

The effects of taekwondo courses on multiple intelligence development – a case study on the 9th grade students

Authors' Contribution:

-  **A** Study Design
-  **B** Data Collection
-  **C** Statistical Analysis
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Abstract

Background & study aim:	During the last two decades Multiple Intelligence (MI) theory has been replaced with Intelligence Quotient (IQ) in order to increase the benefits of formal education programs. Within this frame various studies have been carried out to point out the inter-relation between sportive practices and intelligence development. The aim of this research was effects of taekwondo training on the development of multiple intelligence levels of 9th grade students.
Material & methods:	This research applied the model of pre-test-post-test experimental design with experiment and control groups, each composed of 20 students. The experiment group attended to taekwondo training for 60 minutes per week during 12 weeks; and the control group continued to their standard education program. After 12 weeks multiple intelligence inventory was applied to both groups for the second time in order to find out possible changes in the multiple intelligence levels of the students. The findings of the inventory were evaluated using SPSS 17.0 for Windows program through arithmetic means, and independent samples t-tests.
Results:	As a result of the research, it is founded out that the experiment group which took part in the taekwondo training achieved meaningful differences in bodily/kinaesthetic and interpersonal/social intelligence levels, which also led to the development of overall multiple intelligence level.
Conclusions:	Different kinds of martial arts practices, which would be helpful for the intelligence development of the students, should be adopted as supplementary activities for school curriculum.
Key words:	pedagogical experiment • intelligence quotient (IQ) • martial arts • multiple intelligence theory (MI theory)
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INTRODUCTION

The traditional psychometric tests invented early in the twentieth century relied heavily on measuring just two aspects of human aptitude verbal and computational skills and left out the major aspects of intelligence, such as mental, physical, and social ability [1]. Therefore traditional education programs had also been focused on verbal and mathematical intelligences, which were defined in terms of intelligent quotient (IQ). The three-quarter-century-old,

statistical science behind traditional IQ testing was harshly criticised as it was narrow, biased, and even racist, supporting eugenics.

Gardner, who shared the same criticisms on the traditional understanding of intelligence, proposed the existence of at least seven basic intelligences in Frames of Mind (1983); and afterwards added an eighth category of intelligence [2-5]. According to Gardner's point of view humans possess a number

Verbal/linguistic intelligence

– the production of language, abstract reasoning, symbolic thinking, conceptual patterning, reading, and writing.

Logical/mathematical intelligence

– the capacity to recognize patterns, work with abstract symbols (e.g., numbers, geometric shapes), and discern relationships or see connections between separate and distinct pieces of information.

Visual/spatial intelligence

– visual arts, navigation, mapmaking, architecture, and games requiring the ability to visualize objects from different perspectives and angles.

Bodily/kinaesthetic intelligence

– the ability to use the body to express emotion, to play a game, and to create a new product.

Musical/rhythmic intelligence

– capacities such as the recognition and use of rhythmic and tonal patterns and sensitivity to sounds from the environment, the human voice, and musical instruments.

Interpersonal intelligence

– the ability to work cooperatively with others in a small group, as well as the ability to communicate verbally and nonverbally with other people.

Intrapersonal intelligence

– the internal aspects of the self, such as knowledge of feelings, range of emotional responses, thinking processes, self-reflection, and a sense of intuition about spiritual realities.

Naturalistic intelligence

– the ability to recognize patterns in nature and classify objects, the mastery of taxonomy, sensitivity to other features of the natural world, and an understanding of different species.

Existential intelligence

– another category of intelligence which is commonly defined as the ninth, but Gardner himself regarded it as a half category [7].

of distinct intelligences that manifest themselves in different skills and abilities. All human beings apply these intelligences to solve problems, invent processes, and create things. Intelligence, according to multiple intelligences theory, is being able to apply one or more of the intelligences in ways that are valued by a community or culture [6].

Gardner’s work has encouraged educators and parents to view children as equals regardless of a quotient produced from an intelligence exam or of academic areas for which they develop competence [7]. Practitioners of MI understand that children do not fit a single prototype. Gardner sought to broaden the perception of human potential beyond the confines of traditional IQ scores, seriously questioning the validity of determining an individual’s intelligence through the practice of taking the person out of his or her natural environment and asking him or her to attempt isolated tasks never done before and probably never to be done again [8].

