Applying the Theory of Diffusion of Innovation to Evaluate Students' Acceptance of Swimming Courses Online

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Abstract: This study is designed to determine students' acceptance of swimming courses online using the Theory of Diffusion of Innovation (DOI). Specifically, this study is focusing on the perceptions and motivational factors among participants towards swimming courses online. Additionally, this study would also attempt to identify participants' interest in adopting an alternative method to learning swimming based on the five categories of adopters (i.e., innovators, early adopters, early majority, late majority, and laggards). This intervention study involves both quantitative and qualitative approaches with one experimental group (i.e., 25 participants, mix-genders with an age range between 19-25 years old) comprise of undergraduate-level physical and health education (PHE) students at a local university in central peninsular Malaysia. The researcher has used questionnaires and open-ended questions as the instruments to evaluate the study intervention. Furthermore, the Statistical Package for Social Sciences (SPSS) (version 28.0) was utilised to analyse the variables in this study. The open-ended questions were also included in the post-intervention questionnaire and analysed using the Interpretive Phenomenological Analysis approach and NVivo software (version 14.0) to gather qualitative data from this study. The majority of participants were initially receptive to the ideas but the interest seems to be declining due to various limitations such as poor feedback, lack of authentic learning, and limited resources to support learning. Results from this study will give us a better understanding of individuals' perceptions and needs in developing online swimming courses to enhance meaningful learning, higher engagement and learning ownership of the contents among students.

Keywords: Diffusion, Innovation, Online, Swimming, Teaching and learning

1. Introduction

The ongoing COVID-19 in many countries around the world have changed how we navigate the teaching and learning process. Malaysia's teaching and learning process was no exception and forced to adapt to the new norms which involve shifting many contents and learning processes online. Although theoretical subjects were easier to adapt to, subjects involving movement and practice such as swimming struggled to shift into online learning. The fundamental skills in swimming such as floating and strokes were difficult to learn and practice mainly due to a lack of access to the swimming pool and minimal contact with the instructor.

Nonetheless, the introduction of various technologies such as wearable devices, smartphones, laptops, and tablet computers helped mitigate the consequences of COVID-19 on the teaching and learning process. Presently, there are vigorous and consistent efforts by researchers to focus on using various mobile applications in teaching and learning to help students towards behaviour modification, improvement in PA levels, and a healthy lifestyle beyond schools (Dunn & Robertson-Wilson, 2018). And as children are nurtured along with technology, the younger generations are more readily to start

schools with the basic knowledge and skills to utilise the technology around them successfully (Palicka, Jakubec, & Zvonicek, 2016). Specifically, the number of ownerships for both Internet and mobile devices has risen from 87% to 90% and mobile devices by 98.2% in 2017 and 2018 respectively (Department of Statistics Malaysia (DOSM), 2019). Additionally, as much as 97.9% of Malaysian possess a minimum of one mobile device and 97.1% participated in social networks (DOSM, 2019).

The rationale for this study came out of students' enrolment in the compulsory swimming course in the Oct – Feb semester of 2021. The COVID-19 pandemic at that time forced the university to shift from learning face-to-face to fully online learning due to no students nor staff being allowed to return to campus. The students must enrol in the following course to progress in their studies and avoid bigger consequences (e.g., repeat the course, defer graduation). Based on the author's observations; students undertaking the swimming course online in the past semester were hampered by the lack of a swimming pool available to them (i.e., the far distance between home and swimming pool, control movement order set by the authority) and need to resort to solely dryland swimming. The absence of an "environment" most time has led the students to lose focus and interest due to difficulty to identify their correct or incorrect techniques. Depending mostly on Google Meet [Google Inc.] platform, the students were having issues focusing on learning cues demonstrated by their instructor. Issues such as angles, lighting, device limitations (e.g., screen size, specifications, internet connectivity) as well as the instructor's movement all contributed to difficulty to identify correct or false techniques or worse learning the technique wrongly. Vice versa, the instructor also seems to find it difficult to provide feedback to her students or less accurate feedback due to the same limitations mentioned above.

Some students which did not switch on their device cameras throughout the lesson also could be engaged in off-task behaviour and did not focus on the learning session. Assessment-wise, most of the students were creative in modifying the equipment (e.g., pillow, huge bean bag) and swimming area (e.g., on a table, wide grass area, bed, benches) to demonstrate strokes such as freestyle, breaststroke, and backstroke technique. The most concerning matters related to learning to swim online must be about the knowledge and skills transferred from learning online to the actual swimming pool. When asked, the instructor herself was not sure if her students will be able to swim with the correct technique and safe practice in the swimming pool although many of her students were getting good grades at the end of the respective semester. Although, students might be doing well in dryland swimming the actual swimming was different, challenging, and daunting for some students.

