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Aquisition of basic competencies in physical education pre-service teacher training by integrating new technologies

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Summary

This study evaluates software a computerized time management sheet created to acquire a basic competence in initial teaching training, the management of time. It is designed for the Physical Education (PE) teacher at the early stages of training when the control the students' motor engagement time is fundamental for students to achieve motor learning in this discipline, relating it with other interdependent temporal variables. Repeated measures are used to check the development of the adaptation of the planning of time to the reality of the session, observing the change in the desired tendency in the application of the treatment.

Keywords

Physical Education; planning; software; time management.

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Introduction

In initial teacher training a series of competences must be acquired to ensure the basic training of future teaching professionals in European university centers. The shaping of homogeneous guidelines in the plan for initial training in the European Higher Education Space for the degree in Physical Activity and Sport Sciences is key for the development of the future of physical education (PE). Among these guidelines is achieving basic competencies in teaching, and specifically in the first place to know how to plan PE classes efficiently to provide the teaching profession with sufficient resources.

Thanks to a Teaching Innovation Project (subsequently awarded a prize by the University of Granada), we turned to ICT to create a computer record sheet, subsequently referred to as a computerized time management sheet, to manage a most important competence in the initial training of any PE teacher, the *management of time* in class. This competence has acquired great relevance in our area since the classroom is open and changing, as are the organizational systems and the materials we use in the gym or the sports field. This setting results in time forecasts for the tasks in class being altered enormously in the early stages of training, where the scant or total lack of teaching experience makes it difficult to adapt teaching plans to the reality of the classroom.

Moreover, the correct management of time in the PE class is an important *index of teaching quality*; it must ensure that the students have enough time for the physical practice necessary to achieve a degree of motor learning in educational centers. Other temporal variables such as organization time or students' attention time are detrimental to practice time, and therefore must be controlled to guarantee the effectiveness of classes (Placek & Randall, 1990; Barret, 2000; Momodu 2000; Viciana, Fernández, Zabala, Requena & Lozano, 2003; Lozano, Viciana & Piéron, 2006). Thus, research in this field is of general interest for all faculties awarding these degrees and for the Knowledge Area of PE and Sport.

Aims and hypothesis of the study

In this study, we followed the progress of a teacher doing practice while studying for a degree in Physical Activity and Sport Sciences in the University of Granada over several sessions of internship in an educational center and discovered to what extent the computerized time management sheet helped in that training. The objectives of the study were as follows:

To design and check the effectiveness of a computerized time management sheet for the recording, analysis and contribution of feedback to the training of future PE and sport professionals in a basic competence: the management of time in class.

To apply this ICT as a teacher-training strategy in an educational center, giving immediate feedback on the temporal adaptation by a pre-service teacher (PT) of planning classes to the reality of giving them in the compulsory subject of teacher-training practice in the degree course of Physical Activity and Sport Sciences.

To draw conclusions for the supervision of teaching practice during initial training and so to improve university teaching and the preparation of professionals.

The *hypothesis* was as follows: the administration of feedback of the teacher's time management during teaching practice by means of the computerized time management sheet of record and analysis, together with a supervisory meeting, would improve the adaptation of planning to reality, supplying graphic information that would accelerate the correct management of time in the initial training of the PE teacher.

Method

The study was made through an intra-subject design where the development of the time planning of PE sessions made by the PT before the class compared to the reality of the classes given was analyzed through repeated measures throughout the period of practice.

The *participants* were: a Pre-service teacher (PT) in the last year of the five-year degree course in Physical Activity and Sport Sciences who was doing teacher training practice during the academic year 2001-2002 in the high school, "IES Albaycín", cuesta de San Antonio s/n, 18011, Granada; the supervisor of the practice (a teacher in the Physical Activity and Sport Sciences Faculty and coordinator of this project) and the observer who recorded and analyzed the data in the practice, having previously trained in practice sessions unconnected with this study.