Multiple intelligence theory has broken down the traditional education approaches which have ignored different capacities and talents of children, and served as a rallying point for a reconsideration of the educational practice of the last century. Therefore after the introduction of MI theory in educational programs, even unsuccessful, unmotivated students had chance to record academic growth when exposed to multifaceted interventions and techniques principled by MI theory [9].

Since the beginning of the 21st century, MI theory has widely been adopted in educational programs, and many researches have been carried out in order to define the relations between intelligences and various other aspects. If we accept that different intelligences predominate in different people, it suggests that the same learning task may not be appropriate for all our students. While people with a strong logical / mathematical intelligence might respond well to a complex grammar explanation, a different student might need to comfort of diagrams and physical demonstration because their strengths is in the visual / spatial area. Other students who have a strong interpersonal intelligence may require a more interactive climate if their learning is to be effective [10].

The aim of this research was effects of taekwondo training on the development of multiple intelligence levels of 9th grade students.

MATERIAL AND METHODS

Subjects

The subjects of the study were composed of 40 ninth grade students (age: 15 years) attending to 3 different schools in Yenimahalle district, Ankara, Turkey. Only volunteer students who do not attend to any sportive, cultural or educational courses outside the school were chosen as subjects.

At the beginning of the research multiple intelligence inventory (pre-test) was applied to the subjects, and 2 groups (experiment and control groups) were formed. The division of the groups was defined according to the results of pre-test in order to have equality in multiple intelligence levels in both groups prior to the taekwondo training. The students in both groups are supposed to represent similar socio-economic backgrounds from middle-class families.

Research design

This research applied the model of pre-test – post-test experimental design with experiment and control groups, each composed of 20 students. The experiment group attended to taekwondo training for 60 minutes per week during 12 weeks; and the control group continued to their standard education program. Meanwhile students in both groups did not participate to any other regular academic, social or sportive activities. After 12 weeks the same inventory (post-test) was applied to both groups for the second time in order to find out possible changes in the multiple intelligence levels of the students (Table 1).

Table 1. Experimental design and the division of experiment and control groups

Groups	Pre-test	Application (12 weeks)	Post-test
Experiment (n=20)	Multiple intelligence inventory	Standard education program + 60 minutes of Taekwondo training	Multiple intelligence inventory
Control (n=20)	Multiple intelligence inventory	Standard education program	Multiple intelligence inventory

Analysing of the data

In order to analyse the multiple intelligence levels of the students, the multiple intelligence inventory developed by Gonca Seber (2001) was used as both pre-test and post-test [11].

The inventory is composed of 64 questions, 8 questions for 8 type of intelligence, and prepared as a three-point likert type scale (which was used to differentiate orientations from 1 as low and 3 as high).

The data derived from the inventory were evaluated using SPSS 17.0 statistical package programme for windows through arithmetic means (\bar{X}), standard deviation (SD) and independent samples t-tests (p). The p value was taken as 0.05. Significance level was determined by taking p values into consideration so that $p > .05$ meant there was not a meaningful difference, and $p < .05$ meant there was a meaningful difference.

Limitations

A reliability analysis with calculation of Cronbach’s alpha was also conducted to determine if the measurement tool was acceptable and reliable or not. Cronbach’s alpha was calculated as 0.81 which indicates that the items of the test have high internal consistency. The first limitation of the research is the small sample size which is composed of a total of 40 ninth grade students. As the sample size is not big enough many individual differences of conditions which are not taken into consideration may easily affect the results.

Another limitation arises from the application of the taekwondo training as 60 minutes per week is not considered to be sufficient for taekwondo courses under normal conditions. The normal practice of the courses in sports clubs is composed of 80-90 minutes, and 3 times per week. In this regard, the findings obtained from this study cannot be generalised to usual taekwondo practices.

Third limitation is caused by the design of the research. Although the internal validity of this design is strong, because the pre-test ensures that the groups are equivalent, this design lacks external validity. The major problem, which afflicts many sociological and educational research programs, is that it is impossible and unethical to isolate all of the participants completely. Researchers should bear in mind that the two-group control group design is an exceptionally useful research method, as long as these limitations are not ignored.