Currently, there were scarce resources available on swimming courses online. Based on the author's observations on main databases (i.e., ScienceDirect, ProQuest, Scopus, Web of Science) with keywords "learning", and "swimming online" from the year of 2012 to 2022 found that almost non-existent articles conducted studies on this area. Somewhat related articles tend to discuss (1) online coach education programs, (2) self-regulated learning which involves psychological subprocesses and beliefs, and (3) influences of swimming experience. Therefore, the main aims of this study were to investigate whether learning swimming can be facilitated in an online environment and which categories of innovation adopters (i.e., innovators, early adopters, early majority, late majority, laggards) based on the Diffusion of Innovation (DOI) theory the students consider themselves post-intervention. In short, innovation adopters are distinguished by individual characteristics which influence the adoption of a new idea, behaviour, or product (Rogers, 2003). A detailed description of DOI and these categories of innovation adopters are provided in the literature review. The author expects to see many of the participants consider themselves as the early majority of innovation adopters and are more receptive to the idea especially since the instructor possesses more experience from past online teachings. Additionally, the author also expects most of the participants will still be motivated to learn about the fundamentals of swimming online. Three research questions were studied as follows:

a. What are the participants' perceptions towards swimming online course?
b. Does the intervention (i.e., dryland swimming) influence participants' interest in adopting an alternative method of learning swimming (i.e., online)?
c. Does participants' motivational factor correlate with the categories of adopters and preference to learn swimming online?

2. Literature review

2.1 The Diffusion of Innovation Theory

The DOI theory adopted in this study explained the phenomena and process of how individuals perceive an idea, behaviour, or product as new or innovative. Consequently, these perceptions will encourage or discourage individuals into the adoption phase. Specifically, adoption occurred when individuals practice new behaviour more than previously permanently (Aizstrauta et al., 2015). Nonetheless, as individuals were different from one another, the DOI introduces several categories of adopters mainly the (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards to help us understand the characteristics of the target population and inform us of future planning and modification needed to facilitate behaviour modification or adoption of new practice (Rogers et al., 2019).

The innovators' category usually refers to the pioneers of innovation; for instance, Steve Jobs was one of the co-founders of Apple Inc. which created the first iPhone in the year 2007 which transform the mobile phone into a smartphone which eliminate most physical buttons and allows for touchscreen and wider Internet connectivity. The iPhone transform how people communicate, increase productivity and created a new lifestyle for people (Montgomery & Mingis, 2021). Individuals in this category were commonly associated with a higher willingness to delve into new ideas and take risks (Rogers et al., 2019). Next, the early adopters category involves individuals who represent opinion leaders and are comfortable with adopting new ideas. Nowadays, Malaysian influencers such as "Neelofa" who has around 8 million followers on famous social media constantly assume leadership roles and embrace changes in fashion, lifestyle, beauty, and travel. Big international brand such as Gucci has also collaborated with her to promote their brand and line of products (AJ Marketing, 2022).

The third category known as the early majority refers to individuals who were willing to embrace changes but needed to see evidence that the innovation process and products works beforehand. The strategies to appeal to these individuals include success stories and tangible evidence of the innovation's usefulness (Rogers et al., 2019). The following category called the "late majority" involves a group of individuals which reluctant and more sceptical to changes around them. Similarly, to the early majority group, individuals in this category required extensive information on how many people have tried the innovation and if it was adopted successfully or otherwise (Rogers et al., 2019).

Finally, individuals who are bound by tradition and very conservative in their thoughts and views were considered to be in the laggards category. People in this category tend to be resistant to changes around them and required substantial effort from stakeholders to persuade them in trying and adopting new concepts, products and technology available. Strategies such as statistics, fear appeals and pressure from other adopter groups were thoughts to be effective to support behaviour changes among people in the laggards category (Rogers et al., 2019). Meanwhile, the process of adoption of innovation involves factors such as advantages of the innovation (e.g., time-saving, social prestige), compatibility of the innovation with the individual's values, experiences, and current needs as well as the degree of complexity which highlights negative relationship; the higher the complexity, the lower probability of adoption of the innovation and vice versa. Besides that, the trialability of the innovation (e.g., trial version, free download) could also become a determining factor for potential adopters. Perhaps, most importantly, the degree of observability in terms of tangible results from the proposed innovation could increase awareness, the decision to adopt or reject, initial use, and internalisation of the innovation in their lifestyle. In simpler words, the process of DOI started with knowledge and awareness to form an attitude toward innovation (Aizstrauta et al., 2015).

