool edge: holding the edge; breaststroke kicks, breathing trough snorkel.  
• Breaststroke kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• All of them were able to breathe through snorkel.  
• 15 participants of 18 were able to swim 10 m breaststroke kicks and concurrently breathe through snorkel. 3 participants had small problems with this exercise.  
• All of them had perfect body position and relaxed leg motions. |
| 14             | • To introduce breaststroke kicks and concurrently breathing through snorkel. | • Dry land: sitting; breaststroke kicks.  
• Pool edge: lying; breaststroke kicks.  
• Pool edge: holding the edge; breaststroke kicks, breathing trough snorkel.  
• Breaststroke kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• All of them were able to breathe through snorkel.  
• 16 participants of 18 were able to swim 10 m breaststroke kicks and concurrently breathe through snorkel. 2 participants had small problems with this exercise. All of them had perfect body position and relaxed leg motions. |
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</tr>
</thead>
</table>
| 15             | • To introduce breaststroke hands motion and concurrently breathing through snorkel. | • Dry land: standing; half forward bend; strokes.  
• Pool edge: lying; breaststroke hands, breathing through snorkel.  
• Shallow water: standing; half forward bend; breaststrokes, breathing through snorkel.  
• Shallow water: walking; strokes.  
• Stroke with body extension, breathing through snorkel. | • It was enjoyable for all participants.  
• All of them were able to breathe through snorkel.  
• 15 participants of 18 were able to swim breaststrokes and concurrently breathe through snorkel. 3 participants had small problems with this exercise.  
• All of them had good body position and relaxed hand motions. |
| 16             | • To introduce the breaststroke coordination and concurrently breathing through snorkel. | • Stroke with body extension, breathing through snorkel.  
• 2 strokes + 2 kicks + 2 full cycles, breathing through snorkel.  
• 1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
• Breaststroke, breathing through snorkel. | • It was enjoyable for all participants.  
• All of them were able to breathe through snorkel.  
• 17 participants of 18 were able to swim 20 m breaststroke and concurrently breathe through snorkel. 1 participant had small problems with this exercise.  
• All of them had perfect body position and relaxed motions with small coordination problems. |
| 17             | • To improve exhaling into the water.  
• To improve breathing coordinated with the breaststrokes. | • Stroke with body extension.  
• 2 strokes + 2 kicks + 2 full cycles.  
• Pool edge: holding the edge; blowing bubbles.  
• 1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
• Breaststroke technique | • It was enjoyable for all participants.  
• All of them were able to breathe, but level of difficulty was moderate.  
• 9 participants of 18 had easy exercise of hands, breath and legs; moderate exercise was 5 participants of 18 and difficult exercise 4 participants of 18 in breaststroke technique.  
• Coordination was difficult exercise without snorkel for 15 participants of 18 (no coordination), moderate exercise 3 participants of 18 (low coordination). |
| 18             | • To improve breathing coordinated with the breaststrokes and front crawl strokes. | • One arm stroke, breathing crawl.  
• Catch up stroke, breathing crawl  
• Deep water: holding the edge; blowing bubbles.  
• Breaststroke 1 stroke + 1 kick with longer glide.  
• Breaststroke 1 stroke + 1 kick with longer glide.  
• Breaststroke technique. | • It was enjoyable for all participants.  
• Breathing was exercise with moderate difficulties for all participants; all 18 participants are able to breathe in both techniques’ breaststroke and crawl.  
• 11 participants of 18 were good in exercise of coordination of hands, breath and legs, moderate 5 participants and for 2 participants were difficulties exercise in both technique breaststroke and crawl. |
| 19             | • To improve diving and swimming under water. | • Push of from the wall, dive and touch the bottom of pool at 120 cm depth.  
• Push of from the wall, dive and touch the bottom of pool at 140 cm depth.  
• Push of from the wall, dive and touch the bottom of pool at 150 cm depth.  
• Push of from the wall, dive and touch the bottom of pool at 180 cm depth.  
• Front crawl, counting tree strokes during six leg kicks. | • It was enjoyable for all participants.  
• 4 participants of 18 were able to dive and touch the bottom at 180 cm. 4 participants were able to dive and touch the bottom at 150 cm. 8 participants were able to dive and touch the bottom at 140 cm. 2 participants were able to dive and touch the bottom at 120 cm. |
| 20             | • To improve breathing during front crawl and breaststroke. | • One arm stroke, breathing crawl.  
• Catch up stroke, breathing crawl  
• Deep water: holding the edge; blowing bubbles.  
• Breaststroke 1 stroke + 1 kick with longer glide.  
• Breaststroke 1 stroke + 1 kick with longer glide.  
• Breaststroke technique. | • It was enjoyable for all participants.  
• Breathing was exercise with moderate difficulties for all participants; all 18 participants are able to breathe in crawl, minimum difficulties of breathing in breaststroke.  
• 15 participants of 18 had good coordination of hands, breath and legs, 2 participants have small problems in both technique breaststroke and crawl. |
Table 3

