



## SIMULTANEOUS IMPROVEMENT OF GIFTED YOUTHS IN BIOLOGY AND PHYSICAL FITNESS FACTORS FOLLOWING TRADITIONAL AND INTEGRATIVE TEACHING

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### Abstract:

The major aim of this study was to compare the effects of two different teaching methods (traditional and integrative) on learning biology, as well as development of selected factors of physical fitness (agility, flexibility, speed and balance). Participants were gifted students who finished first grade of junior high schools at the end of academic year 2014-2015. From 1190 students who took the IQ test, 52 persons who had highest IQ scores were chosen and assigned randomly to two groups of traditional (26) and integrated (26) classes. The traditional group was taught biology three sessions and physical education one session per week for twelve weeks. The integrated group were taught biology composed with physical education activities four sessions per week (each session lasted 75 minutes). The results revealed that the mean scores of four physical fitness factors in both groups differed significantly from baseline to post teaching examinations ( $p < 0.01$ ). We found that integrated teaching of physical education with other fields (such as biology) in comparison with traditional method, not only leads to better learning, but also encourages students to be more active in learning process.

**Keywords:** traditional teaching, integrated teaching, learning, physical fitness, biology

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## 1. Introduction

In the global dynamic environment with high level competitions and interactions, educational communities are responsible to develop a flourishing future for societies. Being successful in this difficult task depends on applying suitable methods for effective teaching of all humanistic factors in different aspects (e.g. spiritual, physical, moral, social, etc.) and also developing the creative thinking in learners (Maleki, 1994; Ahmadi, 2001). Many studies have been done to evaluate effectiveness of educational systems regarding different teaching methods. Some of the studies that dealt with examining the effectiveness of traditional or common teaching methods (separate teaching of different courses) came to the conclusion that traditional methods have many limitations (Maleki, 2003; Placek, & Sullivan, 1997). Disability to make a connection between scientific concepts and learning them separately are most common problem of this method (Eggebrecht, 1996; Fahiminejad, Mozafari, & Sabaghiyanrad, 2012; Findley, 2000).

There are several studies presenting other effective teaching methods without limitations of traditional methods. Integrative teaching can be one of the interesting alternative methods in this area in order to remove the illogical boundaries and strengthen the connection between different scientific concepts. Therefore, it has been claimed that integrative teaching may be crucial to achieve unity and integrity in learning various concepts and skills in students with different abilities and interests (Maleki, 2003). The results of numerous studies indicated that integrative teaching is more interesting, stimulating and useful for students in comparison to traditional method (Fahiminejad, et al. 2012; Findley, 2000; Weilbacher, 2000; Zemelman, Daniels, & Hyde, 2005), because this strategy fosters creativity and thinking in students (Mirascieva, 2010).

Recently integrative method of teaching, especially integrative physical education have been paid attention in schools and developed education systems (especially elementary and guidance schools) (Sharifi, 2003; Gribacheva, & Kruglyihin, 2009; Cherkasov, 2013; Hasanshina, & Shatunov, 2015). Therefore, many studies have been done about combination of physical education with other courses, showing the capacity of physical education to be integrated with almost all courses (Placek, 1996; Mozafari, 2001; Zagrebina, 2008).

These studies came to the conclusion that integrative physical education motivates learners and leads to effective learning (Fahiminejad, et al. 2012; Findley, 2000; Housner, 2009; Marx, 2009; Mirascieva, 2010; Mozafari, 2001; Placek, 1995; Rauschenbach, 1996; Soleimani, 2008; Timofeeva, & Shestakova, 2016) more active presence (Ahmadi, 2001; Fahiminejad, et al. 2012; Housner, 2009) conceptual learning (Brayan, & Fennell, 2009) ability to use what students have learned and improving physical activities (Vars, 1991; Erwin, Abel, Beighle, and Beets, 2009; Bodnar, 2014). In spite of all the shortcomings of traditional teaching and advantages of integrative teaching especially integrative physical education and by considering the fact that