2.2 Learning Swimming Online

Although there were scarce resources on learning to swim online, there were several authors which discussed the challenges and benefits of learning online. For instance, Prawanti and Sumarni (2020) work with younger adults in Indonesia found that many participants tend to resist online learning due to challenges such as a lack of knowledge about information and communication technology (ICT), difficulty understanding content, less supportive learning facilities and infrastructure as well as participants' unwillingness to shift from dependent to independent learning. These challenges would

then increase the likelihood of "learning loss" to occurred among students which delayed progression and hindered future learning performance. "Learning loss" is a term used when students might lose their knowledge and skills caused to a certain condition which reduces students' competency levels (Cerelia et al., 2021).

Many educators were also affected by the transition from physical to fully online learning, especially among those who are not techno-savvy. Additionally, shared usage of computers and IT equipment at home also provides another challenge in working from home. Besides that, the lack of infrastructure or resources to facilitate online teaching and learning also serve as a limitation to the shift from physical to online learning (Sahu, 2020). For instance, the author's university itself possesses average Internet connectivity and limited coverage to a specific location such as the library, faculties, and students lounge. Some locations such as students' dormitories and cafeterias would receive minimal and unstable Internet connectivity. Therefore, challenges faced by both students and educators should also be considered when discussing factors which influence DOI among participants. Importantly, assessment and evaluation aspects such as procedures of administrating assignments, projects, and examinations need to be modified to fit online mode and retain academic integrity. Assignments which involve lab tests, practicals, or sports skills would also tend to be negatively affected when the teaching and learning process is conducted online (Raaheim et al., 2019). Consequently, one study found that the higher the online courses made available the higher likelihood of student withdrawal and failure rates in online courses (Capra, 2011).

Teaching and learning online are defined as an approach to learning which uses the Internet and other technologies to initiate communication and promote collaboration in an educational context (Appana, 2008). A study on post-graduate students' perceptions of online learning found that it was convenient where students could learn and engage in discussions whenever and wherever they wish as long as they have their devices and Internet connectivity. The authors continue to suggest that online learning improve engagement, exchanging information and sharing of ideas during learning session through forums and the use of various application available (Tareen & Haand, 2020). Therefore, learning online also transforms the learning process to be less judgemental and more inclusive. Those extroverted or introverted students would have similar opportunities to contribute during learning sessions (Wai & Seng, 2015). Moreover, as students possess different strengths, weaknesses, and interests; online learning offers more freedom for students to dictate their learning and preferences when learning the subject (Wai & Seng, 2015). Rather than solely dependent on online learning, many authors have suggested blended learning instead. The combination of online and face-to-face approaches was touted as the best approach to help students understand, appreciate the knowledge, and improve sports skills (Wahono, 2022).

3. Method

To study the relationship between motivation and categories of adopters and whether students with different swimming skills benefit from the intervention, the author designed this experimental study consisting of quantitative and qualitative approaches with a group of undergraduate pre-service teachers who enrol in the online swimming class between Oct – Feb of 2022 semester. In this study, participants needed to learn theoretical knowledge, and practical skills, completed a presentation, record a tutorial video teaching basic strokes (e.g., freestyle, breaststroke, backstroke), and combine it with prior knowledge as the basis to learn and improve their swimming skills.

The participants involved in this study comprise undergraduate physical and health education pre-service teachers at the central university located in Selangor, Malaysia. The participants consisted of 20 undergraduate students with ages ranging between 22-26 years old. Additionally, the convenience sampling technique was chosen as this study was conducted among the researcher's students which enrol in the online swimming course throughout the semester. As this study was done with a single class during the semester, the sampling technique was appropriate as it is time-saving and geared towards improving the participants' swimming skills and overall delivery of this subject in the following semester (Sharma, 2017). Several inclusion criteria for this study include participants' (1) enrolment in the online swimming course throughout the semester of Oct 21 – Feb 22, (2) completing both pre-and-post questionnaires, (3) participation fully in the intervention throughout the study (i.e., 14 weeks), and (4) free from any injuries and serious health issues at the beginning of the study.

The quantitative data were collected using the Modified Behavioural Belief questionnaire (Zolait & Sulaiman, 2008). The questionnaire was modified to suit the Malaysian tertiary education context and focus on features related to online swimming courses. Specifically, the questionnaire consisted of two sections mainly (1) demographic information, and (2) behavioural belief construct based on Rogers' DOI theory. The second section consisted of 25 questions with subscale components (i.e., attitude, relative advantage, complexity, compatibility, trialability, observability) utilising a 5-point Likert-like scale ranging between 1 – 5 (i.e., 1= strongly disagree, 5= strongly agree). The instrument's main purpose was to prompt participants to reflect on their perception, interests, and motivation levels when learning how to swim online throughout the semester. Previous studies have supported the instrument's validity and reliability in various contexts (Ajzen & Fishbein, 1980; Karahanna et al., 1999; Zolait & Sulaiman, 2008). Additionally, the questionnaire was useful and efficient as it allows a large amount of data collection in a short period to explore the variables change with the intervention (Mills, 2014).

