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Effects of traditional and ludotechnical instructional approaches on the development of athletics performance, efficiency and enjoyment

Pregledni znanstveni članek

UDK 796:37.091.3

KLJUČNE BESEDE: šport, športna vzgoja, učni modeli

POVZETEK – Za tradicionalne metode poučevanja, ki se uporabljajo pri atletskih začetkih, je značilen tehnični pristop, ki vključuje ponavljanje določenih vaj. To je posledica mehanistične teorije, ki atletske discipline opisuje kot preprost niz tehnik, namenjenih temu, da omogočijo visoko učinkovitost določenih gibov. Zaradi tega jih otroci slabo sprejemajo pri pouku športne vzgoje. Namen te raziskave je primerjava učinkovitosti tradicionalnega pristopa in nove metode, pristop igre, pri atletskih učnih izidih. Metoda igre je alternativni pristop k učenju atletskih sposobnosti, ki je usmerjen k igri in celostnemu učenju. Naši rezultati kažejo, da ta alternativni pristop dosega podobne rezultate glede izvedbe in tehnike kot tradicionalni pristop, vendar spodbuja večje razumevanje za atletiko in večje veselje do učenja.

Author review

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KEYWORDS: sport, physical education, instructional models

ABSTRACT – Traditional teaching methods used for athletics initiation are characterised by a technique approach that involves the repetition of certain exercises. This is the result of a mechanistic philosophy that views athletics events as a simple set of techniques aimed at producing high performance of specific movements. This has led to its poor acceptance by children in physical education classes. The aim of this study is to compare the efficacy of traditional approach versus a novel method, the ludotechnical approach, in athletic learning outcomes. The ludotechnical method is an alternative approach to teach athletics abilities, focused on play and comprehensive learning. Our results suggest that this alternative approach produces similar results in terms of performance and technique as traditional instruction, while promoting a better appreciation of athletics and a greater enjoyment in learning.

1. Introduction

It is important to challenge the ideas that athletics initiation in primary schools should place technique as the most important learning outcome and that instruction should be delivered analytically. On the other hand, there is the idea that learning in athletics can be liberating to children and contribute to many valued educational outcomes and positive attitudes. Play and athletics can go together in the primary school, where play can be used to introduce the sport by means of games with rules, minisports, simplified sports etc. (Delgado, Valero & Conde, 2003).

Athletics as an activity for encouraging sport initiation does not require complex facilities or complicated devices; it is enough to have an open space where it is possible to practice different types of throws, jumps and races. For this reason, it is not surprising that the practice of this sport has deep roots in the education and culture of Western and Eastern countries; it is one of the most prevalent aspects of physical education curriculums in schools, offered in almost every country. Its potential interest stems from the demand that it develops the physical qualities of students, its contribution to the capacity of the cardiorespiratory system and the manner in which the characteristics of the disciplines that develop the natural foundations of walking, running, jumping and throwing.

Traditionally, athletics modalities have been synonymous with competition and single events and taught only to the most talented students and prospective athletes (O'Neill, 1993; Launder, 1994). This limited focus has drastically restricted its educational possibilities for all students, talented or not. Similarly, there has been a concentration on single events, in particular those practiced by adults for formal competitions. Finally, there has been a failure to structure athletics instruction in a different way than that used for competitive training outcome (Fisher, 1990).

The teaching methods used for athletics initiation in clubs and sports schools – and brought into primary schools – have grown out of traditional teaching characterized by a technique approach involving the repetition of certain exercises (Valero & Conde, 2003). This is the result of a mechanistic philosophy that views athletics events as a simple set of techniques and the proposition of learning-teaching situations aimed at producing high performance of specific movements. This has led to its poor acceptance by non-athletes, such as children in primary schools. Children are more interested in being able to play than in learning repetitive motor patterns, so this approach to the teaching of track and field frequently leads to disinterested learners in primary schools.

Reviewing the studies on sports instruction published in recent years, it is evident that there is great emphasis on team sports (Gréhaigne et al., 2001; Light & Fawns, 2003). However, there is no research on individual sports such as athletics, despite the large number of available books and basic handbooks (e.g. Hegedus, 1988; Hubiche & Pradet, 1999; Polischuk, 1996) that closely adhere to the traditional (otherwise referred to as the technical or analytical) approach to athletics instruction for children.