elementary and guidance schools are necessary for development of society, still a few studies are in doubt about the positive effect of integrative teaching on learning (Katlin, 1992) and a difference in effectiveness of traditional and integrative methods of teaching. Another challenging subject is about the effect of both traditional and integrative physical education on development of physical fitness factors (Fahiminejhad, et al. 2009). Hence, it is necessary to do a semi-experimental research about effectiveness of two different teaching methods of traditional and integrative physical education on learning biology and development of selected physical fitness factors of male junior high students. The findings of such a research can make variety in school programs, make learning atmosphere more attractive and increase learning motivation. Moreover, it causes a high flexibility in designing and implementing integrative courses which help teachers to consider the interest and ability of students by using all the valuable facilities. Another important point is that integrative teaching is not only limited to education and it can lead to creativity and development of social skills of learners.

The main purpose of this study was to evaluate the advantages of integrative teaching method by using theoretical information and implementing them.

## **2. Materials and method**

This was a semi-experimental study and the population consisted of students who finished first grade of junior high school at the end of academic year 2014-2015. To increase the rate of participation, both students and their parents were provided with some useful services such as knowing their IQ scores, attending extracurricular courses in summer and the opportunity of participating in physical activities and competitions. Finally, among 1190 students who confirmed the agreement to take part in study, fifty two students who had highest IQ scores were chosen and divided into traditional (26) and integrated (26) groups randomly.

After obtaining the informed consent from parents along with verifying form of the participants' health, selected physical fitness factors were tested. To control the intervening variables, such as teacher's method of teaching, teacher's motivation and their teaching experiments, two same physical education and biology teachers were selected for both groups. During 12 weeks of experiment, the odd days selected for traditional group and the even days were appointed to integrative group. The traditional group was taught biology three sessions of seventy five min and physical education one session of seventy five min per week during twelve weeks while the lessons taught separately. Also, integrated group were taught biology lesson composed with physical activities during twelve weeks and "biology - physical education" four sessions a week, each session seventy five min.

By the end of the course, both groups took the post-test of selected physical fitness factors and final test of biology to evaluate their progress in selected physical fitness factors and learning biology. To do this, standard tests of single-leg standing,

Wels modified sit and reach test, 40 yard and shuttle run were used to evaluate balance, flexibility, speed and agility and also a 20-question written teacher made test to evaluate the learning of biology concepts. To determine the validity of the teacher - made test, the opinions of specialized teachers in the area of integrated and biology were used.

To analyze the data of selected physical fitness factors, both dependent and independent t-test were used while the interval scores of biology were changed to four ordinal scales—“very good”, “good”, “acceptable”, and “requiring more practice” — and were analyzed by using Wilcoxon sign-ranked test and Mann-Whitney U test.

### 3. Results

**Table 1:** IQ of participants and mean differences in traditional and integrative groups (independent t-test)

Teaching Method	N	Mean ± Std. Dev	Lower	Upper	t	df	**Sig (2-tailed)
Traditional	26	118,47±2,45	113	121	0.549	50	0.575
Integrative	26	118,54±2,56	113	121			

Sig.\*\*p<0.05

The participants were selected from students with high IQ score and randomly were divided into two groups of traditional and integrated methods. According to the data shown in table 1, independent t-test results showed that there was no significant difference between the two groups in the level of IQ.

**Table 2:** Mean differences of Ranks in traditional and integrative teaching methods on learning biology (Mann-Whitney U test)

Teaching Method	Mean	Z	*Sig (1-tailed)
Traditional	2,12	-3,423	0.001*
Integrative	3,45		

Sig.\*p<0.05

Considering the data in table 2 and the calculated z-score, the mean of the integrative group were significantly higher than the traditional group at  $p<0.05$ . In other words, learning biology occurred more effectively in integrative group than traditional group.

