

The Core competencies through Table Tennis

Las competencias básicas a través del tenis de mesa

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Abstract.

This article analyzes the views of physical education teachers who teach in public schools of the Community of Madrid on the core competencies that can be worked through table tennis and if they recommended its use in primary education. To do this, we used an inductive, transverse and quantitative methodology. The study population was all the public schools in the Community of Madrid, being the physical education teachers responsible for providing the requested data. These data were obtained using a self-administered with closed multiple choice questions previously validated by a panel of 5 experts questionnaire. Indirect variables were: gender of teachers, teacher age, professional experience and type of school. The process of data collection took 3 months, starting in May 2015. The following data were obtained: of the 798 schools in the Community of Madrid, a sample of 276 was obtained, this resulted in a response rate of 34, 59%, assuming the worst case scenario ($p = q$) and a confidence level of 95%, for total of 276 completed questionnaires, the maximum error was $\pm 4.78\%$. After analyzing the results, the contribution of table tennis appreciated the acquisition of basic skills and the objective "k" of Title I, Chapter II, Article 17 objectives of Primary Education LOE amended by LOMCE.

Keywords

Physical education; racquet sports; Primary Education.

Resumen

El presente artículo analiza la opinión de los profesores de Educación Física que imparten clases en los colegios públicos de la Comunidad de Madrid sobre las competencias básicas susceptibles de ser trabajadas a través del tenis de mesa y si creen recomendable su utilización en la Educación Primaria. Para ello, se ha utilizado una metodología inductiva, transversal y de cuantitativa. La población objeto de estudio fue la totalidad de los colegios públicos de la Comunidad de Madrid, siendo los profesores de Educación Física los encargados de facilitar los datos solicitados. Estos datos se obtuvieron utilizando un cuestionario auto administrado con preguntas cerradas de opción múltiple previamente validado por un panel de 5 expertos. Las variables indirectas fueron: el género del profesorado, la edad del profesorado, la experiencia profesional y el tipo de destino. El proceso de la toma de datos supuso un lapso de tiempo de 3 meses, desde mayo de 2015. Se obtuvieron los siguientes datos: sobre una población de 798 colegios, se consiguió una muestra de 276, esto supuso una tasa de respuesta del 34,59%, asumiendo la situación más desfavorable posible ($p=q$) y un nivel de confianza del 95%, para el total de los 276 cuestionarios cumplimentados, el error máximo fue del $\pm 4,78\%$. Tras el análisis de los resultados, se apreció la contribución del tenis de mesa a la adquisición de las competencias básicas y al objetivo “k” del Título I, Capítulo II, artículo 17 de objetivos de la Educación Primaria de la LOE modificada por la LOMCE.

Palabras clave

Educación Física; deportes de raqueta; Educación Primaria.



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Introduction

The Organic Law 2/2006 of May 3, Education (LOE) amended by Organic Law 8/2013, of 9 December, to improve educational quality (LOMCE), in its preliminary Title, Chapter III, on Curriculum and distribution of competences, Article 6. Point 2, point b, defines competences as *"capacity to implement integrated manner specific content to each teaching and educational stage, in order to achieve the proper implementation of activities and the efficient resolution of complex problems."*

From this starting point and the great importance that current regulation gives the sport in general, this study on the inclusion of table tennis in primary education arises. It is an ideal time to develop sports initiation in primary school. *"Sport is a healthy, fun and educational activity that can have profound benefits not only for their health and well-being but also for the physical, psychological and psychosocial comprehensive personal development of the child, in addition to its sports development"* (Pradas, 2009 , p. 151). Table tennis has a great advantage over many other sports due to *"it is open to all, regardless of age or sex, as well as high-level sport as a family or social practice"* (Gatién, 1993, p. 16). This is a key factor that makes it very interesting learning at school age, it can be a sport that accompanies the player throughout his life. Pradas (2009) ratifies that *"table tennis besides being a sport for everyone, presents itself as an attractive game, where its practice is fun at any age, both children and adults, mainly because it presents some simple rules of game, not locking danger to the physical integrity of its practitioners during their game"*(p. 83). Castellar and Pradas (2012) also indicate that *"As a result of the characteristics of the table tennis, sport with a mixed orientation, coeducational and a high degree of motivation, this discipline can be considered as another element to be integrated into the contents of curriculum for Physical Education area in Primary School"*.