Research on team and individual field sports has led to the proposal of alternatives to the purely traditional approaches to teaching individual sports such as gymnastics, judo, swimming, cycling (Blomqvist et al. 2001; Harrison et al. 1998, 1999; Méndez 1999). In that same vein, Valero and Conde (2003) proposed the ludotechnical approach, which uses "play forms" for increasing enjoyment without ignoring or downplaying the importance of skill learning in athletics.

The ludotechnical approach uses features of constructivist teaching and behavioural theories to promote increased learning and enjoyment for young children. It is based on a different conception of athletics that focuses on developmentally appropriate elements related to the age and abilities of the learners. It uses "play forms" as motivating elements and catalysts for engagement in small- and large-group games that contain specific essential elements of one or more athletics events. Play forms are modified games which have one or several technique rules of the discipline the teacher wants to teach, with a high engagement in the task where students have a sufficient number of tries to practice the athletic skill while they are enjoying.

The technique skill continues to be one of the aims of athletics instruction in the ludotechnical approach, but at a level equal to other important outcomes, such as the physiological and emotional development of children and the instilling of motivation for continued participation in athletics. The latter is determined by internal factors such as the triumphs and personal achievements of each athlete. This is enhanced by making regular measurements of times and records available to children so they can assess their own improvement over time.

2. Methods

Participants. Students: 88 fourth-grade students (43 males and 45 females) were randomly selected from three primary school physical education classes in an urban area of Spain. Students were from middle-class socioeconomic backgrounds. None of them had previous experience with athletics. 29 or 30 subjects were randomly assigned to each of two treatment groups (traditional and ludotechnical instruction, respectively). A control group of 29 fourth-grade students from the same school received no athletics instruction during the course of this study. As a result of random assignment, the number of males and females in each group was similar. The amount and type of sport and physical activity undertaken by each of the experimental subjects was recorded in a diary each week to take into account any possible confounding variables, such as the volume and type of exercise. None of the subjects reported sufficient amounts of outside physical activity to cause them to be deselected from the study.

Teachers: three experienced male teachers served as instructors for the experimental groups. All of them were trained in both sport initiation approaches, traditional and ludotechnical, and each had previously specialised in one of the athletics events included in this study (athletic walk, shot put and high jump).

Instruction and treatment verification. A pilot study was conducted prior to the full scale study, involving fewer subjects, fewer events and a shorter treatment period (Valero et al., 2004a). Afterwards, it was decided to use two video cameras instead of one in order to get a better view of the students in the gym and a wireless microphone to record what the teacher said to the students.

In this study, the two treatment groups received instruction in athletics. The ludotechnical group focused on the athletic skill through play forms described earlier. The

traditional group focused on acquiring the athletic skill through analytical tasks. The control group participated in a unit unrelated to athletics.

Each treatment group received 18 lessons of approximately 45 minutes in length for 2 days a week over a nine-week period. A short warm-up of about seven minutes started each lesson, with the aim of preventing possible injuries. Following the introduction, each experimental group received six instruction lessons by direct instruction in athletic walk, high jump and shot put. During each lesson, teachers were limited to giving feedback or instruction on the technique related to the skill in each lesson. Practice tasks became progressively more difficult. Teachers in traditional lessons could not intervene to give instruction related to the games during the assimilation or application tasks, and teachers in ludotechnical lessons had to explain the games as many times as necessary. In both cases, the aim was to improve technical skills.

The traditional instruction had a three-part lesson framework. The first consisted of assimilation exercises, in which the children were engaged in a series of learning tasks designed to develop the technique skill required to reproduce an isolated fragment of an overall model of movement. The second part consisted of application exercises, in which the children completed a set of activities to improve the physical qualities associated with the technique skill they were trying to learn. The third part included some type of "cool down" game to dissipate the tension accumulated during the lesson, although this was unconnected to what was learnt in the earlier part of the lesson (Devís & Peiró, 1995). Each lesson included three assimilation tasks, three application tasks and a game at the end. Teachers refined the phases of each discipline involving ankle, knee, hip, waist, trunk, shoulder, elbow, wrist and neck action, body positioning and rotation in the assimilation tasks. They intervened to provide feedback, a refining task, or both, to draw attention to the technical aspects of the skill. Practice tasks became progressively more difficult. During application tasks and game play, the teacher provided only feedback or instruction on the skill technique.