Learn-to-swim program for F-NGS presented for each session

<table>
<thead>
<tr>
<th>Session number</th>
<th>Session aims</th>
<th>Practices</th>
<th>Learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• To be able to adapt in water. • Pool edge, body sink till to neck. • Pool edge, breathe holding. • Walking on the water. • Pool edge, blowing bubbles.</td>
<td>• It was enjoyable for all participants. • All participants were able to enter the water • All participants were able to blow bubbles.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>• To adapt participants to float and breathe. • Dry land, streamlined position. • Pool edge, vertical position, blowing bubbles. • Shallow water, walking with head up. • Pool edge, streamline blowing bubbles. • Floating in the prone position.</td>
<td>• It was enjoyable for all participants. • All 20 participants were able to float 10 seconds and concurrently hold breath. • 2 participants of 20 were able to float in deep water.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>• To introduce flutter kicks. • Dry land, flutter kicks. • Pool edge, sitting flutter kicks. • Pool edge, lying flutter kicks. • Holding the edge, flutter kicks. • Gliding in prone position, flutter kicks. • Flutter kicks with arms extended forward.</td>
<td>• It was enjoyable for all participants. • 10 participants of 20 were able to swim 10 m flutter kicks and concurrently breathe with head up. 4 participants had small problems and 3 participants had bigger problems with this exercise. 3 participants were not able to do it. • Participants are able to do flutter kicks for 7 seconds.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>• To improve flutter kicks. • Pool edge: lying flutter kicks. • Holding the edge, flutter kicks, breathing through snorkel. • Gliding in prone position, flutter kicks, breathing through snorkel. • Flutter kicks with arms extended forward, breathing through snorkel.</td>
<td>• It was enjoyable for all participants. • 5 participants of 20 were able to swim with stopping 10 m flutter kicks and concurrently breathe with head up. 8 participants had small problems with this exercise; 7 participants were not able to do flutter kicks.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>• To introduce front crawl arm strokes. • Dry lane, half-forward bend, arm strokes. • Shallow water: standing; half-forward bend; one arm strokes, side breathing. • Shallow water: standing; half forward bend; catch up strokes, side breathing. • Gliding in prone position, front crawl arm strokes, side breathing. • Rolling horizontal position</td>
<td>• It was enjoyable for all participants. • 2 participants of 20 were able to do 5 m arms stroke and concurrently breathe. 1 participant had small problems. • 17 participants were not able to swim 5 m without stopping.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>• To improve front crawl arm strokes. • Dry lane, half-forward bend, arm strokes. • Shallow water: standing; half-forward bend; one arm strokes, side breathing. • Shallow water: standing; half forward bend; catch up strokes, side breathing. • Gliding in prone position, front crawl arm strokes, side breathing. • Rolling vertical position</td>
<td>• It was enjoyable for all participants. • 6 participants of 19 were able to swim 10 m front crawl arm strokes without stopping. 8 participants had small problems with this exercise; 5 participants were not able to do 10 m swim crawl without stopping.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>• To improve gliding, breath holding. • Dry land, standing, imitation of streamlined position during gliding with extended hands. • Pool edge: lying; breathe holding. • Push of from the wall and glide on the front in the streamline position, breathe holding.</td>
<td>• It was enjoyable for all participants. • 11 participants of 20 were able to glide and concurrently hold breath. 85% of them had good streamlined positions. 8 participants had small problems with this exercise.</td>
<td></td>
</tr>
<tr>
<td>Session number</td>
<td>Session aims</td>
<td>Practices</td>
<td>Learning outcomes</td>
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</tr>
<tr>
<td>8</td>
<td>To introduce the front crawl coordination and concurrently side breathing.</td>
<td>One arm stroke, side breathing.</td>
<td>8 participants of 20 were able to swim front crawl 10 m without stop and concurrently side breathing. 1 participant had small problems and 3 participants had bigger problems with this exercise. 7 participants were not able to do it.</td>
</tr>
<tr>
<td>9</td>
<td>To improve the front crawl coordination and concurrently side breathing.</td>
<td>One arm stroke, side breathing.</td>
<td>8 participants of 19 were able to swim 10 m front crawl without stopping and concurrently side breathing. 2 participants had small problems with this exercise. 7 participants had bigger problems. 2 participants were not able to do it.</td>
</tr>
<tr>
<td>10</td>
<td>To improve front crawl coordination and concurrently side breathing.</td>
<td>One arm stroke, side breathing.</td>
<td>9 participants of 20 were able to swim 10 m front crawl and concurrently side breathing. 2 participants had small problems and 6 participants had bigger problems with this exercise. 2 participants were not able to do it.</td>
</tr>
<tr>
<td>11</td>
<td>To introduce backstroke.</td>
<td>Dry land: sitting; backstroke kicks</td>
<td>4 participants of 19 were able to push from the edge of the pool in back position and to lift the hips up try to swim backstroke for two meters. 9 participants had small problems and 6 participants had bigger problems with this exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pool edge: sitting; making foam on the surface with backstroke kicks</td>
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<tr>
<td></td>
<td></td>
<td>Gliding face up.</td>
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<tr>
<td></td>
<td></td>
<td>Backstroke kicks with arms extended forward.</td>
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<tr>
<td></td>
<td></td>
<td>Catch up strokes.</td>
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<tr>
<td></td>
<td></td>
<td>Backstroke with gliding</td>
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</tr>
<tr>
<td>12</td>
<td>To improve gliding in supine position.</td>
<td>Dry land: sitting; backstroke kicks</td>
<td>5 participants of 19 were able to push from the edge of the pool in back position and to lift the hips up try to swim backstroke for two meters. 10 participants had small problems and 4 participants had bigger problems with this exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pool edge: sitting; making foam on the surface with backstroke kicks</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Gliding face up.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Backstroke kicks with arms extended forward.</td>
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<tr>
<td></td>
<td></td>
<td>Catch up strokes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Backstroke with gliding</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>To introduce breaststroke kicks and concurrently forward breathing.</td>
<td>Dry land: sitting; breaststroke kicks.</td>
<td>All of them were able to breathe with small problems. None of participants of 18 were able to swim 10 m breaststroke kicks and concurrently forward breathe. 2 participants had small problems. 5 participants had bigger problems. 11 participants were not able to do this exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pool edge: sitting; breaststroke kicks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pool edge: lying; breaststroke kicks.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Pool edge: holding the edge; breaststroke kicks, forward breathing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Breaststroke kicks with arms extended forward.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>To improve breaststroke kicks and concurrently forward breathing.</td>
<td>Dry land: sitting; breaststroke kicks.</td>
<td>1 participant of 20 was able to swim 10 m breaststroke kicks and concurrently forward breathe. 2 participants had small problems. 5 participants had bigger problems. 12 participants were not able to do this exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pool edge: lying; breaststroke kicks.</td>
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<tr>
<td></td>
<td></td>
<td>Pool edge: holding the edge; breaststroke kicks, forward breathing.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Breaststroke kicks with arms extended forward, forward breathing.</td>
<td></td>
</tr>
<tr>
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<tr>
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</tr>
</tbody>
</table>
| 15             | To introduce breaststroke hands motion and concurrently forward breathing. | Dry land: standing; half forward bend; strokes.  
Pool edge: lying; breaststroke hands, forward breathing.  
Shallow water: standing; half forward bend; breaststrokes, forward breathing.  
Shallow water: walking; strokes.  
Stroke with body extension, forward breathing. | It was enjoyable for all participants.  
All of them were able to breathe, but with difficulties.  
1 participant of 15 was able to swim breaststrokes and concurrently breathe forward. 4 participants had small problems, 5 participants had bigger problems, and 5 participants were not able to do this exercise.  
5 participants of 15 had good body position and relaxed hand motions. |
| 16             | To introduce the breaststroke coordination and concurrently forward breathing. | Stroke with body extension, forward breathing.  
2 strokes + 2 kicks + 2 full cycles, forward breathing.  
1 stroke + 1 kick + 1 full cycle, forward breathing.  
Breaststroke, forward breathing. | It was enjoyable for all participants.  
No participants of 19 were able to swim 20 m breaststroke and concurrently breathe forward. 2 participants had small problems with this exercise. 7 participants had bigger problems. 11 participants were not able to do this exercise.  
All of them had problems coordinating breath. |
| 17             | To improve exhaling into the water.  
To improve breathing coordinated with the breaststrokes. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | Stroke with body extension.  
2 strokes + 2 kicks + 2 full cycles.  
Pool edge: holding the edge; blowing bubbles.  
1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
Breaststroke technique.  
Strok | It was enjoyable for all participants.  
All of them were able to breathe, but it was a difficult exercise.  
2 participants of 18 had easy exercise of hands, breath and legs; moderate exercise was 3 participants of 18 and difficult exercise 10 participants of 18. 3 participants were not able to do this exercise in breaststroke technique.  
Coordination was difficult for all participants. |
| 18             | To improve breathing coordinated with the breaststrokes and front crawl strokes. | Push from the wall, dive and touch the bottom of pool at 120 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 140 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 150 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 180 cm depth.  
Front crawl, counting tree strokes during six leg kicks. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | It was enjoyable for all participants.  
Breathing was exercise with moderate difficulties for all participants. All 18 participants are able to breathe in both breaststroke and crawl techniques.  
4 participants from 18 were good in exercise of coordination of hands, breath and legs; moderate 5 participants and for 9 participants were difficulties exercise in both breaststroke and crawl techniques. |
| 19             | To improve diving and swimming under water. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | Push from the wall, dive and touch the bottom of pool at 120 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 140 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 150 cm depth.  
Push off of the wall, dive and touch the bottom of pool at 180 cm depth.  
Front crawl, counting tree strokes during six leg kicks. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | It was enjoyable for all participants.  
7 participants of 18 were able to dive and touch the bottom at 180 cm. 6 participants were able to dive and touch the bottom at 150 cm. 5 participants were able to dive and touch the bottom at 140 cm. |
| 20             | To improve breathing during front crawl and breaststroke. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | It was enjoyable for all participants.  
Breathing was exercise with minimum difficulties for all participants. All 18 participants are able to breathe in crawl, minimum difficulties compared to breathing in breaststroke.  
5 participants of 18 had good coordination of hands, breath and legs, 9 participants had small problems, and 4 participants had bigger problems in both breaststroke and crawl. |
Table 4
Learn-to-swim program for NF-GS presented for each session

<table>
<thead>
<tr>
<th>Session number</th>
<th>Session aims</th>
<th>Practices</th>
<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 1              | To adapt participants to wear goggles and breathe through snorkel. | • Wearing goggles and breathing through snorkel on land.  
• Wearing goggles in water.  
• Wearing goggles and breathing through snorkel in water. | • It was enjoyable for all participants.  
• All participants were able to wear goggles and snorkel.  
• 17 participants of 19 were able to breathe through snorkel. |
| 2              | To adapt participants to float and concurrently breathe through snorkel. | • Wearing goggles and breathing through snorkel on land.  
• Prone position, holding the edge, breathing through snorkel.  
• Shallow water, walking with submerged face, breathing through snorkel.  
• Floating in the prone position, breathing through snorkel. | • It was enjoyable for all participants.  
• 18 participants of 19 were able to float and breathe through snorkel.  
• 4 participants of 20 were able to float in deep water. |
| 3              | To introduce flutter kicks and concurrently breathing through snorkel. | • Dry land, flutter kicks.  
• Pool edge, sitting flutter kicks.  
• Pool edge, lying, flutter kicks.  
• Holding the edge, flutter kicks, breathing through snorkel.  
• Gliding in prone position, flutter kicks, breathing through snorkel.  
• Flutter kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• 17 participants of 19 were able to swim flutter kicks and concurrently breathe through snorkel.  
• 2 participants had small problems.  
• Participants are able to do flutter kicks for 23 seconds. |
| 4              | To improve flutter kicks and concurrently breathing through snorkel. | • Pool edge: lying; flutter kicks.  
• Holding the edge, flutter kicks, breathing through snorkel.  
• Gliding in prone position, flutter kicks, breathing through snorkel.  
• Flutter kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• 15 participants of 19 were able to swim 10 m flutter kick and concurrently breathe through snorkel.  
• 3 participants had small problems and 1 participant had bigger problems with this exercise. |
| 5              | To introduce front crawl arm strokes and concurrently breathing through snorkel. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, breathing through snorkel.  
• Shallow water: standing; half forward bend; catch up strokes, breathing through snorkel.  
• Gliding in prone position, front crawl arm strokes, breathing through snorkel.  
• Rolling horizontal position | • It was enjoyable for all participants.  
• 15 participants of 19 were able to swim 5 m front crawl concurrently breathe through snorkel.  
• 1 participant had small problems, 3 participants had bigger problems with this exercise.  
• Breathing through snorkel has been challenging for 4 participants. |
| 6              | To improve front crawl arm strokes and concurrently breathing through snorkel. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, breathing through snorkel.  
• Shallow water: standing; half forward bend; catch up strokes, breathing through snorkel.  
• Gliding in prone position, front crawl arm strokes, breathing through snorkel.  
• Rolling vertical position | • It was enjoyable for all participants.  
• 18 participants of 19 were able to swim 10 m front crawl arm stroke and concurrently breathe through snorkel.  
• 1 participant had small problems with this exercise. |