Previous researches indicate the low incidence of injury in practicing table tennis at school age (Jenkinson, Naughton and Benson (2014), Malisoux, Frisch, Urhausen, Seil and Theisen (2013) and Sheng (2014)).

Unfortunately, *"there are few works on table tennis. Few books, both disclosure and reflection on table tennis, adorn the shelves of bookstores and libraries"* (Erb, 1999, p.14) and

adds "so, the school environment suffers from lack of explanatory and educational literature regarding this topic"(Erb, 1999, p. 14).

To understand this study, it is necessary to place the table tennis within one kind or another sport, it allows a better understanding of its structure and regulation, facilitates learning and helps the physical education teacher to develop their sport initiation, so table tennis can be defined as "an opposition sport or adversary, this means that a player is pitted against another, included in racquet sports, the playing field is a table divided by a net and aims to win the point based on getting back the ball on the side of the table where the adversary is placed without him being able to do the same, its structure makes it a sport that can be practiced throughout life"(Iglesias, López de Subijana and Gomez. 2015, p. 4).

The present study has a specific purpose which is "Analyze the opinion of physical education teachers who teach in public schools of the Community of Madrid on the core competencies that can be worked through table tennis and the contribution of table tennis in acquiring one of the objectives of primary education stage, as well as its recommendation to incorporate the sport in physical education classes in primary education".

It starts from the hypothesis that table tennis is an interesting sport to be practiced and taught in the subject of Physical Education in Primary Education because of its contribution to the acquisition of basic skills and the objective "k" of Primary education.

Material and method

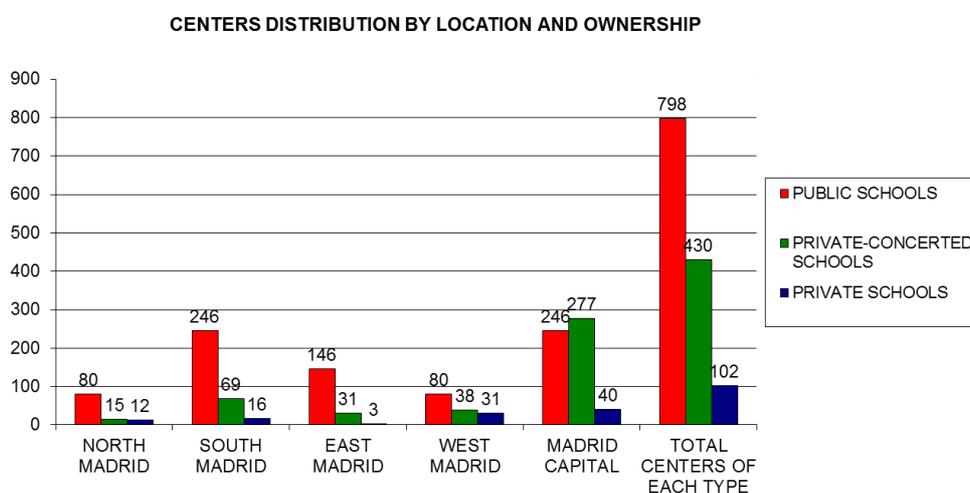
1. Study design.

It has used a cross-sectional design by surveys, "research procedures using surveys establish a set of rules that allow us to access scientifically what people think. One of the main objectives of these rules is that a second researcher can repeat the procedure following the same steps, i.e., must be systematic "(León and Montero, 2004, p.107). The study was quantitative type, to the extent that quantifiable information was obtained through questionnaires. Using the inductive method "it has been developed from the position that values the experience as a starting point for the generation of knowledge. That is, the inductive method of observing reality to, by generating the observation, reaches formulation of the law or scientific rule "(León and Montero, 2004, p.9). With the professional experience as a teacher of physical education at Alhambra School in Madrid has found the value of table

tennis as a sport to be included in the physical education classes, from this point arose a scientific interest in verifying whether or not the value of this sports in Primary Education.