The *instrument used for recording and analyzing* was the software created for the temporal variables, the computerized time management sheet, (Viciano et al., 2003) on a portable computer. The application was made with Visual Basic and Excel Calculation Sheet, which supplied the comparative graphics of the time management plan and the real management of time in the sessions analyzed. Examples of the options of this software are shown in Figure 1.

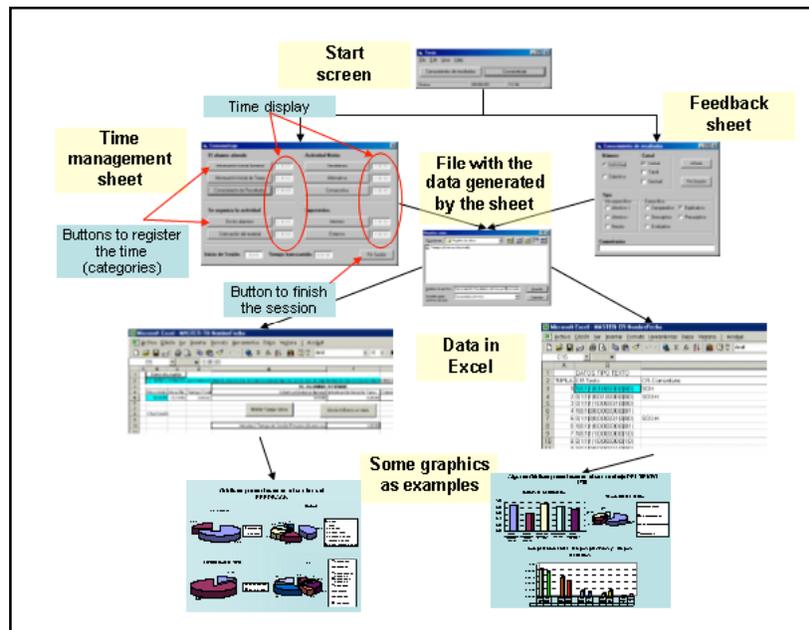


Figure 1. Screens appearing in the software for time management and feedback analyses.

In addition two qualitative instruments were used: the reports of the in-depth supervisory meeting, where the main causes and solutions of the temporal disparities were noted down, and a final open and in-depth interview on the PT's experience, recorded and transcribed to check against the numerical data of the computerized sheet.

The dependent variable of the research was *the discrepancy in class time management compared to the planned time*. It consisted of the sum of the differences between the various times planned and recorded [categories of the software record, modified from Siedentop et al., (1979)], and represents an index of effectiveness between the plan and the practice session interventions:

- Discrepancy in the student's attention time (SAT). SAT is the sum of the time that the teacher devotes to explaining a task, giving the class initial general information and the time spent correcting the students in general.
- Discrepancy in the student's organization time (SOT). SOT is the sum of the time the teacher devotes to giving out and collecting the material and organizing the students to carry out the tasks.
- Discrepancy in the motor engagement time of the student (MET). MET is the time that the student spends in practising physical activity in class.
- Discrepancy in the unplanned time in the session. This time is a consequence of the students' delay in beginning the class or some other unforeseen factor that occurs in PE classes (loss of material, minor injuries, drinking water, and so on).

The *independent variable* employed in the treatment was the supervisory meeting (between the PT and supervisor, the university teacher) where immediate feedback, was given through a graph from the computerized time management sheet, showing the discrepancies in the time recorded when observing the class compared to the planning, and interactive decisions about their causes and possible solutions were discussed for approximately 5 minutes.

There were five phases to the *procedure*:

The first phase consisted of the creation of the computerized time management sheet, on which the observer continuously recorded and analyzed the management of time during the class. For that, the history of this type of instrument and its application in PE teaching were reviewed (Lonzano et al., 2006), and finally the categories to be included in the software, modified from ALT-PE (Academic Learning Time in Physical Education, Siedentop et al., 1979), were decided upon, so creating the definitive software. The computer application permitted, through a simple visual structure and with a simple "click", the change of categories in continuous time recording.