The ludotechnical instruction also focused on a lesson framework that was divided into three parts, as proposed by Valero and Conde (2003). Every learning task was presented in conjunction with a modified play form planned by the teacher before the beginning of the lesson.

First stage: Discipline global presentation. In each lesson, children were introduced to the complete technique skill by a short explanation of the discipline, through a combination of visual and verbal cuing. In later lessons, this part took the form of a brief review. The purpose was to dispense as much as possible with lengthy explanations of how the movement is carried out, thus acting more as a complement to the practical examples of the teacher or student demonstrator.

Second stage: Play forms. This phase included the skill instruction due to be added to modified games by technique rules. One is the basic element of the proposal defined by Conde and Valero (1997, p. 114) as "*the specific element that is included in the portrayal of the ludic activities with the aim that the child playing incorporates and assimilates different technical skills, or phases thereof, causing him to focus his attention on the element he wants to work on and not solely on the game*". Teachers initially included a limited number of technique elements so that children paid attention to them without losing concentration or being overloaded with information. The number of essential elements communicated to the students was increased as their skill level improved. Each lesson consisted of five of these tasks and teachers only provided feedback or instruction on the skill technique or its relation with the game rules.

Third stage: Global practice of every technique element comprising the discipline. This phase included two play-tasks designed to encourage the child to link the different movements that make up the skill thereby mastering it as a whole. The teacher provided feedback or instruction on all of the skill techniques and technical rules, so that they could be integrated into the overall skill of the discipline being learnt.

Treatment verification: every fourth lesson of each instructional unit was analysed to verify that the models were being implemented correctly. Eight benchmarks were developed for each model, reflecting the most important elements in them. The ludotechnical model benchmarks were contained in three groupings: global presentation, play form and global practice.

The global presentation benchmarks were:

- the teacher or one student shows the discipline to the rest of the students; and
- the teacher says something about the technique discipline when the discipline is being shown.

The play form benchmarks were:

- play forms have one or more technical rules;
- tasks are introduced as play-based movements; and
- every student must practice the technical rules at least once.

The global practice benchmarks were:

- the task is introduced as a game;
- the game forces the students to make a complete or nearly complete movement of the athletics discipline; and
- the teacher and students focus on the whole discipline, instead of one or two technical rules.

The traditional model benchmarks were also contained in three groupings: assimilation exercises, application exercises and play. The assimilation exercises benchmarks were:

- students' attention must be focused on one specific part of the body (arms, trunk or legs);
- the movement is linked with one part or phase of the athletics analytic technique; and
- the movement must be repeated several times.

The application exercises benchmarks were:

- one or some of the main muscle groups in the technical movement are used;
- the movement is repeated several times in an analytical way;
- the exercises are not designed to promote enjoyment by the students; and
- the exercises are designed to fatigue the muscles or make it more difficult to develop the movement (e.g. making a high number of repetitions with light loads).

The play benchmarks were:

- the activity is enjoyable to students; and
- there is no direct connection between the assimilation exercises where students have to develop the technical discipline and the play.

The ludotechnical lessons demonstrated 89.53% of the total benchmarks and the traditional model lessons demonstrated 84.05% of the total benchmarks. In both cases, the levels are high enough to verify that teachers satisfactorily implemented the instruction according to the respective design of each model.

General test procedures. Data for efficiency and the technique skill variables were collected over two days on four occasions: before starting the instruction, after three and six weeks of receiving athletics initiation lessons and one month after having finished the instruction. Interviews were conducted at the end of the instruction, once the efficiency and technique skill tests were completed. Teachers and students were directed to the appropriate site on each testing day. More details of each test and procedures are provided in subsequent sections.

Efficiency test. An athletic track was used for efficiency testing of the athletic walk and the shot put on one day and for the high jump on a different day. Three experimenters were trained to administer the tests. Students did a prescribed warm-up for about seven minutes before each test. They were then individually called by an experimenter to do each efficiency test. After the completion of the athletic walk test, the students moved on to the shot put test in a prearranged order.