The qualitative data analysis has adopted the phenomenological research approach which places a higher emphasis on the wholeness of experiences and how they may influence an individual's behaviours (Moustakas, 1994). Specifically, Creswell (2012) defined the approach as a study to describe individuals' lived experiences of a concept or phenomenon. Using this approach, the researcher would focus more on participants' perceptions and feelings on learning to swim online rather than describing phenomena based on categorical system, conceptual and scientific criteria (Pietkiewicz & Smith, 2014). Specifically, the questions were formulated and focused on exploring sensory perceptions and mental phenomena (e.g., thoughts, memories, associations) (Pietkiewicz & Smith, 2014).

As this study was conducted during the COVID-19 pandemic, meeting the participants was impossible as all of them were studying from home. The researcher has decided to include five open-ended questions in the post-intervention questionnaire administered online using the Google Form [Google Inc.]. The questions such as "What does it mean to learn swimming online?" and "What aspect do you least enjoy when learning swimming online?" were meant to be generic and prompt participants to reflect on their experience throughout the intervention period.

The participants of this study were 20 undergraduate pre-service teachers in their third year of studies at a local university in Central Malaysia. Information such as purpose, objectives, benefits, and risk (if any) were brief, and questions were satisfied before potential participants completed their consent form. Any students who did not wish to participate were not penalised and were allowed to continue learning the course as usual. This study was treated as a single-blind study where the participants were not made aware of the intervention throughout the study. They received a pretest at the beginning of the semester and a posttest questionnaire at the end of the study.

Throughout the intervention, the participants were expected to participate in an online swimming class for two hours every Thursday afternoon for 14 weeks. Google Meet [Google Inc.] platform was used as the main platform for the teaching session. The instructor's teaching materials involve demonstration of strokes, modified movement to simulate strokes, videos as learning aids as well as homework to support participants' learning beyond class sessions. The instructor has used a YouTube channel (i.e., Skills N' Talent) as additional learning materials during class sessions as well as revision.

Each of the strokes was taught and practised for three weeks consecutively before moving to another stroke. Besides that, the participants were divided into groups and given time to prepare for a presentation on basic swimming safety and survival skills. The project or video tutorial served as the culminating assignment in which the participants needs to record themselves teaching and demonstrate each basic stroke within eight minutes. The video serves as a replacement for the pre-pandemic practical skills assessment for this course. At the end of this study, the participants were given the link to Google Form [Google Inc.] to complete the post-test questionnaire related to their perceptions, interest, and motivation when learning to swim online.

3.1 Data Analysis

The Statistical Package for the Social Sciences (version 28.0) was used to analyse data. Descriptive statistics, that is means, standard deviation (SD), and percentages were calculated for variables assessed in this study (perception, interest, motivation to learn swimming online). The

inferential statistics were also conducted to explore the potential relationship between independent and dependent variables as well as the likelihood of this study being generalised to various populations (Mills, 2014). Additionally, a normality test (i.e., Shapiro's Wilk) was also conducted to ensure participants' data were analysed from a normally distributed population. The paired sample t-test was used to measure the changes in participants' learning of the course pre-and-post interventions. Apart from changes, the test would also serve as an indicator of the online swimming class's effectiveness (Gratton & Jones, 2010). Besides that, a correlation test was conducted to explore the relationship between participants' motivation and the DOI categories of adopters in learning swimming online.

The qualitative data were extracted using the Interpretive Phenomenological Analysis (IPA) in the following steps such as (1) observing phenomena, (2) questioning, (3) collecting data, (4) linking concepts with data, and (5) communicating (Sudria et al., 2018). Meanwhile, qualitative data analysis software NVIVO was utilised to transcribe, code, and tag data to ease understanding and produce superordinate themes related to this study. Findings from data were then used by the researcher to attempt inductive reasoning and provide conclusions that may be helpful for educators and generalisation of ideas on this topic (Sudria et al., 2018).

4. Results and Discussion

4.1 Findings from Quantitative Data

The participants' main demographic characteristics were shown in Table 1. There were 20 participants comprised of males (n=8) and females (n=12) participated in this study. Age-wise, most of the participants reported being between the 18-21 age brackets (n=15) with the minority of participants belonging to older age groups. In terms of ethnicities, there were few participants reported to be from the West of Malaysia (n=4) while the rest comes from the Malay ethnicity. Importantly, most of the participants also reported having "less than a year" worth of experience (n=13) while several participants have experience in a swimming minimum of three years or more (n=5).

