

## **Bodily-kinesthetic intelligence in relation to swimming performance skills according to gender and swimming course level among physical education students**

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**Abstract.** This study aims to identify bodily-kinesthetic intelligence level among students attending different levels of swimming courses. To investigate students motor intelligence level in relation to gender. To investigate students bodily-kinesthetic intelligence level in relation to swimming course level. To investigate the relation between bodily-kinesthetic intelligence level and swimming performance skills level among students attending different levels of swimming courses. The population of this study were students who attended one of the three levels of the swimming courses in the Faculty of Physical Education /University of Jordan (n= 223). The sample of the study consisted of (189) students (62 females & 127 males). A bodily-kinesthetic intelligence scale consisting of 18 questions was used to collect the required data. The data was analyzed using descriptive and statistical analysis. Results showed that the sample acquired motor intelligence through swimming context on an average level scale (72.2%). There was no significant difference in bodily-kinesthetic intelligence level between males and females students. While there were significant differences in bodily-kinesthetic intelligence level according to swimming course level in favor to swimming course level. There was significant relation between bodily-kinesthetic intelligence level and skills performance level among students in all swimming courses. Therefore bodily-kinesthetic intelligence level proved to have an intimate relationship with swimming performance skills level among students attending different levels of swimming courses in the Faculty of Physical Education, University of Jordan, with no differences due to gender.

**Key words:** *bodily-kinesthetic intelligence, swimming course, gender, skills, performance.*

### **Introduction**

Bodily-kinesthetic intelligence is the capacity that allows individuals to use their complete body in expressing ideas and feelings; it's what characterizes professional actors, athletes and dancers (1,2) noted that bodily-kinesthetic intelligence is the ability to use some parts or all over the body to solve a problem, put forward a product and express feelings or emotions. It enables one to control and interpret body movements and to form a harmony between the body and the mind; people with this kind of intelligence play one or more than one sport (3,4).

According to (5) people who have higher bodily-kinesthetic intelligence have tendency to succeed in sport, dance and arts, they are skilled performance includes characteristics, such as a sense of timing, sensitivity to points of repose or shifts of behavior, and a sense of direction.

Fine motor abilities involve the ability to use one's body in highly differentiated and skilled ways, for expressive and goal-directed purposes (6) mentioned that athletes with high bodily-kinesthetic intelligence have physical-based skills such as coordination, harmonious functioning of muscles, balance, flexibility, dexterity - grace in physical movement, muscle strength, speed, and sensitivity of touch (7) noted that in 1983, psychologist Howard Gardner proposed seven different types of intelligences (musical intelligence,

visual-spatial intelligence, naturalistic intelligence, interpersonal intelligence, emotional intelligence, logical-mathematical intelligence, linguistic intelligence) bodily-kinesthetic intelligence which includes athleticism and the awareness of one's body is an eighth intelligence which was added in 1999, and each one of the intelligences is independent from the others, that means having a high level of one type of intelligence does not guarantee a high level of intelligence on the others (8).

We often talk about learning by doing when we talk about motor learning, this way of learning happens through physical movement and through the knowing of our physical body (7). The body knows many things that are not necessarily known by the conscious logical mind, such as catch a thrown object, maintain balance while walking, and where the keys are on a computer keyboard (9).

Using Piaget's theory, we can note that between the ages of two and seven years old, the child begins to conceptualize through concrete and motor examination of many dimensions of the external world, this information, derived from the child's active physical interaction with the environment provides the data base for building more complex conceptual representations of reality, and for supporting the elaboration of these conceptualizations into higher-order, abstract thought processes. In other words, young children are processing the world through information they are taking in with their bodies, which later becomes the foundation for abstract thought. It stands to reason that during this period children can more easily grasp a lesson that is taught with an active physical language (10).

The human body is a profound vehicle of communication, at the most basic level this communication occurs through facial expressions, body gestures, and physical postures, all of which we use to enhance and deepen our communication with others, whereas, mentioned that communication is a very important process in education (11).