2. Sample of research.

Of the total number of schools that existed in the Community of Madrid for Primary Education in which three types are distinguished: public, private-concerted and private, the population selected for this study corresponded to the total of public primary education of Community of Madrid, with a total of 798 centers in 2014-2015 course. (See Figure No. 1).



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Figure No. 1: Total number of Schools in the Community of Madrid. Source: Community of Madrid.

The people responsible for completing the questionnaires were physical education teachers assigned to each school, because they were suitable to answer the questionnaire. The manner to perform sampling depended on factors such as the objectives, resources and time available. (Cea, 2004).

- Objective: The objective of sampling was to obtain a representative sample of the target population for this, they were sent in 4 different times (during the month of May and June 2015) emails to all schools with a letter presentation and a link to complete the questionnaire. On the other hand, coinciding with the notice of competition for teacher corps specialized in physical education, data collection “*in situ*” was performed at each of the venues of examinations, distributing the questionnaire randomly to the board members (teachers assigned in public schools in the

Community of Madrid) and applicants who have been working with a vacant throughout the year during the course 2014-2015 in a public school of the Community of Madrid.

- Resources: Being a study that has not been subsidized or funded by any agency, it took a great effort to get the human and technical resources to carry out the investigation. It has had volunteer staff for a part of data collection "in situ" and it has invested economic resources in the necessary technical resources.
- Time available: Data collection was planned during the last quarter of the course 2014-2015.

Regarding to the representativeness of the sample is determined by the procedure followed to select each sample unit, which must be equally likely to be chosen to form the sample. The suitability of the sample was achieved by having access to the entire population and sending questionnaires to all schools. The sample size that has been achieved yields a maximum estimate error of less than 5%.

Regarding the data obtained on a population of 798 schools, a sample of 276 was achieved, this resulted in a response rate of 34.59%, assuming the worst case scenario ($p = q$) and a level 95% confidence for the total of 276 completed questionnaires, the estimation error was $\pm 4.78\%$.

The data obtained are summarized as follows:

	Population	Response rate (sample)	% Response rate (sample)	Maximum error for a confidence index 95%.
Public Schools CAM	798	276	34,59%	$\pm 4,78\%$

Figure 2: Population, response rate and maximum error obtained.

The characteristics of the sample are as follows:

Sample characteristics	Men	Women
Total Sample	179	97
Percentage	64,9%	35,1%
Average age	37,83 years	38,44 years
Average years of experience	11,10 years	11,88 years
Employment status, Definitive at the school	70,95%	77,32%

Figure 3: Sample Characteristics

3. Instrument.

In this study the instrument used for data collection was the questionnaire self-administered, León and Montero (2004) understand questionnaire as *"default set of questions designed to record data about people under investigation. Typically, the answer is closed"* (p.65). The self-administered questionnaire is characterized because the respondents themselves are who have to read the questionnaire and fill it without the presence of an interviewer, therefore, it was an ideal instrument for this study because the questionnaire had to be sent to different schools and due to quantity, geographical location or spatial dispersion would have been difficult to reach them to obtain the desired data. To do this, two types of questionnaires were developed: online and pencil and paper.

The questionnaire was developed specifically for research on the suitability of the practice of table tennis in Primary Education, comprises a total of 125 questions, being all questions type closed but the first referred to the name and location of the school which are open type. In order to prepare this questionnaire, 5 dimensions were used: School, professorate, table tennis in relation with legislation, table tennis as sport in primary school and promotion of table tennis in schools.

For the purpose shown in this article, the most interesting dimensions are professorate and table tennis in relation with legislation.