Table 1. The demographic background of the participants

Factors	Frequency	Percentage (%)
Gender		
Male	8	40.0
Female	12	60.0
Age		
18-21	15	75.0
22-25	4	20.0
26-29	1	5.0
Ethnicities		
Malay	16	80.0
Sabahan/Sarawakian	4	20.0
Years of experience		
Less than a year	13	65.0
1-2 years	2	10.0
3 years onwards	5	25.0

Table 2. The normality tests for average scores across pre-and-post intervention

	Kolmogorov-Smirnov (Sig. values)	Shapiro-Wilk (Sig.values)
Pre-intervention	.198	.383
Post-intervention	.200	.946

Based on the table above, both the Kolmogorov-Smirnov and Shapiro-Wilk tests of normality demonstrated no significant values ($p>0.05$) across the pre-and-post intervention. Therefore, this study

failed to reject the null hypothesis for pre-and-post intervention. Specifically, there was no significant relationship between participants' learning to swim online and swimming skills. Hence, based on the results and the Q-Q plot, this study assumes pre-and-post data were normally distributed.

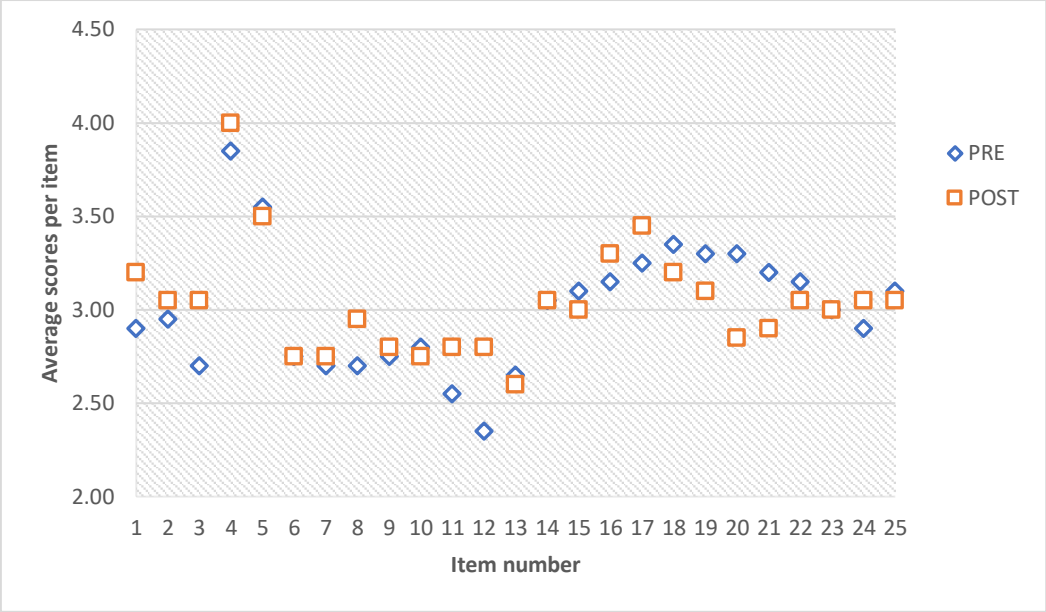

Fig. 1 Mean perception scores on an online swimming course across pre-and-post intervention

Based on Figure 1, there were 12 items which saw an improvement while 13 items recorded decrement in average scores across the intervention. Items related to attitude (i.e., 1-4) all recorded an improvement, while items associated with complexity (i.e., 10-13) were relatively consistent. Unfortunately, items related to observability or intent to practice (i.e., 20-25) all demonstrated reduction except for item 24 which showed slight improvement throughout the intervention. Additionally, items related to relative advantage (i.e., 5-9) demonstrated a slight improvement in all items except for item 5 while compatibility issues (i.e., items 14-16) saw mixed results with item 15 decreasing while item 16 improve throughout the pre-and-post intervention.

For research question one, the participants' perceptions scores towards learning to swim online on a pretest and a posttest show mixed results on different components after experiencing the intervention. Specifically, this study found that participants improve their perceptions of attitudes toward online swimming courses and awareness of the relative advantage of the intervention. Nonetheless, components of observability and intent to practice demonstrated a reduction in perception scores throughout the pre-and-post intervention. These findings are consistent with Zolait and Sulaiman's results (2008) which suggest that participants' experience with swimming is a strong influential factor in shaping their thoughts towards the online swimming course. The participants with prior experience in swimming tend to perceive the intervention more positively compared to participants with less experience.

Table 3. Changes in average scores for perception across pre-and-post intervention

	Mean	**Std. Deviation**	**t**	**df**	**Sig (2-tailed)**
Pre-intervention	75.0	21.9	-.149	19	.883
Post-intervention	76.0	16.9			

A paired samples t-test was conducted to compare changes in participants' learning swimming online course pre-and-post interventions. There was a non-significant difference in the scores for perception in learning swimming online across intervention (M=75.0, SD=21.9) and (M=76.0, SD=16.9) conditions; t(19)=-.149, p=0.883. These results suggest that learning to swim online could negatively affect participants' learning of swimming skills. Specifically, these results suggest that when participants learn to swim online, their swimming skills might lead to improvement or reduction in swimming performance. Apart from prior experience, the level of engagement between the educator and participants as well as the availability of a swimming pool was touted as an important factor to influence participants' interest in learning to swim.