2 They wore goggles until session 17, when they adapted to swimming without them.
<table>
<thead>
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<th>Practices</th>
<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 7              | To improve gliding and concurrently breathing through snorkel. | - Dry land, standing, imitation of streamline position during gliding with extended hands.  
- Pool edge: lying; breathing through snorkel.  
- Push of from the wall and glide on the front in the streamline position, breathing through snorkel. | - It was enjoyable for all participants.  
- 18 participants of 19 were able to glide and concurrently breathe through snorkel. 1 participant had small problems.  
- All of them had good streamlined positions. |
| 8              | To introduce the front crawl coordination and concurrently breathing through snorkel. | - One arm stroke, breathing through snorkel.  
- Crawl, one stroke on the third kicks, breathing through snorkel.  
- Catch up strokes, breathing through snorkel.  
- Semi catch up strokes, breathing through snorkel. | - It was enjoyable for all participants.  
- 11 participants of 18 were able to swim front crawl and concurrently breathe through snorkel. 6 participants had small problems, 1 participant had a bigger problem with this exercise. |
| 9              | To improve the front crawl coordination and concurrently breathing through snorkel. | - One arm stroke, breathing through snorkel.  
- Crawl, one stroke on the third kicks, breathing through snorkel.  
- Catch up strokes, breathing through snorkel.  
- Semi catch up strokes, breathing through snorkel. | - It was enjoyable for all participants.  
- 15 participants of 17 were able to swim 10 m front crawl and concurrently breathe through snorkel. 2 participants had a small problem with this exercise. |
| 10             | To improve front crawl coordination and concurrently breathing through snorkel. | - One arm stroke, breathing through snorkel.  
- Crawl, one stroke on the third kicks, breathing through snorkel.  
- Catch up strokes, breathing through snorkel.  
- Semi catch up strokes, breathing through snorkel. | - It was enjoyable for all participants.  
- 15 participants of 17 were able to swim 10 m front crawl and concurrently breathe through snorkel. 2 participants had small problems.  
- All of them had good streamlined positions. |
| 11             | To improve making bubbles and prone position swimming without snorkel. | - Shallow water: standing; half forward bend, holding the edge; blowing bubbles from one to three repetitions.  
- Shallow water: standing; half forward bend, holding the edge; blowing bubbles.  
- Shallow water: standing; half forward bend; breathing with rotating the head.  
- Catch up strokes.  
- Semi catch up strokes.  
- Swimming crawl. | - It was enjoyable for all participants.  
- All 15 participants were able to blow bubbles 6 times.  
- All participants had difficulties with exercise of breath to coordinate with stroke in crawl. |
| 12             | To improve gliding in supine position. To introduce backstroke. | - Dry land: sitting; backstroke kicks.  
- Pool edge: sitting; backstroke kicks.  
- Gliding face up.  
- Backstroke kicks with arms extended forward.  
- Catch up strokes.  
- Backstroke with gliding. | - It was enjoyable for all participants.  
- 14 participants of 18 were able to push off from the edge of the pool in back position for two meters. 1 participant had a small problem. 2 participants had bigger problems with this exercise.  
- Coordination was poor for the majority of participants; however, 9 participants of 18 had small coordination problems. |
| 13             | To introduce breaststroke kicks and concurrently breathing through snorkel. | - Dry land: sitting; breaststroke kicks.  
- Pool edge: sitting; breaststroke kicks.  
- Pool edge: lying; breaststroke kicks.  
- Pool edge: holding the edge; breaststroke kicks, breathing through snorkel.  
- Breaststroke kicks with arms extended forward, breathing through snorkel. | - It was enjoyable for all participants.  
- All of them were able to breathe through snorkel.  
- 6 participants of 16 were able to swim 10 breaststroke kicks and concurrently breathe through snorkel. 4 participants had small problems. 6 participants had bigger problems with this exercise.  
- All of them had perfect body position and relaxed leg motions. |
<table>
<thead>
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<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 14             | To improve breaststroke kicks and concurrently breathing through snorkel. | Dry land: sitting; breaststroke kicks.  
Pool edge: lying; breaststroke kicks.  
Pool edge: holding the edge; breaststroke kicks, breathing trough snorkel.  
Breaststroke kicks with arms extended forward, breathing through snorkel. | It was enjoyable for all participants. All 18 are able to breathe through a snorkel. However, 9 of 16 easily were able to execute path motion of kicks, moderately 2 of 16, difficulties 5 of 16. All have good body position and relaxed motions with moderate path kick. |
| 15             | To introduce breaststroke hands motion and concurrently breathing through snorkel. | Dry land: standing; half forward bend; strokes.  
Pool edge: lying; breaststroke hands, breathing through snorkel.  
Shallow water: standing; half forward bend; breaststrokes, breathing through snorkel.  
Shallow water: walking; strokes.  
Stroke with body extension, breathing through snorkel. | It was enjoyable for all participants.  
All of them are able to breathe through snorkel.  
12 participants of 17 were able to swim breaststrokes and concurrently breathe through snorkel, 4 participants had small problems, and 1 participant had bigger problems with this exercise.  
All of them had perfect body position and relaxed hand motions. |
| 16             | To introduce the breaststroke coordination and concurrently breathing through snorkel. | Stroke with body extension, breathing through snorkel.  
2 strokes + 2 kicks + 2 full cycles, breathing through snorkel.  
1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
Breaststroke, breathing through snorkel. | It was enjoyable for all participants.  
All of them are able to breathe through snorkel.  
15 participants of 17 were able to swim 20 m breaststroke and concurrently breathe through snorkel. 2 participants had small problems.  
All of them had perfect body position and relaxed motions with small coordination problems. |
| 17             | To improve exhauling into the water.  
To improve breathing coordinated with the breaststrokes. | Stroke with body extension.  
2 strokes + 2 kicks + 2 full cycles.  
Pool edge: holding the edge; blowing bubbles.  
1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
Breaststroke technique. | It was enjoyable for all participants.  
All of them are able to breathe in breaststroke. 14 participants of 17 had easy exercise of hands, breath and legs, moderate exercise 3 participants of 17 in the breaststroke technique.  
Coordination was difficult without snorkel for 13 participants of 16 (no coordination), moderate exercise 3 participants of 16 (low coordination). |
| 18             | To improve breathing coordinated with the breaststrokes and front crawl strokes. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl.  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | It was enjoyable for all participants.  
Breathing was exercise with moderate difficulties for all participants; all 17 participants are able to breathe in both techniques.  
15 participants of 17 were good in exercise of coordination of hands, breath and legs, moderate 2 participants in both techniques’ breaststroke and crawl.  
Coordination was difficult but easier in crawl than in breaststroke. |
| 19             | To improve diving and swimming under water. | Push of from the wall, dive and touch the bottom of pool at 120 cm depth.  
Push of from the wall, dive and touch the bottom of pool at 140 cm depth.  
Push of from the wall, dive and touch the bottom of pool at 150 cm depth.  
Push of from the wall, dive and touch the bottom of pool at 180 cm depth.  
Front crawl, counting three strokes during six leg kicks. | It was enjoyable for all participants.  
7 participants out 17 were able to dive and touch the bottom at 180 cm. 7 participants were able to dive and touch the bottom at 150 cm. 3 participants were able to dive and touch the bottom at 140 cm. |
| 20             | To improve breathing during front crawl and breaststroke. | One arm stroke, breathing crawl.  
Catch up stroke, breathing crawl.  
Deep water: holding the edge; blowing bubbles.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke 1 stroke + 1 kick with longer glide.  
Breaststroke technique. | It was enjoyable for all participants.  
Breathing was exercise with moderate difficulties for all participants; all 17 participants are able to breathe in crawl, minimal difficulties breathing in breaststroke.  
13 participants of 17 had good coordination of hands, breath and legs, 4 participants have small problems in both breaststroke and crawl. |
Table 5