Each experimenter read a short set of written instructions to the student for each efficiency test. The student then performed several practice trials before the actual test began. A test similar to that which would be used in competition was employed to obtain a measure of the performance of each individual in the athletic walk, the high jump and the shot put.

For the athletic walk, the time taken to cover a distance of 50 metres was measured to the nearest 0.1 second. Performance for the high jump was measured as the height of the bar (in centimetres) successfully cleared on a maximum of three attempts. The bar was successively raised by 5 centimetres from its initial height of 70 centimetres. The girls in this study threw a 1-kg shot and the boys threw a 2-kg shot from within a throwing circle of a 2.135-meter diameter. Performance for both was measured as the greatest distance among all the tested throws.

Technique skill test. Three observation sheets (one for each discipline) were created and validated to score the skill technique. This process is described in Valero et al. (2004b). All the subjects were videotaped by two cameras located at right-angles to one another during each skill performance attempt. The tapes were subsequently analysed by three experts in the analysis of athletic skills who scored highly on the reliability index based on Cohen's Kappa ($K = 0.79$ for the athletic walk, $K = 0.64$ for the high jump and $K = 0.78$ for the shot put). The observation sheets were also used to estimate the experts' trustworthiness, measured as Cronbach's Alpha. Very high values were obtained in all instances ($\alpha = 0.84$ for the athletic walk, $\alpha = 0.82$ for the high jump and $\alpha = 0.80$ for the shot put).

The shot put was easier to analyse than the other disciplines because the sequence was short. For the athletic walk skill, the part of the test between the 20- and 30-meter point was chosen for analysis. For the high jump skill, the criterion chosen was the greatest maximum height cleared before the subject knocked off the bar three times.

Interviews. Interviews were conducted at the end of each instructional unit in the study. The interviews had two purposes:

- to provide a greater understanding of the degree of enjoyment experienced by the different groups of students; and
- to analyse the instructors' thoughts and reflections during their teaching of each instructional approach.

A semistructured group interview model was used, as adopted by Taylor & Bogdan (1992). Students were asked four probing questions in an attempt to elicit their reflections. They were asked about the design of their respective instructional unit, their impressions of the athletics lessons they received, their opinions on the instructors and how they had been engaged in the unit. Likewise, instructors were asked three probing questions about their impressions of the two approaches, their opinions about the children's behaviour and their perceptions of the children's motivation with respect to each instructional approach.

The main researcher was equipped with an audiocassette recorder during the student and teacher interviews. The students' interviews were carried out in the classrooms. The students in each class were divided into eight groups of four subjects based on sex, the instructional approach received and the interest in athletics. Interest was determined by asking students whether or not they liked athletics. One boy and girl who liked athletics and another boy and girl who did not like it were chosen at random for each of the instructional approaches. These students then selected three of their classmates of the same sex so that they could all participate in the group interview.

Student interviews lasted for an average of 15 minutes, while the average duration of those for the instructors was 1 hour and 15 minutes. All the interviews were recorded and transcribed verbatim onto paper in preparation for the qualitative analysis using the "Nudist Vivo" (Non-Numerical Unstructured Data Indexing, Searching and Theorizing; QSR, 1999, version 5.0 for PC) program.

Data analysis. The repeated-measures (4 × 3) multivariate analysis of variance (MANOVA) was used to test the differences between the methodological approaches in technique and effectiveness. The intrasubject factor "Test" had four levels (pre-test, intermediate test, post-test and retest) and the intersubject factor "Group" had three levels (control group, which received no instruction; the ludic group, which was subjected to the ludotechnical approach; and the analytical group, which experienced the traditional approach). MANOVA was also used to analyse the teaching-learning process using the single factor of methodology.

The interview transcripts were initially analysed by data-reduction to significant units, followed by interpretation and structuring and, finally, drawing conclusions that are interpreted by the researcher (Miles & Huberman, 1984).