RESULTS

The pre-test scores of both groups (experiment group \bar{X} =2.27 and control group \bar{X} =2.23) are

almost equal (Table 2). On the other hand according to the results of post-test there has been an important increase in experiment group (from \bar{X} =2.27 to \bar{X} =2.54). but a very slight increase in control group (from \bar{X} =2.23 to \bar{X} =2.29). No meaningful difference according to the results of pre-test ($p = .516, p > .05$), but according to the results of post-test there is a meaningful difference between two groups ($p = .000, p < .05$).

Table 2. Overall MI scores and t-test results of experiment and control groups

Groups		\bar{X}	SD	p
Experiment (n = 20)	Pre-test	2.27	0.26	.516
	Post-test	2.54	0.20	.000*
Control (n = 20)	Pre-test	2.23	0.08	.516
	Post-test	2.29	0.20	.000*

*p < .05

For the experiment group it is found out that verbal/linguistic, bodily/kinaesthetic, musical, interpersonal intelligence scores have increased, but logical/mathematical and naturalist intelligence scores have decreased (Table 3). On the other hand visual/spatial and intrapersonal intelligence scores have not changed at all. When it comes to the results of control group, there seems to be only one obvious difference between the scores of intrapersonal intelligence, as it has increased from \bar{X} = 2.48 to \bar{X} = 2.61. No meaningful difference according to the results of pre-test, but according to the results of post-test there is a meaningful difference in bodily/kinaesthetic intelligence ($p = .018, p < .05$) and interpersonal intelligence ($p = .000, p < .05$).

DISCUSSION

With the introduction of MI theory, there has been a real boost in the number of studies investigating the probable positive effects of MI approach in education programmes. Many researchers have carried out case studies to compare the effectiveness of traditional education methods and MI supported learning methods. Most of these studies have proved that MI intelligence approach is much more effective on the development of students’ academic achievement levels when compared to traditional teaching methods [12-28]. Still there were a few other researches in which no difference was observed in the academic achievement levels of the students attending to traditional education programs and MI based education

Table 3. Distributions of MI scores and t-test results of experiment and control groups

Intelligence Type	Groups		\bar{X}	SD	p
Verbal/Linguistic	Experiment (n = 20)	Pre-test	2.16	0.33	.209
		Post-test	2.33	0.44	.882
	Control (n = 20)	Pre-test	2.30	0.37	.209
		Post-test	2.32	0.35	.882
Logical/Mathematical	Experiment (n = 20)	Pre-test	2.41	0.39	.712
		Post-test	2.14	0.50	.138
	Control (n = 20)	Pre-test	2.37	0.35	.712
		Post-test	2.36	0.43	.138
Visual/Spatial	Experiment (n = 20)	Pre-test	2.25	0.40	.533
		Post-test	2.29	0.51	.585
	Control (n = 20)	Pre-test	2.33	0.45	.533
		Post-test	2.38	0.42	.585
Bodily/Kinaesthetic	Experiment (n = 20)	Pre-test	2.23	0.37	.130
		Post-test	2.55	0.34	.018*
	Control (n = 20)	Pre-test	2.40	0.61	.130
		Post-test	2.35	0.36	.018*
Musical	Experiment (n = 20)	Pre-test	2.29	0.35	.183
		Post-test	2.38	0.40	.429
	Control (n = 20)	Pre-test	2.61	0.99	.183
		Post-test	2.56	0.92	.429
Interpersonal	Experiment (n = 20)	Pre-test	2.48	0.34	.425
		Post-test	2.76	0.21	.000*
	Control (n = 20)	Pre-test	2.41	0.28	.425
		Post-test	2.35	0.57	.000*
Intrapersonal	Experiment (n = 20)	Pre-test	2.51	0.22	.719
		Post-test	2.59	0.27	.772
	Control (n = 20)	Pre-test	2.48	0.30	.719
		Post-test	2.61	0.29	.772
Naturalist	Experiment (n = 20)	Pre-test	2.39	0.30	.886
		Post-test	2.31	0.39	.736
	Control (n = 20)	Pre-test	2.38	0.27	.886
		Post-test	2.35	0.41	.736

*p < .05

programs [29,30]. Meanwhile some other researchers have tried to explore the relationship between different sportive, artistic, cultural practices, and intelligence development within the frame of MI theory [1,31-33]. On the other hand many researchers have focused on the application and effects of MI theory based teaching activities on physical education classes [34-38]. Also some researchers, such as Mitchell and Kernodle, have focused on the use of

MI theory for more effective training of specific sport branch, which is tennis in their study [39]. And Ilhan et al. tried to find out the effects MI theory on teaching volleyball and gymnastic units [40].