Learn-to-swim program for NF-NGS presented for each session

<table>
<thead>
<tr>
<th>Session number</th>
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</table>
| 1              | • To be able to adapt in water. | • Pool edge, body sink till to neck.  
• Pool edge, breathe holding.  
• Walking on the water.  
• Pool edge, blowing bubbles. | • It was enjoyable for all participants.  
• All participants were able to enter the water.  
• All participants were able to blow bubbles. |
| 2              | • To adapt participants to float and breathe. | • Dry land, streamlined position.  
• Pool edge, vertical position, blowing bubbles.  
• Shallow water, walking with head up.  
• Pool edge, streamline blowing bubbles.  
• Floating in the prone position. | • It was enjoyable for all participants.  
• All 20 participants were able to float 10 seconds and concurrently holding breath.  
• 16 participants of 20 were able to float in deep water. |
| 3              | • To introduce flutter kicks. | • Dry land, flutter kicks.  
• Pool edge, sitting flutter kicks.  
• Pool edge, lying, flutter kicks.  
• Holding the edge, flutter kicks.  
• Gliding in prone position, flutter kicks.  
• Flutter kicks with arms extended forward. | • It was enjoyable for all participants.  
• 13 participants of 19 were able to swim 10 m flutter kicks and concurrently breathe with head up. 5 participants had small problems and 1 participant had bigger problems with this exercise.  
• Participants are able to do flutter kicks for 12 seconds. |
| 4              | • To improve flutter kicks. | • Pool edge: lying; flutter kicks.  
• Holding the edge, flutter kicks, breathing through snorkel.  
• Gliding in prone position, flutter kicks, breathing through snorkel.  
• Flutter kicks with arms extended forward, breathing through snorkel. | • It was enjoyable for all participants.  
• 11 participants of 19 were able to swim with stopping 10 m flutter kicks and concurrently breathe with head up. 8 participants had small problems. |
| 5              | • To introduce front crawl arm strokes. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, side breathing.  
• Shallow water: standing; half forward bend; catch up strokes, side breathing.  
• Gliding in prone position, front crawl arm strokes, side breathing.  
• Rolling horizontal position | • It was enjoyable for all participants.  
• 12 participants of 19 were able to do 5 m arms stroke and concurrently breathe.  
• 6 participants were not able to swim 5 m without stopping. |
| 6              | • To improve front crawl arm strokes. | • Dry lane, half-forward bend, arm strokes.  
• Shallow water: standing; half-forward bend; one arm strokes, side breathing.  
• Shallow water: standing; half forward bend; catch up strokes, side breathing.  
• Gliding in prone position, front crawl arm strokes, side breathing.  
• Rolling vertical position | • It was enjoyable for all participants.  
• 16 participants of 19 were able to swim 10 m front crawl arm strokes without stopping. 1 participant had small problems with this exercise, 2 participants were not able to do 10 m swim crawl without stopping. |
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| 7              | To improve gliding, breathe holding. | Dry land, standing, imitation of streamline position during gliding with extended hands.  
                Pool edge: lying; breathe holding.  
                Push of from the wall and glide on the front in the streamline position, breathe holding. | It was enjoyable for all participants.  
                17 participants of 19 were able to glide and concurrently hold breath. 90 % of them had good streamlined positions. 3 participants had small problems with this exercise. |
| 8              | To introduce the front crawl coordination and concurrently side breathing. | One arm stroke, side breathing.  
                Crawl, one stroke on the third kicks, side breathing.  
                Catch up strokes, side breathing.  
                Semi catch up strokes, side breathing. | It was enjoyable for all participants.  
                15 participants of 19 were able to swim front crawl 10 m without stop and concurrently side breathe. 4 participants had small problems. |
| 9              | To improve the front crawl coordination and concurrently side breathing. | One arm stroke, side breathing.  
                Crawl, one stroke on the third kicks, side breathing.  
                Catch up strokes, side breathing.  
                Semi catch up strokes, side breathing. | It was enjoyable for all participants.  
                All 19 participants were able to swim 10 m front crawl without stopping and concurrently side breathing. |
| 10             | To improve the front crawl coordination and concurrently side breathing. | One arm stroke, side breathing.  
                Crawl, one stroke on the third kicks, side breathing.  
                Catch up strokes, side breathing.  
                Semi catch up strokes, side breathing. | It was enjoyable for all participants.  
                All 19 participants were able to swim 10 m front crawl without stopping and concurrently side breathing. |
| 11             | To improve gliding in supine position.  
                To introduce backstroke. | Dry land: sitting; backstroke kicks  
                Pool edge: sitting; making foam on the surface with backstroke kicks  
                Gliding face up.  
                Backstroke kicks with arms extended forward.  
                Catch up strokes.  
                Backstroke with gliding. | It was enjoyable for all participants.  
                13 participants of 19 were able to push from the edge of the pool in back position and to lift the hips up try to swim backstroke for two meters. 2 participants had small problems and 3 participants had bigger problems with this exercise. |
| 12             | To improve gliding in supine position.  
                To improve backstroke. | Dry land: sitting; backstroke kicks  
                Pool edge: sitting; making foam on the surface with backstroke kicks  
                Gliding face up.  
                Backstroke kicks with arms extended forward.  
                Catch up strokes.  
                Backstroke with gliding. | It was enjoyable for all participants.  
                18 participants of 19 were able to push from the edge of the pool in back position and to lift the hips up try to swim backstroke for 10 m meters. 1 participant had small problems with this exercise. |
| 13             | To introduce breaststroke kicks and concurrently forward breathing. | Dry land: sitting; breaststroke kicks.  
                Pool edge: sitting; breaststroke kicks  
                Pool edge: lying; breaststroke kicks.  
                Pool edge: holding the edge; breaststroke kicks, forward breathing.  
                Breaststroke kicks with arms extended forward. | It was enjoyable for all participants.  
                All of them were able to breathe with small problems.  
                11 participants of 19 were able to swim 10 m breaststroke kicks and concurrently forward breathe. 7 participants had small problems. 1 participant had bigger problems.  
                All 19 participants had a problem with kick technique. |
| 14             | To improve breaststroke kicks and concurrently forward breathing. | Dry land: sitting; breaststroke kicks.  
                Pool edge: lying; breaststroke kicks.  
                Pool edge: holding the edge; breaststroke kicks, forward breathing.  
                Breaststroke kicks with arms extended forward, forward breathing. | It was enjoyable for all participants.  
                All of them were able to breathe with bigger problems.  
                All 16 participants were able to swim 10 m breaststroke kicks and concurrently forward breathe. |
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<th>Learning outcomes</th>
</tr>
</thead>
</table>
| 15            | To introduce breaststroke hands motion and concurrently forward breathing. | - Dry land: standing; half forward bend; strokes.  
- Pool edge: breaststroke hands, forward breathing.  
- Shallow water: standing; half forward bend; breaststrokes, forward breathing.  
- Shallow water: walking; strokes.  
- Stroke with body extension, forward breathing. | - It was enjoyable for all participants.  
- All of them were able to breathe but with difficulties.  
- 6 participants of 16 were able to swim breaststrokes and concurrently breathe forward.  
- 6 participants had small problems, 4 participants had bigger problems.  
- 6 participants of 15 had good body position and relaxed hand motions. |
| 16            | To introduce the breaststroke coordination and concurrently forward breathing. | - Stroke with body extension, forward breathing.  
- 2 strokes + 2 kicks + 2 full cycles, forward breathing.  
- 1 stroke + 1 kick + 1 full cycle, forward breathing.  
- Breaststroke, forward breathing. | - It was enjoyable for all participants.  
- 9 participants of 16 were able to swim 20 m breaststroke and concurrently breathe forward.  
- 4 participants had small problems with this exercise. 2 participants had bigger problems. 1 participant was not able to do this exercise.  
- All of them had small problem of coordination with breath. |
| 17            | To improve exhaling into the water.  
To improve breathing coordinated with the breaststrokes. | - Stroke with body extension.  
- 2 strokes + 2 kicks + 2 full cycles.  
- Pool edge: holding the edge; blowing bubbles.  
- 1 stroke + 1 kick + 1 full cycle, breathing through snorkel.  
- Breaststroke technique | - It was enjoyable for all participants.  
- 13 participants of 16 had easy exercise of hands, breath and legs; moderate exercise was 3 participants from 16 to do this exercise in breaststroke technique.  
- Coordination was poor, but exercise for all participants was good. |
| 18            | To improve breathing coordinated with the breaststrokes and front crawl strokes. | - One arm stroke, breathing crawl.  
- Catch up stroke, breathing crawl  
- Deep water: holding the edge; blowing bubbles.  
- Breaststroke 1 stroke + 1 kick with longer glide.  
- Breaststroke 1 stroke + 1 kick with longer glide.  
- Breaststroke technique. | - It was enjoyable for all participants.  
- Breathing was exercise with minimal difficulties for all participants. All 16 participants are able to breathe in both breaststroke and crawl.  
- 12 participants of 16 were good in exercise of coordination of hands, breath and legs, moderate 2 participants and for 3 participants had difficulties with both breaststroke and crawl. |
| 19            | To improve diving and swimming under water. | - Push off from the wall, dive and touch the bottom of pool at 120 cm depth.  
- Push of from the wall, dive and touch the bottom of pool at 140 cm depth.  
- Push of from the wall, dive and touch the bottom of pool at 150 cm depth.  
- Push of from the wall, dive and touch the bottom of pool at 180 cm depth.  
- Front crawl, counting tree strokes during six leg kicks. | - It was enjoyable for all participants.  
- 15 participants of 18 were able to dive and touch the bottom at 180 cm. 2 participants were able to dive and touch the bottom at 150 cm. 1 participant was able to dive and touch the bottom at 140 cm. |
| 20            | To improve breathing during front crawl and breaststroke. | - One arm stroke, breathing crawl.  
- Catch up stroke, breathing crawl  
- Deep water: holding the edge; blowing bubbles.  
- Breaststroke 1 stroke + 1 kick with longer glide.  
- Breaststroke 1 stroke + 1 kick with longer glide.  
- Breaststroke technique. | - It was enjoyable for all participants.  
- All 18 participants are able to breathe in crawl and breaststroke.  
- 16 participants of 18 had good coordination of hands, breath and legs, 2 participants have small problems in both breaststroke and crawl. |
UČINKI UPORABE PLAVALNIH OČAL IN DIHALKE PRI ZAČETNEM UČENJU PLAVANJA NA NAPREDEK NEPLAVALCEV S STRAHOM PRED VODO