In the second phase, at the end of February 2001, the study began by recruiting a volunteer PT, who was not given specific information about the aims of the research. To do this a meeting was held with the PTs of the high school "Instituto de Educación Secundaria Albaycín" in Granada, where all six were offered the possibility of taking part in the study whose objectives were educational, but without explaining in detail what it consisted of. Finally, the PT was chosen completely at random among four volunteers.

The third phase was the establishment of a base line of the temporal variables during three practice sessions; no guidelines were given either before or after the class. The main premise was that a PE class should be planned, setting out the temporal distribution, and then applied in the school. For that the PT was given a scheme of PE content (Viciano, 2002a) that would continue to be used throughout the development of the study. As a further premise the total time distribution of the class should be so planned that it included at least 40-60% MET for the student (Viciano 2002b).

In the fourth phase, from March to May, the PT was told what the study would consist of, the aim of the software and that the treatment would be applied over ten sessions. The PT gave a weekly class in the high school and subsequently attended the supervisory meeting to discuss the observation data collected by the supervisor. A graph of the discrepancies in each of the temporal categories planned was given and the main differences discussed, going more deeply into the causes and finding possible errors in the planning of the class time and in the intervention during the practice. These two actions constituted further training in addition to the traditional supervision that the other PTs received during their practice, for although the supervisory meeting was still held, the other PTs were only shown the subjective data of their practice and without the aid of the computer graph of the results of the observation. The PE classes lasted 50 minutes in the school timetable, so that to achieve an acceptable distribution of class time the PT should plan for motor activity of at least 20-30 minutes, the rest of the time being distributed among the other variables (Student Attention Time, SAT; Student Organization Time, SOT, and unforeseen time). At the end of the study the interview with the PT asked only one

question about his opinion of his experience: How have your practice classes developed and what do you think of the experience?

The fifth and final phase was to draft the final report.

Results

The results of the study show the positive influence of the independent variable (feedback of time management in PE classes in the supervisory meetings) over the base line established, changing the evolutionary tendency and so confirming the hypothesis formulated at the beginning of the study.

The times of the sessions analysed are set out in Table I. To read and interpret them it is necessary to highlight that MET was kept fixed as a criterion at 30 minutes, while the planned temporal values of SAT and SOT (criteria to establish the discrepancy) were variables for each session, since the type of content, the type of organization (formal, informal or semi-formal), the structures of the tasks (individual, in pairs, threes or sub-groups), their difficulty and the material employed, meant that SAT and SOT were different for each one of them.

Furthermore, the temporal discrepancies of the sessions are interdependent, that is, a major discrepancy in any one of the times planned results in an equal discrepancy in the rest of the times. Thus, when there are major discrepancies in some of times (MET, SAT or SOT), the other times are also altered, so that the total discrepancy is higher. Equally, if unforeseen time is not included in the plan as happened in the three sessions to establish the base line, where the PT had no orientation in the planning of the sessions or feedback about his/her performance, the discrepancy is even greater, since all the unforeseen time is added to the discrepancy.

Table I. Distribution of real times of the base line and of the treatment in minutes and seconds.

Times (DV)	Baseline Sessions			Treatment-evolution Sessions									
	1	2	3	1	2	3	4	5	6	7	8	9	10
MET	22'02"	24'37"	23'10"	24'01"	26'45"	25'54"	31'02"	27'19"	27'58"	30'10"	31'30"	28'49"	30'27"
SAT	14'44"	14'23"	12'50"	12'58"	14'30"	11'06"	7'46"	12'	11'02"	8'21"	8'27"	10'11"	9'23"
SOT	10'14"	10'20"	12'33"	10'11'	9'34"	9'40"	8'08"	9'04"	10'30"	8'09"	8'05"	9'45"	9'15"
Unforeseen	3'00"	0'40"	1'27"	2'50"	-	3'20"	3'03"	0'17"	0'30"	2'20"	1'50"	1'15"	0'55"
Discrepanc-ies	15'56"	10'46"	13'40	11'58"	10'28"	8'12"	6'11"	5'48"	7'00"	4'00"	4'48"	2'22"	3'24"
Average	13'27"			10'13"			6'20"			3'38"			

Table I shows a highly significant improvement ($p < .001$) in the match between the time planned and the reality, since the values of temporal discrepancies drop significantly during the treatment tending to zero, although obviously it is practically impossible to achieve this due to the many circumstances that affect educational practice in this discipline.