This study, which was carried out on the ninth grade students in Ankara, examined the concept of MI, and utilized taekwondo courses in order to find out the relationship between this application and development of the

eight intelligences. On exploring the Turkish literature to date, there are some similar case studies which have been carried out in order to point out the relationship between specific sport practices and MI development, and used similar research designs with experiment-control groups and pre-test-post-test applications. Cengiz and Pular have adopted 12 weeks football training to the 8-10 years old children, and investigated the development of bodily/kinaesthetic and musical intelligences [41]. In this study it was pointed out that football training had positive effects on the development of both intelligences. Another case study was carried out by Bozkus, who preferred to investigate the effects of folk dance practices on the intelligence development of 5th grade students in terms of MI theory [42]. After 16 weeks of folk dance practices, it was found that the experiment group had recorded meaningful development in all 8 intelligence types. Therefore these 2 studies have reached to similar findings.

In all the studies which adopted some kinds of physical practices as supplementary activities, it would be expected to achieve a meaningful development in bodily/kinaesthetic intelligence. Therefore our study has also pointed out that taekwondo courses have contributed to the development of bodily/kinaesthetic intelligence levels of the students. Parallel to this finding, it is also conveyed that motor skills of youngsters training martial arts develop faster than untrained ones [43,44]. But the profits of martial arts in children education cannot be limited with only physical uses. In this respect, Jagiello and Dornowski have pointed out that the importance of martial arts in children and youth development is not limited with biological sphere, but also includes mental, pedagogical values [45]. In their study only 1,3% of the surveyed Physical Education College students declared that martial arts are useless in children education. In another study by Sasaki, it was pointed out that martial arts are undoubtedly more educational; as they emphasize spiritual development, than sport-like, especially compared to European recreational sports [46]. Turkmen also underlined the physical, psychological and social benefits of martial arts practices in children development [44].

In this study, as presented in Table 2, it was understood that taekwondo courses had meaningful effects on the development of overall intelligences of the students. But when it comes to the each type of intelligence shown in Table 3, this study has pointed out that there is meaningful difference in only bodily/kinaesthetic and interpersonal intelligences. Although there is a relative increase in musical intelligence,

no meaningful difference is recorded. Therefore the findings of this study are not completely parallel to the findings of the study by Cengiz and Pular, as their study showed increase in musical intelligence. Also there is not a serious accordance with the study by Bozkus, as all the intelligences had meaningful increase in his study. However it is almost impossible to conclude that football or folk dances are more useful in terms of multiple intelligence development.

It is important to note that this study has shown significant increase in the interpersonal intelligence level of the students, which proves that taekwondo courses are helpful for socialization of the children. According to the Table 3, the most increase was noted in the interpersonal/social intelligence. Therefore socializing effect comes forward as the dominant effect of the courses. Kiremitci, in his study, underlined that participation to the sports activities helped to the socialization process of secondary school students as a result of increase in self-confidence, self-esteem, self-expression, control of stress and anxiety, and some other positive psychological feelings [47].

CONCLUSIONS

The main conclusion of this study is that students can benefit from taekwondo courses as a supplementary education activity, because the results of the research showed significant differences between the overall MI scores of the experiment group and the control group. It was also found out that taekwondo courses were more effective in the development of the students' interpersonal/social intelligence throughout eight intelligence types. Therefore taekwondo and some other martial arts should be adopted as supplementary activities for school curriculum.

As a result, the findings of this study contribute to the field by providing evidence of the educational benefits of taekwondo practices in MI development and in interpersonal intelligence development specifically. This is very important, because although previous studies have underlined that different kinds of sports practices helped to MI development, no study so far has stressed development in interpersonal intelligence. Still future research is needed to understand the relationship between application of different sports and MI development, and to generalise the findings of this study. Finally, future research should also explore the relationship between different kinds of sports and development of different kinds of intelligences.

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