**Table 3:** Mean differences of the pretest and post-test in traditional teaching methods on the selected physical fitness factors(dependent t-test)

The physical fitness factors	Test	Mean ± Std. Dev.	t	df	**Sig (2-tailed)
Agility	pretest	9,97±0,93	-4,579	25	0.001**
	post-test	9,51±0,97			
Flexibility	pretest	25,13±0,79	-4,388	25	0.001**
	post-test	25,37±0,83			
Speed	pretest	8,28±0,39	3,583	25	0.003**
	post-test	8,10±0,34			

Balance	pretest	28,77±2,19	-2,972	25	0.010**
	post-test	29,03±2,37			

Sig. \*\*p<0.01

According to the table 3, the level of correlated t for comparing the pretest and post-test mean of the traditional group in physical fitness factors was significant at  $p < 0.01$ . In other words, the mean of the selected physical fitness factors in post test of traditional group were significantly higher than the mean of these factors in pretest of traditional group. Therefore, the null hypothesis about the lack of significant difference between the mean of pretest and post-test of traditional group in selected physical fitness factors is rejected.

**Table 4:** Mean differences of the pretest and post-test in integrative teaching method on the selected physical fitness factors(dependent t-test)

The physical fitness factors	Test	Mean ± Std. Dev.	T	df	**Sig (2-tailed)
Agility	pretest	9,92±0,79	-10,153	25	0.001**
	post-test	9,33±0,74			
Flexibility	pretest	25,18±0,70	-7,102	25	0.001**
	post-test	27,20±0,87			
Speed	pretest	8,44±0,48	8,045	25	0.001**
	post-test	7,81±0,41			
Balance	pretest	28,71±2,84	-6,391	25	0.001**
	post-test	34,41±2,72			

Sig. \*\*p < 0.01

Considering table 4, the level of correlated t for comparing the pretest and post-test mean of the integrative group in selected physical fitness factors was significant at  $\alpha < 0.01$ . In other words, the mean of the four physical fitness factors in post test of integrative group were significantly higher than the mean of these factors in pretest of integrative group. Hence, the null hypothesis about the lack of significant difference between the mean of pretest and post-test of integrative group in selected physical fitness factors is rejected.

**Table 5:** Mean differences of the four physical fitness factors in the traditional and integrative teaching methods on the selected physical fitness factors in Final test

The physical fitness factors	Test	Mean ± Std. Dev.	t	df	**Sig (2-tailed)
Agility	traditional	9,51±0,91	-3,498	50	0.001**
	integrative	9,33±0,74			
Flexibility	traditional	25,37±0,78	-4,693	50	0.001**
	integrative	27,20±0,86			
Speed	traditional	8,10±0,31	3,982	50	0.001**
	integrative	7,81±0,41			
Balance	traditional	29,03±3,42	-3,121	50	0.029**
	integrative	34,41±5,29			

Sig. \*\*p<0.01

Considering table 5, the level of correlated  $t$  for comparing the mean of the traditional and integrative group in physical fitness factors was significant at  $p < 0.01$ . In other words, the mean of the four physical fitness factors in post test of integrative group were significantly higher than the mean of these factors in post test of traditional group. So the null hypothesis is rejected and it means that the mean of final score of four physical fitness factors in integrated method were significantly higher than traditional method.

#### 4. Discussion and Conclusion

Although in Iran's educational system same as the majority of educational communities in all level of education such as guidance period, the concepts of different fields are usually organized within separate course books, in the face of a real life and multi-dimensional situations, the traditional method is not capable of solving problems. So the integrative teaching method as an alternative can lead to a meaningful learning and transfer necessary knowledge and skills of living to students for more active, effective and rational living.

The results show that in the traditional group (Table 3), significant differences were observed between the pretest ( $8,28 \pm 0,39$ ) and post-test ( $8,10 \pm 0,34$ ) score of speed, between the pretest ( $9,97 \pm 0,93$ ) and post-test ( $9,51 \pm 0,97$ ) score of agility, between the pretest ( $28,77 \pm 2,19$ ) and post-test ( $29,03 \pm 2,37$ ) score of balance, and between the pretest ( $25,13 \pm 0,79$ ) and post-test ( $25,37 \pm 0,83$ ) score of flexibility. These findings emphasize the effectiveness of traditional teaching of physical education in development of selected physical fitness factors.