There is a large drop out happening at traditional education at this age range; one of the biggest reasons is that students have no idea why they are learning all the information presented. They do not see the connection to the real world. In other words, the 'body component' has not been added to the learning process, resulting in lack of motivation and interest, academic education needs to be related to real life by using the concept of "learning by doing" in order to make sense to undergraduate students noted that bodily-kinesthetic intelligence is not widely developed in our culture outside of sports; it is not highly valued, especially in education, or as a form of expression (1,2).

In children, bodily-kinesthetic intelligence has not yet atrophied; they naturally use it in their actions, explorations, expressiveness, and communication, it appears that this area of intelligence is more engaged and accessible when we are children, the child who gets distracted or frustrated by traditional forms of teaching can often be motivated and find connections through movements, helping the child to connect thinking and movement by kinesthetic learning within education environment, children can have the opportunity to become purposeful movers and they can develop higher bodily-kinesthetic intelligence, the thing that offers them the chance to engage in a creative process, a process in which they gain the ability to use their bodies effectively to solve movements problems and working skillfully with objects, both those that involve the fine motor movements of one's fingers and hands and those that exploit gross motor movements of the body, they will become skilled at using their bodies to convey feelings and ideas, they will have good hand-eye coordination and they will be very aware of their bodies, their fine and gross motor skills will be more advanced than the average person's, they also can learn best by doing things not by receiving verbal instructions, in that way the education system will become more effective and enjoyable (1).

Swimming is a sport which learnt in unfamiliar environment and which includes many motor skills, it requires specific motor and psychological skills, many swimming learners have to face their fear of water, plus the requirements for learning various motor skills during the learning process, people who have bodily-kinesthetic intelligence are very aware of- and very much in control of their movements, if teachers recognize the students physical intelligence this creates an entirely new and effective means to reach these students (12) mentioned that if students have higher level of bodily-kinesthetic intelligence that will make them mentally sharpen, physically comfortable with their bodies and better able to cope with the demands of the motor learning process. In seeking to advance the literature in youth development/sport area in Arab region, this study aims to investigate bodily-kinesthetic intelligence in relation to swimming performance skills according to gender and swimming course level among physical education students.

In fact, the bodily-kinesthetic intelligence helps the students to recognize their own skills and achieve the ability to utilize the whole body to state the thoughts and emotions to gain better learning (13).

The Faculty of Physical Education at the University of Jordan offers swimming courses to all students enrolled in Physical Education program. Three levels of swimming courses are offered each academic semester: basic, intermediate and advanced.

Both basic and intermediate swimming courses are obligatory for all students. The advanced course, on the other hand, is optional and more challenging. All levels have their own expected outcomes.

By the end of the three swimming courses students are expected to learn swimming skills such as floating, treading deep water, front and back crawl, butterfly stroke, breaststroke and dolphin kick, in addition to essential life-saving techniques.

Students are expected to be committed to learning and practicing swimming skills. They spend approximately 48-60 hours/semester learning and training their swimming skills and techniques under their teachers' supervision (14) suggested that researchers must establish "what sport can teach, how it can be taught, and where it best can be taught" Based on these questions, the authors identified the aim of this study as follows: to identify bodily-kinesthetic intelligence level among students attending different levels of swimming courses; to investigate students bodily-kinesthetic intelligence level in relation to gender; to investigate students bodily-kinesthetic intelligence level in relation to swimming course level; to investigate the relation between bodily-kinesthetic intelligence level and swimming performance skills level among students attending different levels of swimming courses.

## Material and Method

*Participants.* The population of this study were students who attended one of the three levels of the swimming courses in the Faculty of Physical Education at the University of Jordan (n= 223). The sample of the study consisted of 189 students (84% of the population) (62 females, 127 males) distributed as described in Table 1. They attended the swimming courses one hour/three days a week for four months.