Table 4. The Pearson correlation scores for variables assessed between attitude and motivation across pre-and-post intervention

Correlations		
Attitude	Pearson Correlation	.817
	Sig. (2-tailed)	<.001
	N	20
Motivation	Pearson Correlation	.817
	Sig. (2-tailed)	<.001
	N	20

A Pearson product-moment correlation coefficient was computed to assess the relationship between the participants' attitudes and motivation to learn swimming online. There was a positive correlation between the two variables r=0.817, n=20, p=0.001. Overall, there was a strong, positive correlation between an individual's attitude and motivation to learn swimming online. Specifically, positive attitudes were correlated with increases in interest in learning to swim online.

4.2 Qualitative Data Findings

The main aim of this analysis was to gauge participants' perception, interest, and motivation on learning to swim online throughout the intervention. As this study was conducted fully online due to the previous movement control order (MCO), the qualitative data were also collected using open-ended questions included in the post-intervention questionnaire. The open-ended questions which involved 20 participants yielded four central themes (i.e., dryland swimming, techniques, novelty, and difficulty levels when learning to swim online).

4.2.1 Learning to Swim Online is Associated with Dryland Swimming

Based on Figure 2, there were five participants (25%) who stated the word "dryland" when answering questions related to online swimming classes. Specifically, the participants suggest that online classes required them to learn swimming skills on dryland rather than in the swimming pool. Despite the lack of learning authenticity, the participants acknowledged dryland swimming offers higher options for them to learn swimming skills. One participant suggested that "I can do many exercises when learning dryland swimming." (Amanda) Apart from that, learning to swim online provides more accessibilities for participants to learn and practice their swimming skills albeit in dryland. Another participant shared "I gain knowledge of the right techniques and practice the techniques on dryland." (Puteri) Therefore, their enrolment in this online subject allows them to keep on learning and practising the swimming skills safely using equipment and playing area available to them throughout the pandemic.

Nonetheless, some participants also voice their concern about the lack of learning authenticity when the learning was modified to dryland swimming. With regards to novice learners and dryland swimming; "it is quite difficult for me who does not know the basics of swimming and I thought the others would be the same." (Zahida). Additionally, "dryland swimming is no fun. Swimming in the pool is much more fun." (Athira). Learning authenticity is important to provide participants with knowledge, skills and support linkages between content learning with real-world situations. Without it,

participants would be expected to struggle to decide on what skills, why, how, when, and where to apply the content learned during swimming. Unfortunately, the above sentiment was also reflected by the insignificant changes in average scores for perception between pre-and-post intervention. Studies on groups of pre-service teachers in Spain which forced to complete their practicum online due to the previous pandemic also found that participants missed the physical contact of PE and feels like the subject is losing its identity by switching learning mode (Varea & Gonzalez-Calvo, 2020).