On the professorate dimension, the following items are highlighted:

Variable	Type
Indicate your genre	Nominal
Indicate your age	Quantitative
Years of experience teaching physical education	Quantitative
Indicate employment status	Nominal

About the dimension of table tennis in relation with legislation, the following items are highlighted:

Variable	Type
Article 4 of Decree 89/2014, of 24 July, the Governing Council by establishing the Community of Madrid for the Primary Education Curriculum. Establishes the objectives of Stage k) Assess of hygiene and health, know and respect the human body, and use physical education and sport to encourage personal and social development. Do you think that table tennis can help students to achieve this goal:	Nominal
Indicate the following competencies which you believe that can be worked with table tennis.	Nominal
Do you recommend the use of Table Tennis in the area of Physical Education in Primary Education?	Ordinal

As stated above, the instrument used for data collection has been a self-administered questionnaire. In the absence of a validated instrument that could be adapted to the specific characteristics and needs of the study, the questionnaire had to be specifically designed by using the literature review in the first instance. Then a panel of 5 experts with over 15 years of research experience in the field of sciences of physical activity and sport was created; and

they held three rounds on the content and relevance of the questions. This confirmed the external validity of the instrument.

4. Procedure.

The procedure used in this research was configured to respond the issues rose in this study and its main function is to unite all aspects of the investigation (see Figure No. 4).

Phase I: Definition of research objectives	•Review the state of knowledge; Justification of the research; objectives and hypotesis.
Phase II: Selection of research population	•Selection of the population and sample calculation.
Phase III: Instrument design and research technique	•Development and validation of the questionnaire
Phase IV: Data Sampling	•Application of questionnaires
Phase V: Result Analysis	•Treatment of the results; statistical analysis
Phase VI: Result Evaluation	•Discussion and interpretation of results; Conclusions

Figure No. 4: Research design phases.

5. Data Analysis.

Completed all questionnaires, data were coded and loaded into a computer data analysis package, the Predictive Analytics Software (SPSS, v.21).

The analysis of data for the purpose discussed in this article was carried out based on the following aspects:

1. Descriptive statistics for continuous variables in mean values and standard deviation, and for categorical variables in frequencies (percentages,%).
2. The variables age and years of experience were established in categories using cluster analysis procedure k-means, in the case of the variable age three groups were defined (25-35 years, between 36-45 years and older 45 years), while the variable years of experience was settled into two groups (between 1 and 13 years of experience and over 13 years of experience).
3. For the analysis of categorical variables, contingency tables were used to determine the degree of association between questions and variables such as age, years of experience, gender and type of destination of professorate. The procedure was performed considering the Chi-Square test of Pearson with adjusting Montecarlo (Fisher test) for cases that would show values lower than 5% of the expected frequency or one case per cell. To estimate the degree of relationship between

categories of study, corrected standardized residuals were used, taking the values above 2.0 or -2.0 as significant for interpretation (Pardo and Ruiz, 2004). Also, to estimate the size of the effect (TE) of that test the value of the V Cramer was used, considering the values as small 0.10, moderate with 0.30 and high from 0.50 (Volker, 2006).

4. For the analysis of mean comparisons of ordinal variables (questions with scores of scale of 1 to 5) the U-mann-Whitney test was used for two independent samples (gender, years of experience and type of destination) and the Kruskal Wallis test was used for comparisons of more than 2 independent samples (age of professorate).

All the analyses were performed using SPSS 21.0 statistical software. The significance level for all analyzes was set at $p < 0.05$.

Results

The results of the three items discussed in this article are analyzed:

1. The opinion of teachers on the basic skills (BBCC) that are worked with table tennis in physical education classes (Figure No. 5). The results showed that the BBCC that were developed the most were competence in linguistic communication (64.07%), social and civic competence (57.04%) and competence sense of initiative and entrepreneurship (52.96%). The BBCC that were considered less relevant by teachers were mathematical competence and basic competences in science and technology (25.19%) and the competence of learning to learn (28.15%).