**Table 1.** Swimming courses students' population and sample distributed by course level

Course Level	Male students		Female students	
	Sample (N)	%	Sample (N)	%
Basic swimming (1)	53	41.7%	23	37.1%
Intermediate swimming (2)	63	49.6%	24	38.7%
Advanced swimming (3)	11	8.6%	15	24.1%
Total	127	100%	62	100%

### *Scale Construction and Validation*

The authors needed a valid and reliable scale in order to assess the acquisition of bodily-kinesthetic intelligence in the swimming context for undergraduate students, to study the relation between bodily-kinesthetic intelligence level and swimming performance skills level among students attending different levels of swimming courses. A long process of reviewing similar and related literature took place in order to find the most suitable. No adequate scale was found to match the aims of the study. Thus, it was necessary to construct a new scale. Based on the literature review and relying on the authors' relevant experiences, a primary version of bodily-kinesthetic intelligence through swimming context scale was constructed. The scale aimed to identify undergraduate students' bodily-kinesthetic intelligence level through questions that reflect their abilities to use their bodies effectively to solve swimming skills learning problems or create new swimming skills. The scale consisted of 18 items targeting to ask the students to identify the sense of their body movements and functions and the inner body movements response. The primary version was presented to five experts in the field in order to validate their contents in relation to relevancy to the swimming context and clarity of items. In light of the expert's feedback, necessary modifications were made and the final version of the scale was ready.

### *Bodily-Kinesthetic intelligence through swimming context scale*

The scale (see Appendix A) consisted of two parts. The first part included information about the swimming course level. The second part included 18 questions which experts agreed to be the most appropriate and

feasible to fulfill the aim of this study, and which reflecting awareness of one's body and the abilities to use the body effectively to solve swimming skills learning problems or create new swimming skills. (2) identified bodily kinesthetic intelligence as the ability to use some parts or all over the body to solve a problem, put forward a product and express feelings or emotions, whereas, (5) noted that people who have higher bodily kinesthetic intelligence have tendency to succeed in sport such as swimming, dance and arts. Students were asked to place a signal under the level they think they acquired through their swimming context.

A five-level Likert for frequency was used to assess each item: always (5), often (4), sometimes (3), rarely (2) and never (1), Three levels of bodily-kinesthetic intelligence through swimming context were determined: (1-2.33 low, 2.34-3.67 average and 3.68-5 high). The scale's reliability coefficient has been calculated through measuring the internal consistency for each factor using the Cronbach's Alpha. Table 2 shows good levels of reliability with a total number of 0.78.

**Table 2.** Reliability coefficient of "bodily-kinesthetic intelligence through swimming context scale"

	Scale	Cronbach's Alpha
	Bodily-kinesthetic intelligence	0.78*

Note: \* indicates significance level at  $p \leq 0.05$

#### *Swimming skills performance evaluation*

The first two authors in this study are expert swimming instructors for twenty years. In order to evaluate students' performance swimming skills, they evaluated the student s ` performance through an objective practical med-term exam (after the first 6 weeks of the semester) and grades were adopted in the three swimming courses levels.

*Data Collection.* Data was collected from the study sample at the med of the academic semester which ran from September 2016 to January 2017. Research ethics approvals and permissions were obtained. The bodily-kinesthetic intelligence through swimming context scale was distributed to the sample of the study (n=189) by the authors. The students were assured that their contribution was totally voluntary, all data were strictly confidential and would be used only for scientific research purposes. They were asked not to write their names on the questionnaires. They were instructed to carefully read the items, check the answer that mostly corresponds to them and to answer all items.

*Statistical Analysis.* In order to obtain a complete image of the study results, data statistical analysis included: descriptive statistics (means, standard deviations, percentages, one way ANOVA, Independent t-Test) to identify the nature of acquisition of bodily-kinesthetic intelligence among the students of the swimming courses, Pearson correlation to examine the relation between bodily-kinesthetic intelligence through swimming context and swimming performance skills according to gender and swimming course level, as well as the Internal consistency of the scales using Cronbach's coefficient alpha. Data was processed by SPSS.

## **Results**

### *Bodily-kinesthetic intelligence through swimming context scale*

Table 3 shows the relative importance of each item of the bodily-kinesthetic intelligence through swimming context scale for the sample of this study according to their responses; the item (15) came on a high level scale (88%). Students believed that the more they practice swimming skills, the better their performance become. While, the item (17) with the content (I can master the complex swimming skills and movements that require muscular coordination) came on an average level scale (62.2) and it was the lowest between the scale items. As for the scale as a whole the relative importance came on an average level of (72.2%).