Also in the integrative group (Table 4), significant differences were observed between the pretest ( $8,44 \pm 0,48$ ) and post-test ( $7,81 \pm 0,41$ ) score of speed, between the pretest ( $9,92 \pm 0,79$ ) and post-test ( $9,33 \pm 0,74$ ) score of agility, between the pretest ( $28,71 \pm 2,84$ ) and post-test ( $34,41 \pm 2,72$ ) score of balance, and between the pretest ( $25,18 \pm 0,70$ ) and post-test ( $27,20 \pm 0,87$ ) score of flexibility. These differences illustrate the effectiveness of the integrative method for physical fitness factors.

Finally comparing the final scores of the two groups of traditional and integrative revealed (Table 5) that there are significant differences between the mean speed score of the traditional group ( $8,10 \pm 0,74$ ) and the integrative group ( $7,81 \pm 0,41$ ), between the mean agility score of the traditional group ( $9,51 \pm 0,91$ ) and the integrative group ( $9,33 \pm 0,74$ ), between the mean balance score of the traditional group ( $29,03 \pm 3,42$ ) and the integrative group ( $34,41 \pm 5,29$ ), and between the mean flexibility score of the traditional group ( $25,37 \pm 0,78$ ) and the integrative group ( $27,20 \pm 0,86$ ).

Pestalozzi (1978) emphasized that teaching different scientific fields simultaneously by removing the boundaries of human knowledge and also by preparing the suitable ground for actual understanding of human problems can lead to better learning (Jafari, & Ghorbani, 2009).

The main purpose of this study was to evaluate the advantages of integrative teaching method by using theoretical information and implementing them. So this study compared the effectiveness of traditional and the integrative teaching method in terms of learning biology and physical fitness in male junior high students.

By examining the effects of integrative physical education teaching method on learning biology, the results show that the mean scores of integrative group were significantly higher than traditional group.

The concepts of biology in guidance level are the basic grounds of other fields such as physics and chemistry in higher level of education. So it is one of the important fields and the suitable teaching method of biology can lead to more interest and motivation in learners and result in professional future of them, but the inactive environment and over expectation in traditional method of teaching put the learners in difficulty such as inadequate motivation and interest. In such an environment, applying the physical activities and integrating them with different concepts of biology, make an opportunity for students to learn concepts in different ways through playing (Mirascieva, 2010; Placek, & Sullivan, 1997) which lead to meaningful learning in happy and attractive environment.

It seems that according to the findings of this study and also previous ones, applying the integrative physical education in junior high schools lead to more effective learning in biology than traditional method (Findley, 2000; Weilbacher, 2000; Zemelman et.al. 2005). Also findings of this study show that integrated teaching of biology concepts with physical activities, prepares the suitable ground and satisfying environment for learning (Mirascieva, 2010) as well as development of physical fitness factors in students. Therefore to compare the effectiveness of traditional and integrative method of teaching in development of physical fitness factors (agility, flexibility, speed, and balance), these factors were taken as pre and post test in both traditional and integrative groups.

The findings of this study and previous ones show that integrated teaching of physical education with other fields (such as biology) in comparison with traditional method, not only leads to better learning, but also encourages students to be achieve higher levels of physical health and development of selected physical fitness factors. The results also lay the ground for future studies. These findings also help the administrators and planners in the Ministry of pedagogy replace traditional methods with new ones, such as integrative teaching, especially integrative teaching of different courses along with physical activities. Also, the officials of education system can provide researchers with essential facilities to do research in this area and present the results to the teachers and people to inform them about the benefits of integrative method of teaching and to ask and encourage to support this method.

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