3. Results

Technique skill and efficiency

The comparison carried out indicates that there were differences between the methodological groups ($F = 6.236$, $p < 0.001$) and between the sexes ($F = 2.454$, $p < 0.05$). the intrasubject analysis reveals a general significant difference over time ($F = 5.541$, $p < 0.001$) and the interaction between the methodological groups ($F = 3.332$, $p < 0.001$) and the sex of the subjects ($F = 2.645$, $p < 0.01$) with the factor "Test". It is possible to examine which particular variable is responsible for this difference by inspecting the univariate comparisons.

Table 1: Univariate comparison of intrasubject effects.

Effect	*Test*	*Test-group*	*Test-sex*	*Test-group-sex*
Walk skill	0.000	0.003	0.796	0.512
Walk efficiency	0.000	0.000	0.006	0.334
High jump skill	0.011	0.019	0.306	0.581
High jump efficiency	0.104	0.704	0.019	0.017
Shot put skill	0.315	0.037	0.309	0.725
Shot put efficiency	0.006	0.099	0.109	0.711

Considering the intrasubject factor, Table 1 shows differences in the athletic walk technique ($F = 7.593$, $p < 0.001$) and performance ($F = 28.992$, $p < 0.001$), the

shot put performance ($F = 4.258$, $p < 0.01$) and the high jump technique ($F = 3.859$, $p < 0.05$). There was also an interaction between test and group for the athletic walk technique ($F = 3.425$, $p < 0.005$) and performance ($F = 22.655$, $p < 0.001$), the high jump technique ($F = 2.627$, $p < 0.05$) and the shot put technique ($F = 2.299$, $p < 0.05$). The significant interaction between test and group for the shot put technique may obscure genuine differences in the shot put technique for the test factor. There was also a significant test and sex interaction for the walk efficiency ($F = 4.343$, $p < 0.01$) and the high jump efficiency ($F = 3.391$, $p < 0.05$) variables as well as an interaction between test, group and sex for the high jump efficiency ($F = 2.673$, $p < 0.05$).

Considering intersubject effects, Table 2 shows that the methodology (group) exhibited differences only in the efficiency ($F = 7.881$, $p < 0.001$) and technique of the walk ($F = 55.412$, $p < 0.001$), while there were differences in sex in the shot put technique ($F = 10.435$, $p < 0.01$).

Table 2: Univariate comparison for intersubject effect.

Effect	*Relative growth rate*	*Group*	*Sex*	*Group-sex*
Walk skill	0.428	0.001	0.724	0.262
Walk efficiency	0.885	0.000	0.312	0.482
High jump skill	0.378	0.951	0.344	0.399
High jump efficiency	0.738	0.275	0.458	0.252
Shot put skill	0.542	0.489	0.002	0.880
Shot put efficiency	0.638	0.531	0.890	0.086

The interaction between test and group implies that the differences between the levels of a factor depended on the other levels. Therefore, the results were analysed separately for all levels of each main factor. Table 3 illustrates the main results of the inferential study for each of the variables. Of particular note are the following:

- The post-test athletic walk skill was significantly greater in the ludotechnical ($p < 0.01$) and analytical ($p < 0.001$) groups than in the control group.
- The post-test walk efficiency was significantly lower than the pre-test levels in the ludotechnical ($p < 0.001$) and control ($p < 0.05$) groups. This was not the case in the analytical group, in which there was no change.
- The shot put efficiency only improved in the control group in the post-test ($p < 0.05$) and retest ($p < 0.05$) measurements compared with the pre-test estimate. Nevertheless, this improvement does not mean that the results obtained for this group differed significantly from those of the other two groups.

- The high jump skill was greater in the ludotechnical and analytical groups. In the former, only a difference between the retest and pre-test estimates was detected ($p < 0.05$). The analytical group had better post-test results compared with the pre-test ($p < 0.05$) and intermediate test estimate ($p < 0.005$).