**Table 3.** Means, SD, percentages of importance, level of acquisition and ranking of bodily-kinesthetic intelligence of students through swimming courses (N 189)

Item	Questions	Mean	SD	%	Ranking	Level
1	I can perform all swimming skills with high capacity	3.42	1.1	68.4	12	Moderate
2	I can maintain the balance my body in the water during performing different swimming skills	3.55	1.05	71	9	Moderate
3	I have the skills that allow me to change my body positions easily in water	3.77	0.99	75.4	7	High
4	I can highly perform swimming skills that require connection senses and movements	3.81	1.14	76.2	6	High
5	I can perform new swimming skills more accurately and faster than my colleagues	3.45	0.89	69	11	Moderate
6	I have the ability to identify my mistakes and my colleagues mistakes during swimming performance	3.32	0.89	66.4	15	Moderate
7	I feel relaxed and I can interact well with water during learning new swimming skills	3.4	1.2	68	13	Moderate
8	I have no difficulty in making crucial decision regarding swimming movements when I have multiple options	3.9	0.96	78	4	High
9	I am distinguished in performing swimming skills that require attention and high perception	4.1	0.77	82	3	High
10	I have high potential to solve all motor problems and difficulties that face me in the water during swimming	3.33	1.17	66.6	14	Moderate
11	During learning new swimming skills my mind can keep fine technical details of the new skills for a long time	4.12	0.63	82.4	2	High
12	I have specific strategies to correct my motor and swimming skills errors within water	3.23	1.22	64.6	16	Moderate
13	I can effectively withstand stressful conditions and situation during practical tests of swimming skills I have already learned	3.12	0.98	62.4	17	Moderate
14	I can quickly adapt with new difficult motor skills in swimming	3.46	0.89	69.2	10	Moderate
15	The more I practice swimming skills, the better my performance become	4.4	0.56	88	1	High
16	I have high capabilities that enable me to perform swimming styles that require highly smooth performance	3.61	0.89	72.2	8	Moderate
17	I can master the complex swimming skills and movements that require muscular coordination	3.11	1.2	62.2	18	Moderate
18	Whenever the performance requirements increase, i can perform swimming skills at my best	3.9	0.89	78	4	High
	Total scale	3.61	0.44	72.2		Moderate

*Bodily-kinesthetic intelligence level according to gender.* Table 4 shows that there was no significant relation occurred between bodily-kinesthetic intelligence level and gender.

**Table 4.** Means, SD and t-Test between Males and females students in bodily-kinesthetic intelligence level through swimming

Scale	Gender	Mean	SD	T	Level of significant	Sig
Bodily-kinesthetic intelligence level	Males (N 127)	3.63	0.46	0.91	0.35	No
	Females (N 62)	3.56	0.55			

Note: \* indicates significance level at  $p \leq 0.05$

*Bodily-kinesthetic intelligence level according to swimming course level*

**Table 5.** One Way ANOVA for bodily-kinesthetic intelligence of students through swimming courses according course level

Scale	Variations source	Sum of squares	DF	Mean squares	F	Sig
Bodily-kinesthetic intelligence level	between groups	64.52	2	32.25	39.57	*0.0
	within groups	151.5	186	0.81		
	Total	216.1	188			

*Note: \* indicates significance level at  $p \leq 0.05$*

Table 6 shows the direction of differences between the three swimming courses in bodily-kinesthetic intelligence of students, after the positive results of homogeneity of variance test, (L.S.D) test for dimensional comparisons showed that there were significant differences in bodily-kinesthetic intelligence level between swimming course level (1) and swimming course level (3) in favor of swimming course level (3), and there was significant differences in bodily-kinesthetic intelligence level between swimming course level (2) and swimming course level (3) in favor of swimming course level (3). Yet there was no significant differences between swimming course level (1) and swimming course level (2).