11. OBSEŽEN POVZETEK V SLOVENŠČINI

11.1 Uvod


Razlogi za slabo plavalno znanje otrok in mladostnikov so različni (Pharr et al., 2018). Pogosto se nanašajo na dostopnost bazenov, na kulturno-socialne zadržke, na rasne in etnične ovire, na zdravstvene zadržke ter na negativne izkušnje staršev ali širše družine z vodnim okoljem itd. (Lachocki, 2012). Pogost razlog je tudi strah pred vodo (Berukoff & Hill, 2010; Pharr et al., 2018). Njegova pojavnost v populaciji je med 2 in 3% in je pogostejša pri otrocih kot pri odraslih (Stinson et al., 2007). Pojavi se že v otroškem obdobju, pri čemer obstaja več domnev o njegovem vzroku.
(Becker et al., 2007). Najpogosteje ga povezujejo s slabo izkušnjo (nepričakovani padec v vodo, utapljanje…) iz preteklosti (Shank, 1987; Whiting & Stembridge, 1965). Možno je, da ne gre za vzročno-posledični proces in da se pojaviti kot biološki strah brez slabih predhodnih izkušenj (Graham & Gaffan, 1997; Menzies & Clarke, 1993; Poulton et al., 1998). Strah pred vodo se lahko izrazi v različnih okoliščinah kot: strah pred plavanjem, strah pred temno vodo, strah pred potopitvijo glave, strah pred bližino vodnjaka, strah pred plutjem s čolnom itd. Strah pred vodo lahko posameznika odvrne od številnih aktivnosti v vodi in ob njej ter tako tudi od učenja plavanja (Milosevic & McCabe, 2015).

11.2 Predmet in problem

Dobro znanje plavanje in plavalne sposobnosti so nujna zaščita pred utopitvami (Brenner et al., 2006). Načrtno učenje plavanja je marsikje po svetu zmanjšalo število utopitev. To velja tako za države v razvoju (Linnan et al., 2011), kot tudi za razvite države (Yang et al., 2007; Brenner et al., 2009). Načrtno učenje plavanja naj bi zmanjšalo število utopitev za 88% (Brenner et al., 2009). To je razlog, da so začetni in nadaljevalni programi del šolskih učnih načrtov v številnih evropskih državah (Jurgec et al., 2016).

Pri sodobnih programih učenja plavanja, je v ospredju ideja zaščite pred utopitvami. Vedno manj se poudarja tradicionalno učenje plavalnih tehnik in premagovanje razdalj (Quan et al., 2015). Cilj učenja plavanja neplavalcev in tudi plavalcev je torej pridobivanje vodne kompetence, ki združuje zmožnost uporabe (Water Safety USA, 2015):

- različnih plavalnih veščin in telesnih sposobnosti, ki so potrebne za rešitev nepričakovanih težav v vodi,
- vedenja o nevarnostih in znanja o preventivnem delovanju, v obliki zagotavljanja aktivne varnosti v vodi in ob njej.

Začetno učenje plavanje je sestavljeno iz prilagajanja na vodo in učenja plavanja. Stopnja prilagajanja na vodo se sicer med posameznimi državami nekoliko razlikuje, načeloma pa združuje vaje vstopa v vodo, gledanja pod gladino, nadzora dihanja, plovnosti in orientacije v vodi (American Red Cross, 2009; Gresswell, 2015; Langendorfer, 2010; Langendorfer & Bruya, 1995; Stallman et al., 2008; Stallman et al., 2017a). Po prilagoditvi neplavalca na vodo, se začne z


Pripomočkov za učenje plavanja je veliko. Uporabljajo se za:

- povečanje plovnosti (plovnji pripomočki, kot so rokavčki, črvi, jopiči, plavalne deske, plovci itd.),
- prilagajanje učenca na vodo in povečanje motivacije za učenje (različne plovnje in potopljive igrače, žoge, podvodni poligoni),
- neovirano gledanje pod gladino in dihanje (plavalna očala, maske, dihalke) in
- izboljšanje plavalne tehnike (lopatke, plavuti).

V dosedanjih raziskavah na področju učenja in poučevanja plavanja so raziskovalci le redko proučevali učinke uporabe različnih pripomočkov na prilagojenost na vodo in znanje plavanja učencev. Še največ so se osredotočali na ugotavljanje učinkov uporabe različnih plovnih pripomočkov (Kjendlie, 2009; Kjendlie & Mendritzki, 2012; Parker et al., 1999; Scurati et al., 2006). V zadnjem času se pri učenju plavanja vedno pogosteje uporabljajo za otroško uporabo prilagojena plavalna očala, maska in dihalka. To so pripomočki, ki omogočajo neovirano gledanje in dihanje pod gladino. To plavalnim začetnikom ali neplavalcem omogoči lažjo potopitev obraza in s tem povečanje njihove plovnosti. Na ta način se jim poveča samozaupanje in jih motivira, da dvignejo noge iz dna ter se spriččeno uležejo iztegnjeni na gladino. Glede na to je možno, da je program, ki temelji na učenju plavanja v prsnem položaju, lahko z uporabo plavalnih očal ali maske in dihalke, učinkovitejši (Kapus et al., 2018).
11.3 Cilj in hipoteze

Cilj raziskave je bil, ugotoviti učinke uporabe plavalnih očal in dihalke med začetnim učenjem plavanja na prilagojenost na vodo in na znanje ter sposobnosti plavanja neplavalcev z izraženim strahom pred vodo ali brez njega. Učinke poskusnega učenja smo primerjali z učinkami učenja plavanja, pri katerem plavalnih očal in dihalke nismo uporabljali.

V skladu s ciljem smo postavili hipoteze, v katerih smo trdili, da bo začetno učenje plavanja ob uporabi plavalnih očal in dihalke, imelo večji učinek na prilagojenost na vodo in na znanje ter sposobnosti plavanja neplavalcev, od učenja, pri katerem se teh dveh pripomočkov ne bo uporabljalo. Postavili smo 6 hipotez, ki so se posamično nanašale na zmožnosti (oz. znanje in sposobnosti) prilagojenosti na vodo in plavanja. Vsako od teh hipotez smo opredelili posebej za neplavalce z izraženim strahom pred vodo in posebej za neplavalce brez njega. Skupaj smo torej postavili 12 hipotez.

11.4 Metode dela

Preiskovanci

V raziskavi je sodelovalo 80 otrok (40 deklic in 40 dečkov), starih od 10 do 11 let. Bili so neplavalci, ki se pred raziskavo še nikoli niso udeležili plavalnega tečaja. S pomočjo vprašalnika (Misimi et al., 2020) smo preiskovance razdelili v dve glavni skupini: na tiste, z izraženim strahom pred vodo in na tiste, brez njega. Vprašalnik je vseboval dvajset trditev, do katerih so se preiskovanci opredelili s pomočjo 5-stopenjske Likertove lestvice (1 = se sploh ne strinjam, 2 = se ne strinjam, 3 = nisem prepričan, 4 = se strinjam, 5 = se zelo strinjam). Vsako od teh dveh skupini smo razdelili še na dve podskupini: na tiste, ki so se učili plavati s plavalni očali in dihalko ter na tiste, ki pri učenju teh dveh pripomočkov niso uporabljali. Raziskovalni program je torej potekal v štirih skupinah preiskovancev:

_______________________________

3 V slovenskem delu besedila doktorske disertacije uporabljamo izraze, kot so: neplavalec, preiskovavec, plavalni začetnik in plavalec, ki veljajo za oba spola.
• skupina F-GS (preiskovanci z izraženim strahom pred vodo, ki so se učili plavati s plavalni očali in dihalke),
• skupina F-NGS (preiskovanci z izraženim strahom pred vodo, ki pri učenju plavanja niso uporabljali plavalnih očal in dihalke),
• skupina NF-GS (preiskovanci brez izraženega strahu pred vodo, ki so se učili plavati s plavaličnimi očali in dihalke) in
• skupina NF-NGS (preiskovanci brez izraženega strahu pred vodo, ki pri učenju plavanja niso uporabljali plavalnih očal in dihalke).

Testni protokol

Vse štiri skupine so se učile in vadile pet-krat na teden, štiri tedne. Ena vadbenega enota je trajala 45 minut. Učenje sta vodila dva plavalna učitelja z ustrezno usposobljenostjo. Da bi se izognili učinkom različnega načina in pristopa do poučevanja, sta skušala poučevati podobno (pristop, pohvale in spodbude itd.). Skupine sta pri posamezni vadbeni enoti menjavala.