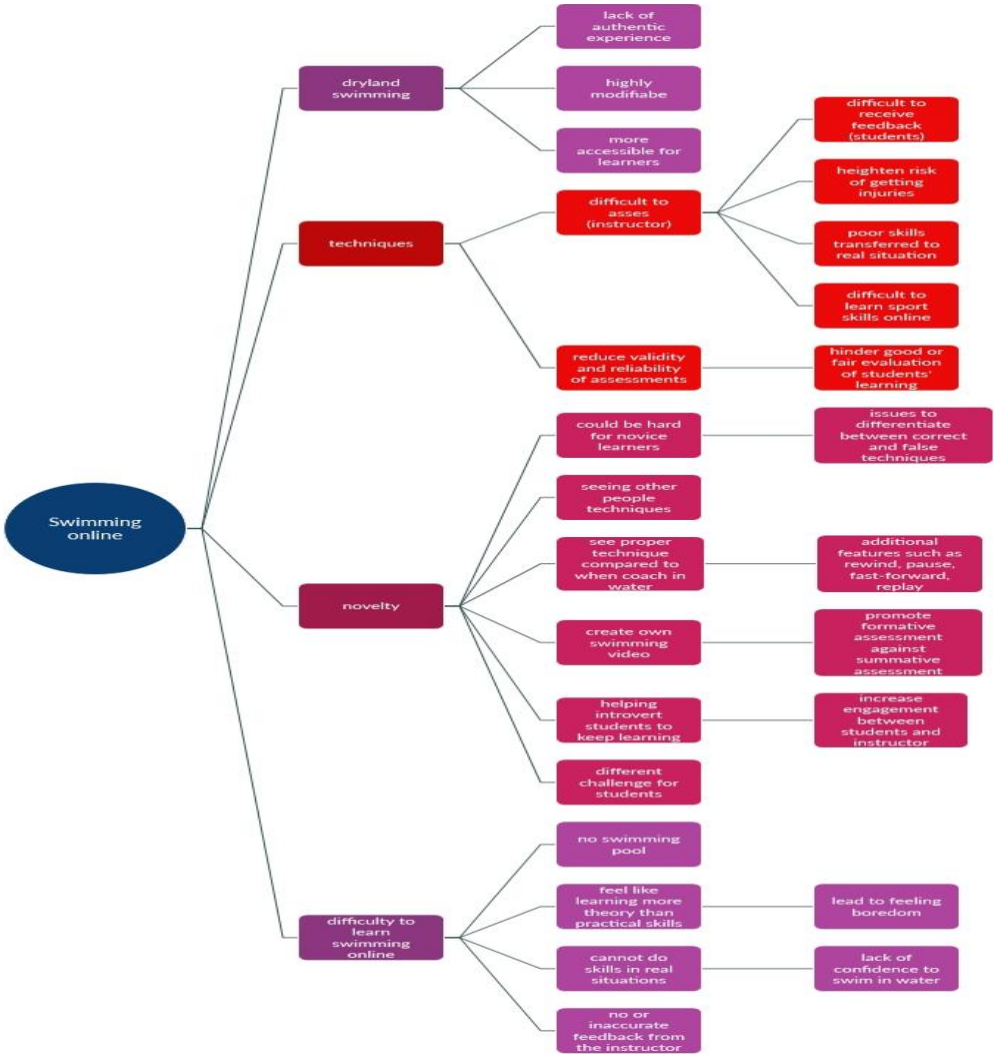

Fig. 2 A mind map was created based on participants' feedback on learning the swimming course online

4.2.2 Learning Swimming Techniques Through the Digital Screen is Challenging

There were seven participants (35%) discussed how learning swimming techniques was affected by online classes. The participants comprised of undergraduate pre-service teachers were looking at this issue from both educators' and learners' perspectives. From the educator's perspective, the participants speculate educators would experience issues related to assessment (i.e., identifying students' correct and false techniques, shifting from physical to online swimming class, type of assessments) as well as to maintain the credibility of assessments due to major changes in delivering the learning content. Besides that, the learners complained about difficulty to receive feedback from instructors, a potentially higher chance of getting injuries due to false techniques and predicted poor

skills transferred to the actual swimming pool. One participant commented, "I need to see the process when learning to swim online." (Syafiqa) while another participant "I am not confident to swim in the pool." (Amanda) These statements were consistent with the questionnaire results where while attitudes towards online learning improve but the intent to practice after the intervention were declining. Previous studies related to exergaming which shares some similarities with our issue also found that participants were excited initially before many of them were struggling to maintain the excitement and PA routine through exergame. The participants seem to improve their leisure physical activity (LPA) but tend to lose interest in the exergame because of the lack of value added to their existing sports skills (Staiano et al., 2017).

4.2.3 The Sense of Novelty

There were 13 references made associated with the sense of novelty when learning to swim online. The participants suggest that being able to compare their techniques with others using digital video features such as (1) fast-forward, (2) rewind, (3) replay, and (4) pause was interesting and helpful. One participant suggests that "it is something new to me learning swimming online." (Luqman). Related to DOI, both knowledge and awareness was important determiners in participants' intention to learn to swim online (Aizstrauta et al., 2015). Apart from that, the online class was also helpful as it allows the participants to see proper techniques on strokes compared to when the educator demonstrated the skills in the water. Specifically, important learning cues could be reviewed repeatedly, focusing on specific parts of the stroke and higher personalisation of learning between participants. The previous study with post-graduate students' perceptions of online learning also echoed the benefits of learning online and how it was perceived as attractive to many students (Tareen & Haand, 2020).

The alternative assessment (i.e., individual swimming video) is also helpful to promote formative assessment rather than the traditional summative assessment. The ongoing assessment would be helpful to promote higher engagement between educators and students as there are more materials to discuss and receive feedback from the educator. For instance, one participant appreciated the online classes as they helped her to keep learning despite being an introverted individual "I'm an introvert and for me, online course is suitable for my styles." (Puteri) Besides that, formative assessments in this online class were also beneficial as they stimulate participants to learn and practice more to create the best version of the swimming video before submission. This repetitive learning helps them internalise the learning, develop correct techniques as well as encourage the participants to explore an avenue of technology around them to complete tasks.