**Table 6.** (L.S.D) test for dimensional comparisons to show the direction of differences between the three swimming courses in bodily-kinesthetic intelligence of students through swimming

Scale	Groups differences	Differences	Level of significant	ig
Bodily-kinesthetic intelligence level	Swimming (1) - swimming (2)	-.12	0.2	O
	Swimming (1) - swimming (3)	-.22	*0.0	ig
	Swimming (2) - swimming (3)	-.43	*0.0	ig

*Note: \* indicates significance level at  $p \leq 0.05$*

Table 7 shows that there was significant relation acquired between bodily-kinesthetic intelligence level and swimming performance skills level among the three levels of swimming courses in an average scale (77%).

**Table 7.** Pearson correlation coefficient values between bodily-kinesthetic intelligence level of students through swimming and swimming performance skills level for the sample (N 189)

	Bodily-kinesthetic intelligence level
Swimming performance skills level	0.77*

*Note: \* indicates significance level at  $p \leq 0.05$*

**Discussion and Conclusion**

The results of this study showed that students in advanced swimming course level (3) had the highest level of bodily-kinesthetic intelligence compared with the basic and the intermediate swimming courses (1) and (2). The authors believe that students in advanced swimming course level (3) had more experiences in swimming skills, because they previously finished swimming courses (1) and (2) successfully. The advanced swimming course is optional and more challenging, students in this course face more challenges, have to perform four swimming styles (front and back crawl, butterfly stroke, breaststroke and dolphin kick), in addition to essential life-saving techniques, and even though the advanced course is optimal, the students enrolled in it by their will because they believe they had the skills that qualify them to pass the course successfully and this reflects their confidence in their skills and abilities, and that explains the high bodily-kinesthetic intelligence they showed. They had the abilities to use their entire body efficiently.

This is consistent with the result of previous research of (15) who stated that bodily-kinesthetic intelligence is directly related to people's body perception and mastery experiences in physical activities.

No significant differences have been found between the basic level (1) and the intermediate level (2) swimming courses, this result due to the equal requirements of the two courses. Whereas, in the basic course students are expected to learn treading deep water, front and back crawl, as for intermediate course students are expected to learn how to dive and to perform breaststroke swimming, the expected physical requirements and outcomes are almost equal. In this zone (16) indicated that the context of the activity contributes significantly to the outcomes of participation. As for the scale as a whole, the results showed that bodily-kinesthetic intelligence through swimming context among students came above average (72.2%).

This result may be logical for physical education students here sport activities of all kinds are at the core of their specialization. The authors believe that swimming is a kind of sport which helps the students to acquire some motor abilities that contribute to effect the awareness of the body in a good way and that may enhance the level of bodily-kinesthetic intelligence. That's what (2) acknowledge: bodily-kinesthetic intelligence level refers to a keen awareness for perceptible changes in our body momentum, balance, position and stationary. This result corresponds to research by (17) who claimed that swimming training and exercise can provide an appropriate ground for demonstrating abilities and competence, and may enhance bodily-kinesthetic intelligence.

No significant differences have been found in bodily-kinesthetic intelligence level between male and female students, this is consistent with the result of previous research of (18) which investigated the bodily-kinesthetic intelligence as an sports person ship orientation of students in school of physical education and sport, in which he found no significant differences in bodily-kinesthetic intelligence between genders in terms of students participating in individual sports.

The results of this study also revealed that a positive significant relation occurred between bodily-kinesthetic intelligence level and swimming performance skills level among students attending different levels of swimming courses in an average scale (77%).

The authors think that teachers in this study were an effective part of the teaching-learning process and its reflection on bodily-kinesthetic intelligence level, they used the appropriate active participatory encouraging teaching and learning methods, pushing the students to use their whole body for stating thoughts and emotions, recognize their own skills and abilities. This is similar to the findings of (19) who mentioned that by implementing an attitudinal methodology in a stunt unit in a physical education class, it will directly influence the perception of students. It is also similar to the findings of (20) who stated that students need to have confidence in themselves and satisfaction with their sport skills; they can have confidence in their performance when they have high movement satisfaction which effects positively their motivations to perform in their best and their abilities to use the entire body to get required motions that demand action and movements, and (21) who indicated that bodily-kinesthetic intelligence can be developed with different sports and exercises.

Findings of this study emphasized that there is a positive relation between bodily-kinesthetic intelligence level and swimming performance skills level among students attending different levels of swimming courses.

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