Table 3: Summary of results

Results by test	Pre-test	Walk efficiency: $\mu C = \mu L < \mu A$
	Intermediate test	Walk efficiency: $\mu C < \mu L < \mu A$
	Post-test	Walk efficiency: $\mu C < \mu L = \mu A$ Walk skill: $\mu C < \mu L = \mu A$
	Retest	Walk efficiency: $\mu C < \mu L = \mu A$ Walk skill: $\mu C = \mu L < \mu A$
Results by group	Control group	Walk efficiency: $\mu 1 = \mu 2 < \mu 3 = \mu 4$ Shot put efficiency: $\mu 1 = \mu 2$; $\mu 1 < \mu 3 = \mu 4$; $\mu 2 = \mu 3 = \mu 4$
	Ludic group	Walk efficiency: $\mu 1 < \mu 3 < \mu 2 = \mu 4$ Walk skill: $\mu 1 = \mu 2 < \mu 3 = \mu 4$ High jump skill: $\mu 1 = \mu 2 = \mu 3$; $\mu 1 < \mu 4$; $\mu 2 = \mu 3 = \mu 4$
	Analytical group	Walk skill: $\mu 1 = \mu 2 < \mu 4$; $\mu 1 < \mu 3 = \mu 4$; $\mu 2 = \mu 3$ High jump skill: $\mu 1 = \mu 2 < \mu 3 = \mu 4$

Note: μC: average control group; μL: average ludic group; μA: average analytical group; $\mu 1$: average pre – test; $\mu 2$: average intermediate – test; $\mu 3$: average post – test; $\mu 4$: average re – test

Interview data

Teaching-learning process assessment. Generally, the pupils expressed that they did not tire of the classes in either model. However, the instructors had a different view than the pupils, which was influenced by their prior experience and the lack of training in methodologies other than the traditional one. They perceived the traditional approach as excessively rigid instruction with a simple and straightforward delivery. They expressed that the newness of the ludotechnical approach lessened their confidence and their direction, perhaps leading them to demand less of their pupils believing the students would do nothing more than play the game and would not seek any other type of learning.

Differences between the approaches. Of the three athletics disciplines taught, the high jump was clearly best liked by the pupils. Those who received the traditional approach reported that they learnt more technique and had a smaller requirement for physical work, leading to an aversion towards the other two athletics disciplines. The students who received the ludotechnical approach expressed a high degree of enjoyment, which is in direct contrast to the students who experienced the traditional approach. Indeed, the latter approach made it more difficult to ensure that pupils continued to concentrate on practicing the sport, giving rise to many more incidents of misbehaviour and managerial problems for the instructors.

On the other hand, it was perceived that less learning took place under the ludotechnical approach due to the students' preconception that play is something far removed from the complete cognitive development of the individual. Indeed, those who experienced the traditional approach were thought to have improved more than those who had experienced the other approach, but the results do not bear this out.

Motivation. In referring to the motivation of pupils of these ages, the importance of the play form needs to be recognizsd because it is essential for the development of pupil and because it is an element that prompts learning. Motivation is improved by the increased enjoyment of the play-form itself. The ludotechnical approach is regarded as being the most suitable for bringing this about, since it involves adapting play forms to each person's characteristics.

The instructors remarked that competition was a very interesting and appropriate element to include in the lessons, whereas the pupils made no reference to this; they were only concerned with the play form as an element that gave them enjoyment.

Two additional elements that may influence pupils' motivation are the mass media (Beaudoin et al., 2007) and their relationships with friends (Hogg & Hains, 1996). The media generate preconceived ideas about gaining significant knowledge and motivate pupils to master technical aspects. Similarly, observing the activities that their own friends engage in and seeing how they enjoy themselves give rise to a stronger interest in, and thus motivation for, playing sport.

Influences on the study

There was an observed tendency by the students to deviate from the predetermined instructional approaches probably for two very different reasons. The group with the traditional approach became bored, which prompted the teachers to provide something different from what was originally intended. By contrast, there was a tendency by the teachers of the ludotechnical approach to remain in a current learning activity longer, rather than moving on with the planned programme in order to offer all of the proposed activities. Nevertheless, the instructors followed both approaches well but commented that they were not able to go beyond the "script" set out in the programmed lessons. This led to very different pupil behaviour from what they would have wished.

4. Discussion

Efficiency and athletics skill tests

The traditional and ludotechnical methodologies yielded similar improvements in the measured performance of the athletic walk. This finding is consistent with the conclusions drawn from other research studies of different sports (Allison & Thorpe, 1997;

Blomqvist et al., 2001; Boutmans, 1983; French et al., 1996; Gabriele & Maxwell, 1995; Griffin et al., 1995; Harrison et al., 1998; 1999; Lawton, 1989; McMorris, 1988; Méndez, 1999; Mitchell et al., 1995; Turner, 1992; 1996; Turner & Martinek, 1992).