Analysis of the BBCC that are worked with table tennis

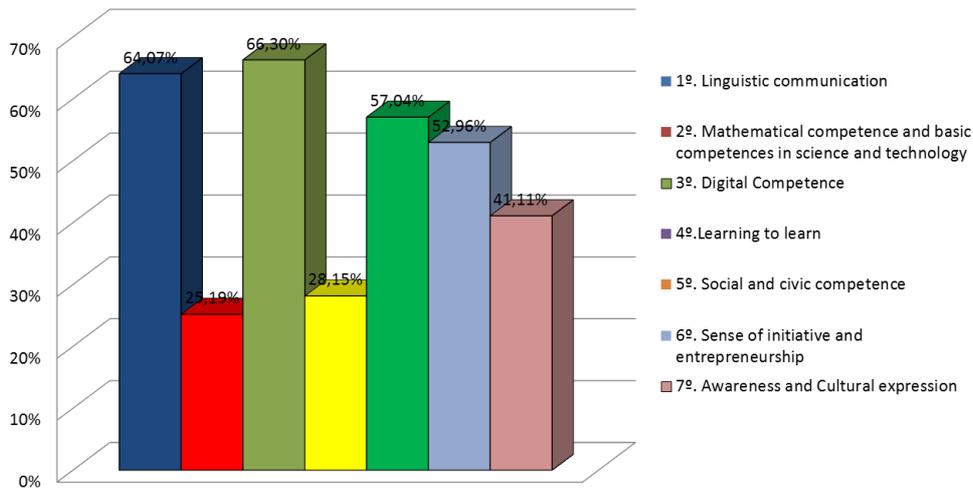


Figure No. 5: Analysis of basic competences (BBCC) that are worked with table tennis.

2. The results of the opinion about table tennis and its place in the k stage goal of primary education showed that 92% of men and 97% of women considered that table tennis fit k objective, while 1.1% of men considered that this sport had no place in the k objective, and 6.15% of men and 2.1% of women did not have clear the possibility of inclusion of sport within the stage objective "k". (See Figure No. 6).

Percentage Analysis between men and women objective K

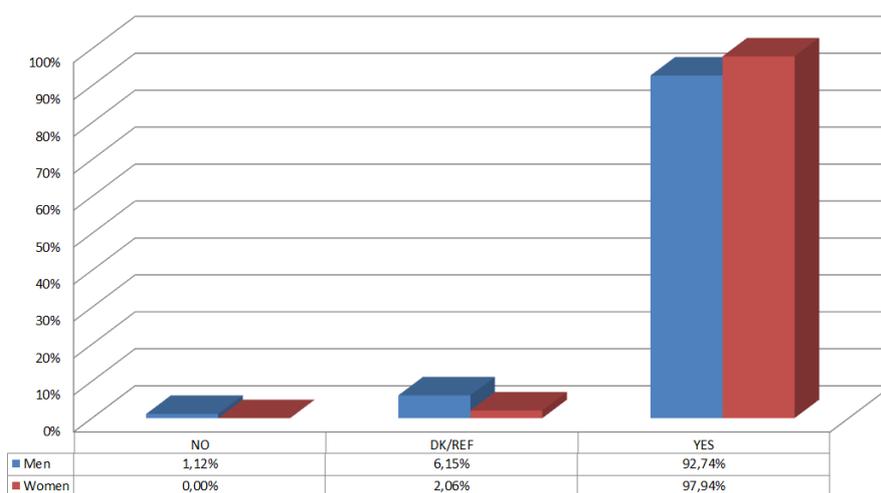


Figure No. 6: Analysis of the inclusion of table tennis in the stage objective "k" of primary education by gender.

3. Regarding the opinion of professorate about whether it was advisable or not the use of table tennis in physical education classes, the results of Figure 6 showed that 82.6% of the professorate surveyed agreed with the recommendation, 3.6% and 13.8% not and do not know or refused.