Nonetheless, changes can also be hard for some participants especially the novice learners "because this way of learning swimming is still new." (Aiman) and "it's kind of hard for newbies." (Jo) Novice learners tend to be context-dependent when learning and spend more time remembering information and process. They are also more likely to demonstrate conform behaviour to the rules compared to advanced beginner or competent learners (Persky & Robinson, 2017). Therefore, novice learners would find it difficult to learn swimming online as it lacks direct learning, communication, and a relationship between educators and learners. Previous studies with younger adults in Indonesia also find their participants resisting online learning due to similar reasons (Prawanti & Sumarni, 2020).

4.2.4 Higher Level of Difficulty When Learning to Swim Online

Most of the participants have written their concerns when trying to learn swimming skills online. The participants were lamenting about the absence of a swimming pool and thus cannot perform the skills in real situations. Several participants shared "not good because it cannot be done properly." (Kimi) and "I couldn't feel the real swimming environment." (Rasyid). The absence in the swimming pool means absence in the actual learning setting and the opportunity for participants to practice and experiment with different techniques to perform freestyle, breaststroke, and backstrokes was limited to dryland swimming. These resulted in lower interest in learning and poor transfer from learning to practice. The numerical data related to motivation and attitude also conform to the above statement where lower motivation equates to lower attitude toward swimming and vice versa.

Additionally, some participants associated the online classes with a higher feeling of boredom due to the perception of learning more theories and less practical during learning sessions. For instance,

a participant shared "Online class is more talk than practical." (Nas) Moreover, the participants also mentioned not getting or receiving inaccurate feedback from the instructors occasionally throughout the intervention. One participant highlighted "If we perform false skills how and who going to correct us because the lecturer cannot monitor one by one during an online class." (Luqman) Inaccurate feedback will affect participants' perceptions towards swimming, false techniques which reduce movement efficiency and heighten the risk of getting injuries (e.g., muscle tears, joints inflammation) as well as fear of failure. These findings can be associated with the term "learning loss" in which participants' started to lose interest in swimming due to a lack of knowledge and skills gained through online classes (Cerelia et al., 2021). From the results, this study found that learning to swim online may not improve students' swimming skills. Further looking at the patterns of the results suggests that students with different levels of experience would perceive the intervention differently.

5. Implications for Practice and Conclusions

From the analyses, the majority of the participants demonstrate some distinct behaviours and preferences. Accordingly, we propose some suggestions for educators in planning online swimming classes for novice students (see Table 5). The addition of online classes for swimming added an option for students and allow them to decide the ones they prefer. This approach could potentially maximise the learning benefits and enjoyment of learning swimming regardless of learning mode. Because there are endless possibilities with online classes, these guidelines are intended for the management and pedagogy aspects of learning to swim online and not the learning content. The labels in the first column refer to reasons provided by the participants while the second column describes our suggestions for each of the reasons.

Table 5. Suggestions to mitigate issues associated with learning to swim online

Reasons	Suggestions
Associate online swimming classes with a higher feeling of boredom	• More figural questions to promote reasoning and thinking • Utilised different sources such as videos, fantasy scenarios, and posters
Difficulty to receive feedback from instructors	• Provide fewer prompts to avoid confusion • Correct one skill at a time
Issues related to assessment (students)	• No hidden assessments • Ensure participants are well-informed and familiar with the type of assessment • Modified type of assessments which allow the students to practice swimming skills and utilised technology around them (e.g., video demonstration, water rescue tutorials)
Assessment credibility	• Establish a consistent environment or platform for assessment • Establish points to be assessed during the online swimming assessment • Revise rubrics to include or exclude items associated with learning to swim online
Lack of learning authenticity	• Use videos (e.g., YouTube) to promote learning and problem-solving • Invite experts or notable swimmers to share strategies to learn swimming in various contexts (e.g., pandemic, monsoon season) • Invite students to share their opinions and ideas throughout the semester through discourse with the community of learners

Future research should continue to investigate the impact of online swimming courses on students' learning achievement, especially on their fundamental swimming skills. Besides that, future studies can also look into the human factors in online swimming such as learners' individual differences, learning styles, and preferences in using visual and audio materials. Future research could also expand on this current research by implementing longer interventions and focusing on specific goals such as techniques and skills performance.

Our work has demonstrated students were curious and keen to explore a new avenue to learn swimming. The majority of participants were initially receptive to the ideas but the interest seems to be declining due to various limitations such as poor feedback, lack of authentic learning, and limited resources to support learning. Although most participants were receptive, few participants intend to continue in this mode and promote online swimming to their peers. The researcher believes that to make this approach useful and sustainable; the instructor should spend time to make adjustments to their lesson plans, revise present contents and practice teaching swimming in a different context (i.e., online). Ultimately, this study was designed to provide empirical evidence of the potential of learning to swim online and initiate a new topic of interest in this field of study.

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