The measured efficiency of the control group was greater than that of the treatment groups. This was probably the consequence of improvement in the skills with the traditional and ludotechnical approaches being associated with poorer efficiency, (e.g, learning to walk in a technically correct fashion always means that more time is taken to cover the distance in the performance test).

For the other disciplines, there were no differences between the groups in the different tests, although there were differences within the same group. This was particularly true in the measured performance of the control group in the shot put, which was due, in addition to the well-known principle of repetition and continuity training (Grosser et al., 1988), to the subjects' lack of knowledge of the technique, which made throwing further a more important criterion than throwing correctly.

On the other hand, the traditional and ludotechnical groups both showed a significantly improved high jump technique, even though this was not consistent throughout the study. This could be due to the longer time needed to learn the motor pattern of such a complex discipline and the demanding starting point established for the performance of this skill on the test (all subjects began with a jump of a minimum height of 70 centimetres).

Another matter that requires consideration is the relatively short length of the instructional units in this study (only six lessons for each athletic technique). More sessions devoted to each athletic technique would have meant an excessively long treatment overall and less time available for the other curricula contents that have to be taught during the school year.

Therefore, it may be inferred that the ludotechnical and the traditional approach to programmes of athletics initiation were both generally effective for two of the three disciplines (walk and high jump), although they might require a longer treatment time to produce more conclusive results, as McMorris (1998), McPherson and French (1991) and Méndez (1999) found. In a similar way, it is noted that the discipline of the shot put, in which no significant improvements were made in either the ludotechnical or the traditional group, a longer treatment time is clearly needed. This could have been anticipated since this is the most complex of the three disciplines offered in these units. This complexity is implicitly recognised by the order in which these disciplines appear in various manuals of athletics learning (Hegedus, 1988; Hubiche & Pradet, 1999; Polischuk, 1996; Vinuesa & Coll, 1997) based on the principle of progression through disciplines with increasingly complex techniques (Navarro, 1997).

Aspects of the teaching-learning process and the interviews

The subjects' attitudes towards the practice of athletics and their perceptions of the methodology they experienced were assessed based on the group interviews of students and instructors after the completion of the instructional units. It was found

that the manner in which instructors imparted knowledge to their classes had been influenced by their own experience of specific teaching-learning approaches (traditional approach). The absence of a similar level of experience with the ludotechnical approach led to a lack of confidence and failure to know in which direction to take the lessons.

The instructors expressed a preconceived idea that ludotechnical play forms do not lead to "serious learning" and regarded the approach as having the capacity for producing enjoyment but not learning, despite the result that the ludotechnical approach was equally effective in promoting technique and performance.

It should be added that the play form in the ludotechnical approach was the most motivating element, leading to enjoyable participation experiences for those students. This finding is in keeping with those reported by several other authors (Couedou, 1995; Duff, 1993; O'Neill, 1992; Watts, 1987; Zanatta, 1984).

On the other hand, the lack of enjoyment associated with the traditional approach put pressure on the teachers and the students, leading the latter to "let off steam" through misbehaviour and inattentive behaviour much more often than did the students who experienced the ludotechnical approach. This observation of a lack of enjoyment is consistent with the findings of other research studies (e.g. Allison & Thorpe, 1997; Boutmans, 1983; Durán & Lasierra, 1987; Griffin et al., 1995; Méndez, 1999; Turner, 1996). Although these studies were not concerned with athletics, they compared the two instructional approaches to sport learning settings, concluding that students who concentrated excessively on the technique exhibited more behavioural problems. In the few studies of athletics as the learning content, Murrie (1997) and Zanatta (1984) agreed that the traditional approach led to less interest and children who were engaged in this way became bored.

The instructors' obvious preference for the ability of the ludotechnical or similar approach to inspire the students' interest has been noted previously (Allison & Thorpe, 1997; Boutmans, 1983; Durán & Lasierra, 1987; Griffin et al., 1995; Méndez, 1999; Ormond et al., 1995; Turner & Martinek, 1995). Moreover, studies such as those of Almond (1984), Beaumont (1990), O'Neill (1992) and Zanatta (1984) drew conclusions that are in close accord with those of the present research: competition can be considered an integral element of learning, boosting motivation and encouraging human relationships.