Program učenja plavanja je bil za vse preizkušance podoben. Pri skupinah F-NGS in NF-NGS je program sledil običajnemu začetnemu programu učenja plavanja, torej: prilagajanje na upor vode (vstop v vodo), prilagajanje na potapljanje glave, prilagajanje na gledanje pod gladino, prilagajanje na izdihovanje v vodo, prilagajanje na plovnost, prilagajanje na drsenje, učenje udarcev, učenje zaveslajev, učenje gibanja glave in dihanja v koordinaciji z zaveslajami in učenje koordinacije celotne plavalne tehnike (Kapus idr., 2002). Z uporabo plavalnih očal in dihalke, smo pri skupinah F-GS in NF-GS ta vrstni red nekoliko spremenili. Po prvih dveh stopnjah (prilagajanje na upor vode (vstop v vodo) in na potapljanje glave), smo izpustili prilagajanje na gledanje pod gladino in na izdihovanje v vodo ter nadaljevali s prilagajanjem na plovnost in na drsenje ter učenjem plavalnih tehnik. Nato smo pripomočka postopoma odstranili, tako da smo preiskovance prilagodili še na gledanje pod gladino in na izdihovanje v vodo. Končni cilj programov je bil pri vseh štirih skupinah enak, in sicer samostojno plavanje brez uporabe plavalnih očal in dihalke.

Pred poukom plavanja in po njem, smo s pomočjo 11 testov ocenili prilagojenost preiskovancev na vodo in njihovo znanje ter sposobnosti plavanja (Harrod & Langendorfer, 1990).
**Test vstopa v vodo**
Preiskovanci so stali na robu plitkega dela bazena in na poljuben način vstopili v vodo. Njihovo zmožnost vstopa v vodo smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovancek ni vstopil v vodo.
- Ocena 2 je pomenila, da je preiskovancek se delal na rob bazena in se z učiteljevo pomočjo vstopil v vodo.
- Ocena 3 je pomenila, da je preiskovancek se delal na rob bazena in se brez učiteljeve pomoči, vendar zadržano, vstopil v vodo.
- Ocena 4 je pomenila, da je preiskovancek se delal na rob bazena in se brez učiteljeve pomoči ter zadržko vstopil v vodo.
- Ocena 5 je pomenila, da je preiskovancek skočil na noge v vodo.

**Test gledanja pod gladino**
Preiskovanci so stali v plitvi vodi. Potopili so obraz, učitelj jim je pokazal določeno število prstov. Preiskovanci so jih prešeli, dvignili obraz iz vode in povedali število prstov, ki so jih videli. Nalogo so ponovili trikrat. Njihovo zmožnost gledanja pod gladino smo ocenili s pomočjo dveh ocen:

- Ocena 1 je pomenila, da preiskovancek ni uspešno opravil naloge.
- Ocena 2 je pomenila, da je preiskovancek uspešno opravil nalogo.

**Test zadrževanja diha**
Preiskovanci so stali v plitvi vodi. Potopili so obraz in skušali čim dlje zadrževati dih. Njihovo zmožnost zadrževanja diha smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovancek ni želel opravljati nalogo.
- Ocena 2 je pomenila, da je preiskovancek le na hitro potopil obraz, z minimalnim zadrževanjem diha.
- Ocena 3 je pomenila, da se je preiskovanek med potopom obraza in zadrževanjem diha držal za nos.
- Ocena 4 je pomenila, da je preiskovancek potopil obraz in do 7 sekund zadrževal dih.
- Ocena 5 je pomenila, da je preiskovancek potopil obraz in več kot 7 sekund zadrževal dih.
**Test spuščanja mehurčkov**

Preiskovanci so stali v plitvi vodi. Potopili so obraz in izdihnili skozi usta (spuščali mehurčke). Nalogo so zaporedno, brez prekinitev, ponavljali toliko časa, dokler so lahko. Njihovo zmožnost spuščanja mehurčkov smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovanec ni naloge opravil niti enkrat.
- Ocena 2 je pomenila, da je preiskovanec nalogo ponovil dvakrat.
- Ocena 3 je pomenila, da je preiskovanec nalogo ponovil trikrat ali štirikrat.
- Ocena 4 je pomenila, da je preiskovanec nalogo ponovil petkrat.
- Ocena 5 je pomenila, da je preiskovanec nalogo ponovil šestkrat ali več.

**Test drsenja v prsnem položaju**

Preiskovanci so se v plitkem delu bazena odrinili od stene in kar najdlje drseli v prsnem položaju z vzročenimi rokami ter glavo v vodi. Njihovo zmožnost drsenja v prsnem položaju smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovanec ni želel opravljati naloge.
- Ocena 2 je pomenila, da se je preiskovanec le odrinil od stene bazena in nato brez drsenja stopil na dno.
- Ocena 3 je pomenila, da je preiskovanec drsel v poševnem, prsnem položaju, z dvignjeno glavo.
- Ocena 4 je pomenila, da je preiskovanec drsel manj kot 4 sekunde v prsnem položaju, s potopljeno glavo.
- Ocena 5 je pomenila, da je preiskovanec drsel več kot 4 sekunde v prsnem položaju, s potopljeno glavo.

**Test drsenja v hrbtnem položaju**

Preiskovanci so se v plitkem delu bazena odrinili od stene in kar najdlje drseli v hrbtnem položaju z vzročenimi rokami ter glavo v vodi. Njihovo zmožnost drsenja v hrbtnem položaju smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovanec ni želel opravljati naloge.
- Ocena 2 je pomenila, da se je preiskovanec le odrinil od stene bazena in nato brez drsenja stopil na dno.
• Ocena 3 je pomenila, da je preiskovane dresel v poševnem, hrbtnem položaju, z dvignjeno glavo.
• Ocena 4 je pomenila, da je preiskovane dresel manj kot 4 sekunde v hrbtnem položaju, z glavo na gladini.
• Ocena 5 je pomenila, da je preiskovane dresel več kot 4 sekunde v hrbtnem položaju, z glavo na gladini.

**Test vzdolžnega obračanja**

Preiskovanci so se v plitvem delu bazena ulegli na gladino. Iz lebdenja v prsnem položaju, so se vzdolžno obrnili v hrbtni in se nato vrnili v prsni položaj. Obračali so se lahko le z gibi nog in rok, brez dotika dna. Njihovo zmožnost vzdolžnega obračanja smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovane ni želel opravljati naloge.
- Ocena 2 je pomenila, da se je preiskovane brez dobrega nadzora telesa obrnil le minimalno.
- Ocena 3 je pomenila, da se je preiskovane vzdolžno obrnil brez postanka v hrbtnem in/ali prsnem položaju.
- Ocena 4 je pomenila, da se je preiskovane vzdolžno obrnil in se pri tem primerno dolgo zadržal v hrbtnem in prsnem položaju. Med nalogo je bil položaj telesa poševen, z višjim položajem glave.
- Ocena 5 je pomenila, da se je preiskovane vzdolžno obrnil in se pri tem primerno dolgo zadržal v hrbtnem in prsnem položaju. Naloge je izvedel/-la sproščeno, z iztegnjenim in vodoravnim telesom.

**Test prečnega obračanja**

Preiskovanci so se v plitvem delu bazena ulegli na gladino. Iz tri sekundnega lebdenja v prsnem položaju, so se dvignili v pokončni položaj. V njem so ostali tri sekunde in se nato ulegli v hrbtni položaj, v katerem so ostali tri sekunde. Obračali so se lahko le z gibi nog in rok, brez dotika dna. Njihovo zmožnost prečnega obračanja smo ocenili s pomočjo 5-stopnejske lestvice:

- Ocena 1 je pomenila, da preiskovane ni želel opravljati naloge.
• Ocena 2 je pomenila, da se je preiskovanci brez dobrega nadzora telesa obrnil le minimalno.
• Ocena 3 je pomenila, da se je preiskovanci prečno obrnil brez postanka v posameznih položajih.
• Ocena 4 je pomenila, da se je preiskovanci prečno obrnil, vendar se je v posameznih položajih zadržal manj kot tri sekundne.
• Ocena 5 je pomenila, da se je preiskovanci prečno obrnil in se pri tem tri sekundne ali več zadržal v posameznem položaju.

Test plavanja v prsnem položaju
Preiskovanci so plavali brez vmesnega dotika dna ali roba bazena toliko časa, dokler so zmogli. Če so zmogli 10 metrov ali več, smo test zaključili. Nalogo so začeli v vodi z odrivom od roba bazena. Plavali so na poljuben način v prsnem položaju. Njihovo zmožnost plavanja v prsnem položaju smo ocenili s pomočjo 5-stopnejske lestvice:
• Ocena 1 je pomenila, da preiskovanci ni želel opravljati naloge.
• Ocena 2 je pomenila, da preiskovanci plaval od 1 do 7 sekund.
• Ocena 3 je pomenila, da preiskovanci plaval od 8 do 14 sekund.
• Ocena 4 je pomenila, da preiskovanci plaval od 15 do 21 sekund.
• Ocena 5 je pomenila, da preiskovanci plaval 10 metrov.