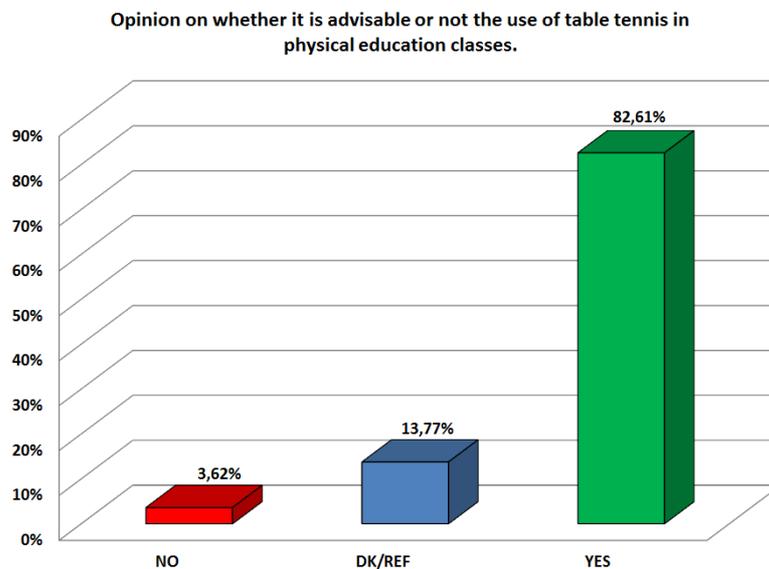


Figure 7: Frequencies on the opinion on whether it is advisable to use the table tennis in PE classes.

Then the results of the analysis of contingencies are presented by differentiating the opinion of professorate by gender, age, experience and type of destination regarding the question if they think it is advisable the use of table tennis in physical education.

The results presented in Table 1 showed that there were not differences of opinion on professorate gender on whether it is advisable the use of table tennis in physical education.

Table 1: Frequency analysis on the opinion of professorate by gender and whether it is advisable to use table tennis in physical education at primary school.

		Genre		χ^2	dg	P	EF	ES
		Man	Woman					
No	n	9	1					
	%	90,0%	10,0%					
	Adjusted Residuals	1,7	-1,7					
DK/REF	n	25	13	2,809	2	0,266	3,51	0,1
	%	65,8%	34,2%					
	Adjusted Residuals	,1	-,1					
Yes	n	145	83					
	%	63,6%	36,4%					
	Adjusted Residuals	-1,0	1,0					
Total	n	179	97					
	%	64,9%	35,1%					

Note= df: degrees of freedom; ES: effect size; EF: expected frequency, when the value was less than 5 or the % of re-counting in the box is below 1 Fisher's test was applied.

The results presented in Table 2 showed that there were not differences of opinion in teachers depending on the age group about whether it is advisable the use of table tennis in physical education.

Table 2: Frequency analysis on the opinion of professorate by age and whether it is advisable to use table tennis in physical education at primary school.

		Age			χ^2	df	P	EF	ES
		25-35	36-45	≥ 46 Years					
No	n	1	5	4	3,289	2	0,496	1,4	0,08
	%	10,0%	50,0%	40,0%					
	Adjusted Residuals	-,4	,7	-,4					
DK/REF	n	2	15	20					
	%	5,4%	40,5%	54,1%					
	Adjusted Residuals	-1,6	,2	1,0					
Yes	n	34	84	100					
	%	15,6%	38,5%	45,9%					
	Adjusted Residuals	1,7	-,5	-,6					
Total	n	37	104	124					
	%	14,0%	39,2%	46,8%					

Note= df: degrees of freedom; ES: effect size; EF: expected frequency, when the value was less than 5 or the % of re-counting in the box is below 1 Fisher's test was applied.

The results presented in Table 3 showed that there were not differences of opinion in teachers based on the experience about whether it is advisable the use of table tennis in physical education.

Table 3: Frequency analysis on the opinion of professorate by years of experience and whether it is advisable to use table tennis in physical education at primary school.

		Years of experience		χ^2	df	P	EF	ES
		1-13	≥ 14					
No	n	2	8					
	%	20,0%	80,0%					
	Adjusted Residuals	-,7	,7					
DK/REF	n	6	26	2,995	2	0,206	3,07	0,11
	%	18,8%	81,3%					
	Adjusted Residuals	-1,6	1,6					
Yes	n	69	140					
	%	33,0%	67,0%					
	Adjusted Residuals	1,8	-1,8					
Total	n	77	174					
	%	30,7%	69,3%					

Note= df: degrees of freedom; ES: effect size; EF: expected frequency, when the value was less than 5 or the % of re-counting in the box below 1 Fisher's test was applied.