Several important elements, including the mass media and the relationships with friends, can influence children's motivation. For example, when a child observes other children (especially friends) enjoying themselves, it encourages the child to join in the proposed exercises. Another factor was the "script" set out in the programmed lessons in this study, which prevented the instructors from deviating from the planned activities and perhaps forcing them to behave in a very different manner than they might have chosen themselves. This demonstrates that the teaching-learning process was well controlled in this study, thus preventing variables other than those of the proposed methodology from influencing the technique, performance and motivation of the students learning athletics for the first time.

Finally, this work demonstrates that there is a place in the school environment for an alternative approach to physical education content, as athletics initiation. The ludotechnical approach addresses its development as well as the characteristics and needs of learners, not teachers. It yields similar results for performance and technique than the traditional instruction, but promotes a better appreciation of athletics and a greater enjoyment while learning it.

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Projektne naloge za nadarjene učence

Pregledni znanstveni članek

UDK 37.091.313-056.45

KLJUČNE BESEDE: šolski knjižničarji, projektno delo, timsko delo, nadarjeni učenci, informacijska pismenost, informacijsko komunikacijska tehnologija

POVZETEK – Prispevek opisuje projektno delo s timskim pristopom pedagoških delavcev, osnovano na poizvedovalnih aktivnostih učencev, pri katerem sodeluje šolski knjižničar. Želene kompetence, ki jih učenci skozi proces pridobivajo, so: informacijska pismenost, učenje učenja, pridobitev znanja s področja teme projekta, bralna pismenost, smiselna uporaba informacijsko komunikacijske tehnologije (IKT) in socialne veščine. Zaradi kompleksnosti tega procesa je tak način dela še posebej primeren za nadarjene učence kot dodatna aktivnost. Nadarjenost sama po sebi še ne zagotavlja višje stopnje informacijske pismenosti, rabe informacij za kreativno pisanje se je skozi izkušnje treba naučiti, prav tako rabe IKT nasploh. Prikazana je študija primera enega od projektov, za evalvacijo so bili izpeljani intervjuji s sodelujočimi mentoricami in razgovor v obliki fokusne skupine sodelujočih učencev.

Author review

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KEYWORDS: school librarians, project work, team work, gifted pupils, information literacy, information and communications technologies

ABSTRACT – The article describes project work and team approach based on inquiry based pupils' activities, in which also school librarian is involved. Pupils gain the following competences: effective use of information and communications technologies (ICT), information literacy, learning how to learn, curriculum content, literacy competence and social skills. Due to the complexitiy of this process, this kind of work is recomended for gifted children as an activity beside regular classes. Gift itself does not gurantee a higher level of information literacy. The use of information for creative writing should be tought as well as the use of ICT for successful presentations. The case study of a project is presented and the evaluation is based on interviews with teachers and conversations with pupils in the form of a focus group.

1. Projektna naloga in pridobivanje učenčevih kompetenc

Delovne naloge šolskega knjižničarja v osnovi obsegajo dvoje: interno bibliotekarsko delo in bibliopedagoško delo (Stružnik, 1999, str. 40). Kot drugi strokovni delavec dela tudi z učenci s posebnimi potrebami, med katerimi so zanimiva skupina prav nadarjeni učenci. Koncept *Odkrivanje in delo z nadarjenimi učenci* (1999) govori o šolskih knjižničarjih, ki v tem pogledu prispevajo predvsem pri raziskovalnem in projektnem delu učencev. Možnosti za vključitev v delo z nadarjenimi učenci so različne, v tem prispevku nas zanima projektno delo, ki se najbolje uresničuje s sodelovanjem več strokovnih delavcev. Šolski knjižničar je motiviran za tako sodelovanje, ker tudi na tak način lahko prispeva k povečevanju informacijske pismenosti učencev ter pridobivanju drugih kompetenc v tem procesu: na primer bralne pismenosti, učiti se učiti in učenja socialnih veščin, kar je domena vseh strokovnih delavcev. Današnje