Ocenjevanje dihanja med testom plavanja v prsnem položaju
Pri testu plavanja v prsnem položaju (opisan zgoraj) smo s pomočjo 5-stopnejske lestvice ocenili tudi znanje dihanja:
• Ocena 1 je pomenila, da preiskovanci ni želel opravljati naloge.
• Ocena 2 je pomenila, da preiskovanci plaval z zadrževanjem diha.
• Ocena 3 je pomenila, da preiskovanci plaval, bodisi z ves čas dvignjeno glavo bodisi jo je potapljal, vendar je pri tem izdihoval nad gladino.
• Ocena 4 je pomenila, da preiskovanci plaval z izdihovanjem pod gladino, vendar gibanje glave in dihanje nista bila usklajena z zaveslaji.
• Ocena 5 je pomenila, da preiskovanci plaval z izdihovanjem pod gladino. Gibanje glave in dihanje sta bila usklajena z zaveslaji.
Preiskovanci so plavali brez vmesnega dotika dna ali roba bazena toliko časa, dokler so zmogli. Če so zmogli 10 metrov ali več, smo test zaključili. Nalogo so začeli v vodi z odrivom od roba bazena. Plavali so na poljuben način v hrbtnem položaju. Njihovo zmožnost plavanja v hrbtnem položaju smo ocenili s pomočjo 5-stopnjske lestvice:

- Ocena 1 je pomenila, da preiskovanec ni želel opravljati naloge.
- Ocena 2 je pomenila, da je preiskovanec plaval od 1 do 7 sekund.
- Ocena 3 je pomenila, da je preiskovanec plaval od 8 do 14 sekund.
- Ocena 4 je pomenila, da je preiskovanec plaval od 15 do 21 sekund.
- Ocena 5 je pomenila, da je preiskovanec plaval 10 metrov.

Pred poukom plavanja in po njem smo v dveh dneh izvedli vse teste. Testiranje in pouk smo opravili v istem bazenu (globina plitkega dela je 120 cm, globokega pa 180 cm, temperatura vode je bila 26 ºC). Zaradi lažjega spremljanja in analize, smo testiranje in pouk tudi posneti.

Metode obdelave podatkov
11.5 Rezultati


Preglednica 1

*Primerjava ocen testov posameznih skupin pred poukom plavanja in po njem. Vrednosti ocen so podane v medianah s kvartilnimi razmiki v oklepajih*

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<th>Skupina</th>
<th>OCENA PRED POUKOM</th>
<th>Razlike med skupinami pred poukom</th>
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</table>

Opomba. F-GS - skupina z izraženim strahom pred vodo, ki se je učila plavati s plavalni očali in dihalko, F-NGS – skupina z izraženim strahom pred vodo, ki pri učenju plavanja ni uporabljala plavalnih očal in dihalke, NF-GS - skupina brez izraženega straha pred vodo, ki se je učila plavati s plavalni očali in dihalko, NF-NGS – skupina brez izraženega straha pred vodo, ki pri učenju plavanja ni uporabljala plavalnih očal in dihalke, # - statistično pomembna razlika med skupinami pred poukom (Kruskal–Wallisov test; p < 0.05), ## - statistično pomembna razlika med skupinami pred poukom (Kruskal–Wallisov test; p < 0.01), * - statistično pomemben učinek pouka (Wilcoxonov test; p < 0.05), ** - statistično pomemben učinek pouka (Wilcoxonov test; p < 0.01).

Velika večina preiskovancev (izjema je le skupina NF-NGS pri testih vstopa v vodo, gledanja pod gladinjo in plavanja v prsnem položaju), je z učenjem plavanja napredovala v prilagojenosti na vodo ter v znanju in sposobnostih plavanja (p < 0.05 in p < 0.01 v stolpcu Učinek pouka v preglednici 1).
Preglednica 2

*Primerjava učinkov pouka (Δ) pri posameznih testih med skupinama F-GS in F-NGS ter skupinama NF-GS in NF-NGS. Vrednosti Δ so podane v aritmetičnih sredinah s standardnimi odkloni v oklepajih.*

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Opomba. F-GS - skupina z izraženim strahom pred vodo, ki se je učil a plavati s plavalni očali in dihalko, F-NGS – skupina z izraženim strahom pred vodo, ki pri učenju plavanja ni uporabljala plavalnih očal in dihalke, NF-GS - skupina brez izraženega strahu pred vodo, ki se je učil a plavati s plavalni očali in dihalko, NF-NGS - skupina brez izraženega strahu pred vodo, k i pri učenju plavanja ni uporabljal a plavalnih očal in dihalke.

Statistično pomembna razlika v učinkih pouka med skupinama (ANOVA; p < 0.05), $$ - statistično pomembna razlika v učinkih pouka med skupinama (ANOVA; p < 0.01).

Primerjava učinkov pouka med skupinama z izraženim strahom pred vodo je pokazala, da je bil učni napredek pri testih vstopa v vodo, drsenja v hrbtnem in plavanja v prsnem položaju večji, pri testu pihanja mehurčkov pa manjši pri skupini F-GS, kakor pri skupini F-NGS (p < 0.05). Podobno je pokazala tudi primerjava učinkov pouka med skupinama brez izraženega strahu pred vodo. Skupina NF-GS je v testu plavanja v prsnem položaju napredovala bolj, v testu pihanja mehurčkov pa manj v primerjavi s skupino NF-NGS (p < 0.01 in p < 0.05).

11.6 Razprava

Cilj raziskave je bil ugotoviti učinke uporabe plavalnih očal in dihalke med začetnim učenjem plavanja na prilagojenost na vodo in na znanje ter sposobnosti plavanja neplavalcev z izraženim
strahom pred vodo ali brez njega. Učinke poskusnega učenja smo primerjali z učinkini učenja plavanja, pri katerem plavalnih očal in dihalke nismo uporabljali. Rezultate raziskave lahko strnemo v dve glavni točki:

1. Ne glede na to, ali je bil strah pred vodo pri neplavalcih izražen ali ne, je uporaba plavalnih očal in dihalke povzročila večji napredek v zmožnosti plavanja v prsnem položaju. Nasprotno je bil napredek v zmožnosti pihanja mehurčkov manjši od napredka, ki ga je povzročilo učenje, pri katerem plavalnih očal in dihalke nismo uporabljali.

2. Uporaba plavalnih očal in dihalke je pri neplavalcih z izraženim strahom pred vodo omogočila tudi večji napredek v zmožnosti vstopa v vodo in drsenja v hrbtnem položaju.

**Zmožnost vstopa v vodo**

Utopitev je lahko posledica nepričakovanega padca v vodo. Zato je zmožnost varnega vstopa v vodo ena od osnovnih vodnih kompetenc (Stallman et al., 2017). Rezultati v preglednici 2 potrjujejo hipotezo H1, v kateri smo trdili, da bo napredek neplavalcev z izraženim strahom pred vodo v zmožnosti vstopa v vodo večji, ob uporabi plavalnih očal in dihalke med učenjem plavanja. Razlog za to je lahko dejstvo, da plavalna očala omogočijo neovirano gledanje pod gladino, dihalka pa neomejeno dihanje. Na ta način plavalni začetniki, sploh tisti z izraženim strahom pred vodo, lažje potopijo obraz in glavo v vodo ter posledično začutijo svojo plovnost in občutek lebdenja na gladini (Kapus et al., 2018). Očitno je imela skupina F-GS, ki je uporabljala plavalna očala in dihalke, več priložnosti za to spoznanje kot skupina F-NGS, ki teh dveh pripomočkov ni uporabljala.

Taki izrazitega učinka uporabe plavalnih očal in dihalke pri neplavalcih brez izraženega strahu pred vodo nismo ugotovili. Učeni napredek v zmožnosti vstopa v vodo se med skupino NF-GS in skupino NF-NGS ni statistično pomembno razlikoval (preglednica 2). Ti rezultati ne potrjujejo hipoteze H2, v kateri smo trdili, da bo napredek neplavalcev brez izraženega strahu pred vodo v zmožnosti vstopa v vodo večji, ob uporabi plavalnih očal in dihalke med učenjem plavanja. Razlike v učinku uporabe plavalnih očal in dihalke glede na to, ali je pri neplavalcih izražen strah pred vodo ali ne, so pričakovani. Vstop v vodo je namreč ena od tistih zmožnosti in posledično strahov, ki najbolj razlikuje obe skupini neplavalcev (Misimi et al., 2020). Glede na rezultate raziskave lahko zaključimo, da je uporaba plavalnih očal in dihalke primerna in smiselna za
premagovanje strahu pred vstopom v vodo, torej zmožnostjo, ki se jo običajno vadi na začetku
plavalnega tečaja.