Finally, the results presented in Table 4 showed that there were not differences of opinion in teachers depending on the type of destination about whether it is advisable the use of table tennis in physical education.

Table 4: Frequency analysis on the opinion of professorate by type of destination and whether it is advisable to use table tennis in physical education at primary school.

		Type of Destination		χ^2	df	P	EF	ES
		Definitive	No Def.					
No	n	6	4	1,796	2	0,366	2,68	0,07
	%	60,0%	40,0%					
	Adjusted Residuals	-1,0	1,0					
DK/REF	n	26	12	1,796	2	0,366	2,68	0,07
	%	68,4%	31,6%					
	Adjusted Residuals	-,7	,7					
Yes	n	170	58	1,796	2	0,366	2,68	0,07
	%	74,6%	25,4%					
	Adjusted Residuals	1,1	-1,1					
Total	n	202	74	1,796	2	0,366	2,68	0,07
	%	73,2%	26,8%					

Note= df: degrees of freedom; ES: effect size; EF: expected frequency, when the value was less than 5 or the % of re-counting in the box is below 1 Fisher's test was applied.

Discussion

The results of this research show that table tennis contributes to the acquisition of basic competences and the development of objective "k" of Title I, Chapter II, Article 17 objectives of Primary Education LOE amended by LOMCE, that indicates " *Assess of hygiene and health, know and respect the human body, and use physical education and sport to encourage personal and social development.*"

According to Jenkinson, Naughton and Benson (2014), Malisoux, Frisch, Urhausen, Seil and Theisen (2013) and Sheng (2014) the table tennis work, a part of the health component highlights the cooperative, socializing and motivating aspect of their practice.

Analyzed the basic competences that help to acquire and the contribution to develop the objective "k" can be concluded by saying that the practice of table tennis can be an interesting sport to develop in the stage of primary education. The professorate is responsible for widening the spectrum of activities proposed in the contents of physical education

(Dimitrov, 2014). Therefore, the proposal of traditional and alternative sports is a wealth of student learning.

On the other hand, the results whether it was advisable or not the use of table tennis in physical education classes show that most professionals recommend the use of table tennis in the class sessions of the physical education subject. There are no differences of opinion analyzing the results by gender, age, years of experience or type of destination.

Conclusions

The practice of table tennis can contribute to the acquisition of basic competences, mainly to competence in linguistic communication, social and civic competence and the competence sense of initiative and entrepreneurship, also it can contribute to the development of the objective "k" Title I, Chapter II, Article 17 objectives of Primary Education LOE amended by LOMCE, also referred in Article 4 of Decree 89/2014, of 24 July, the Council of Government, establishing for the Community of Madrid Curriculum of Primary Education, stating *"Assess of hygiene and health, know and respect the human body, and use physical education and sport to encourage personal and social development."* In addition, it was shown the low rate of injuries.

Finally, there exists a great interest by professorate surveyed to use the table tennis in physical education classes.

Limitations of the study

The limitations of the study have been mainly of two types, temporary and financing. Temporary, to the extent that this research has been carried out combined the professional development of the author as secretary (within the management team), TIC coordinator and specialist teacher in physical education at CEIP Alhambra in Madrid. Financial, since the lack of external financing has proved to be another limitation factor in this investigation, as it has affected the size of the study sample due to be unable to have employees for data collection and being unable to go to different schools to complete the questionnaire and perform data

collection, using only volunteers for taking data at different locations of the opposition. This lack of external funding has prevented the sampling at national scale data limiting the research to the Community of Madrid.

Future research

The results obtained in this research in addition to meeting the objectives and hypothesis contained in this study generate, at the same time, many new questions that enable future research, among them are the following:

First, perform a program of sports promotion of table tennis in schools of the Community of Madrid.

Second, expand the study to high schools, starting with the public and continuing for concerted-private and private.

Third, implement a program of sports promotion of table tennis in the high schools of the Community of Madrid.

Fourth, analyze the evolution of the number of federal licenses of table tennis following the progressive introduction of table tennis in primary and high schools.

Finally, expand the study at national scale both primary and high schools.

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