Zmožnost gledanja pod gladino

Zmožnost gledanja pod gladino omogoči boljšo orientacijo med plavanjem in tudi v okoliščinah
nepričakovanega padca v vodo (Stallman et al., 2008). Rezultati v preglednicah 1 in 2 kažejo, da
so skupine F-GS, F-NGS in NF-GS z učenjem plavanja v tej zmožnosti napredovale, vendar se
učni napredek med skupinami ni razlikoval. Glede na to ne moremo potrditi hipotezi H3 in H4, v
katerih smo trdili, da bo napredek neplavalcev z izraženim strahom pred vodo in brez njega v
zmožnosti gledanja pod gladino večji, ob uporabi plavalnih očal in dihalke med učenjem plavanja.

Zmožnost nadzora dihanja

Zmožnost nadzora dihanja med plavanjem ali gibanjem v vodi je ena od najpomembnejših vodnih
kompetenc, ki jo morajo plavalni začetniki osvojiti (American Red Cross, 1961, 2014; Junge et
al., 2010; Langendorfer & Bruya, 1995; Stallman, Junge, & Blixt, 2008). V naši raziskavi smo
ucinke učenja plavanja na zmožnost nadzora dihanja ugotavljali s pomočjo:

- testa zadrževanja diha,
- testa pihanja mehurčkov in
- ocenjevanja dihanja med testom plavanja v prsnem položaju.

Zmožnost nadzora dihanja združuje potopitev glave in zadrževanje diha (Langendorfer & Bruya,
1995). Vse štiri skupine so v zmožnosti zadrževanja diha napredovale (preglednica 1). Učni
napredek med njimi se ni razlikoval (preglednica 2). Dihanje med plavanjem in gibanjem v vodi
nasprotno je ovisno od zemeljskih pritiskov, ki otežuje širitev prsnega koša pri vdihu in se pri večini
plavalnih tehnik zoperstavlja izdihu (Lomax & McConnell, 2003). Zato je učenje pihanja
mehurčkov ena od temeljnih veščin, ki jo morajo plavalni začetniki osvojiti. Vse štiri skupine so z
učenjem plavanja v tej zmožnosti napredovale (preglednica 1). Nepričakovano je bil učni napredek
v skupinah F-NGS in NF-NGS (nista uporabljali plavalnih očal in dihalke) večji kot napredek v
skupinah F-GS in NF-GS (sta uporabljali plavalna očala in dihalke) (preglednica 2). Dihalka
omogoči prosto, neovirano dihanje. Skupini F-NGS in NF-NGS, ki je nista uporabljali, sta imeli
tako več priložnosti, da osvojita zmožnost pihanja mehurčkov kot skupini F-GS in NF-GS. Dihanje
med plavanjem je (mora biti) usklajeno in zato omejeno s plavalo tehniko (Holmér et al., 1974).
Rezultati v preglednici 1 kažejo, da so vse skupine z učenjem plavanja napredovale v zmožnosti dihanja med plavanjem v prsnem položaju. Učni napredek med njimi se ni razlikoval (preglednica 2).

Z dobljenimi rezultati ne moremo potrditi hipotezi H5 in H6, v katerih smo trdili, da bo napredek neplavalcev z izraženim strahom pred vodo in brez njega v zmožnosti nadzora dihanja, večji ob uporabi plavalnih očal in dihalke med učenjem plavanja. Nekateri rezultati so celo nasprotni od naših domnev. Glede na njih lahko zaključimo, da uporaba plavalnih očal in predvsem dihalke, ni najprimernejša in ne najbolj smiselna za učenje pihanja mehurčkov.

**Zmožnost drsenja**

Drsenje je premikanje iztegnjenega, pasivnega telesa po vodni gladini ali pod njo (Kapus et al., 2002). V naši raziskavi smo učinke učenja plavanja na zmožnost drsenja ugotavljali s pomočjo testa drsenja v prsnem položaju in testa drsenja v hrbtnem položaju.


Rezultati v preglednici 2 potrjujejo hipotezo H7, v kateri smo trdili, da bo napredek neplavalcev z izraženim strahom pred vodo v zmožnosti drsenja večji ob uporabi plavalnih očal in dihalke med učenjem plavanja. Nasprotno tega ne moremo trditi za neplavalce brez izraženega strahu pred vodo. Rezultati namreč ne potrjujejo hipoteze H8, v kateri smo trdili, da bo napredek neplavalcev
brez izraženega strahu pred vodo v zmožnosti drsenja večji ob uporabi plavalnih očal in dihalke med učenjem plavanja.

**Zmožnost spreminjanja položaja telesa**

Prečno in vzdolžno obračanje je povezano z orientacijo v vodi in zato nujna veščina (znanje) pri zaščiti pred utopitvijo (Stallman et al., 2017). Rezultati v preglednici 1 kažejo, da vse skupine z učenjem plavanja napredovale v zmožnosti vzdolžnega in prečnega obračanja. Učni napredek med njimi se ni razlikoval (preglednica 2). Torej ne moremo potrditi hipotez H9 in H10, v katerih smo trdili, da bo napredek neplavalcev z izraženim strahom pred vodo in brez njega v zmožnosti spreminjanja položaja telesa večji, ob uporabi plavalnih očal in dihalke med učenjem plavanja.

**Zmožnost plavanja**

Zmožnost plavanja v prsnem in hrbtnem položaju v različnih okoliščinah je osnovna zaščita pred utopitvami (Stallman et al., 2017). Rezultati v preglednici 2 kažejo, da je bil napredek neplavalcev, z izraženim strahom pred vodo in brez njega v zmožnosti plavanja v prsnem položaju, večji ob uporabi plavalnih očal in dihalke med učenjem plavanja. Plavanje v prsnem položaju je skupaj z potopljenim glavo (ob uporabi maske in dihalke) plavalnemu začetniku lažje, kot plavanje prsnega (torej z zaveslaji skladnim gibanjem glave in dihanja) ali plavanje žabe (Kapus et al. (2018). Uporaba maske in dihalke mu namreč:

- izboljša plovnost in poveča njegovo samozavest, da dvigne noge od tal.
- omogoča vodoravni položaj telesa na gladini in poenostavi koordinacijo gibov rok, nog in dihanja (Parker et al., 1999),
- olajša učenje v globoki vodi in ga sprosti.

Glede na dobljene rezultate menimo, da je imela skupina F-GS v primerjavi s skupino F-NGS več priložnosti, da je izkoristila omenjeni prednosti. Možno sicer je, da je uporaba plavalnih očal in dihalke podobno učinkovala tudi pri neplavalcih brez izraženega strahu pred vodo. Vendar je bolj verjetno, da je razlika v napredku v zmožnosti plavanja v prsnem položaju med skupinama NF-GS in NF-NGS posledica premalo občutljivega testa. Skupini sta se namreč že pred poukom plavanja pri tem testu razlikovali, pri čemer je večina preiskovancev v skupini NF-NGS že takrat dosegla oceni 4 in 5 (preglednica 1). Ker sta to bili najvišji oceni pri tem testu, vsega napredka pri tej
skupini žal nismo uspeli popolnoma izmeriti. To je bil eden od le dveh (še različen učinek na zmožnost pihanja mehurčkov, ki pa ima smiselno razlago) statistično različnih učinkov med skupinama NF-GS in NF-NGS (preglednica 2). Zato je malo verjetno, da ne bi slednja, tudi v sposobnosti plavanja v prsnem položaju, z učenjem napreduvala podobno veliko kot pri ostalih zmožnostih in podobno kot skupina NF-GS.

Rezultati v preglednici 1 kažejo, da so vse skupine z učenjem plavanja napredovale v zmožnosti plavanja v hrbtnem položaju. Učni napredek med njimi se ni razlikoval (preglednica 2).


11.7 Zaključki

Rezultati raziskave so razgrnili pozitivne in negativne učinke uporabe plavalnih očal in dihalke pri začetnem učenju plavanja. Pozitivni učinki so se pokazali predvsem pri neplavalcih z izraženim strahom pred vodo. Pri tej skupini je uporaba plavalnih očal in dihalke pomembno pripomogla k večjemu učnemu napredku v zmožnostih vstopa v vodo, drsenja v hrbtnem položaju in plavanja v prsnem položaju. Pri neplavalcih brez izraženega strahu pred vodo, uporaba teh dveh pripomočkov ni imela pomembnih učnih učinkov. Negativni učinki uporabe plavalnih očal in dihalke pri začetnem učenju plavanja, so se pokazali pri osvajanju zmožnosti izdihavanja v vodo. Učni napredek je bil namreč pri testu pihanja mehurčkov, ob uporabi teh dveh pripomočkov, statistično pomembno manjši.

Uporaba plavalnih očal in dihalke je smiselna za zmanjševanje strahu pred vodo in ustvarjanja lažjih okoliščin za učenje iztegnjenega položaja telesa na gladini (med lebdenjem in med plavanjem). To dviguje neplavalčeve samozavest, ga motivira in mu olajša učenje. Opozarjamo pa na to, da mora biti uporaba primerna in preudarna. Obstaja namreč nevarnost, da se neplavalec
preveč navadi na ta dva pripomočka, s čimer se mu zavre osvajanje vodnih kompetenc brez njiju. Končni cilj začetnega učenja plavanja, je vendarle varno plavanje brez pripomočkov.