To make this development clearer the average discrepancy has been calculated in the last column in the table (the average of the three base line sessions, as well as the averages of the treatment

sessions grouped in threes, except for the final group of four sessions). The evolution is evident, and therefore the influence of the independent variable over the dependent, when these measures are compared (base line: 13'27"; sessions 1, 2 and 3 of treatment: 10'13"; sessions 4, 5 and 6 of treatment: 6'20"; and sessions 7, 8, 9 and 10 of treatment: 3'38").

In Figure 1 the evolution of the temporal discrepancy is shown in a linear graph, clearly demonstrating the tendency to zero and the change in the tendency of the curve from the moment of the application of the treatment to the experimental subject.

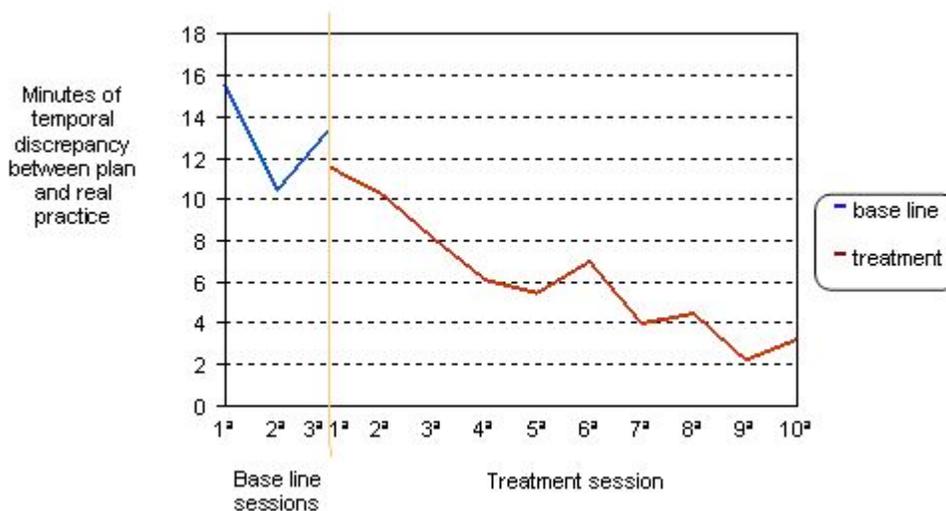


Figure 1. Evolution of the discrepancy between time planned and real time

The most important decisions recorded in the supervision reports, a product of the analysis of the discrepancy data and the agreement between the PT and the supervisor were as follows:

Table II. Most Important Decisions Analyzed and corrected

Decisions	Correction
In Planning	<ul style="list-style-type: none"> - To Include unforeseen time, (not more than 1 or 2 minutes), since it was given in the base line and is essential in any plan - We must be realistic in the general initial planning of the session, since normally more time is taken than planned. The main actions taken in this sense were: to match the designation of the time to the initial information of the class, to count in beforehand the time for explaining the task and also the transition time between tasks and organizational structures. - WE must structure the teacher's instructions and corrections in the task so that they are clear and so more effective, foreseeing the more important aspects of the task and the most common corrections
In the intervention	-To shorten the explanations of the tasks and the initial information of the sessions, which were very long, in order to increase MET

	<ul style="list-style-type: none"> - To shorten SOT facilitating the transitions between tasks. This entailed not changing the organizational structure between tasks, but keeping the same groups of students and material to promote continuity of the practice - The material could not be complicated to distribute and collect; if it were, too much MET would be lost in the session
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These agreements set out in Table II helped enormously to achieve the temporal match between planning and performance in the treatment.

Among the *statements made by the PT* in his final interview that showed the effectiveness of the computerized time sheet, were the following:

"At first I did not plan well, because I always lacked time to finish the exercises..."

"The truth is that being able to observe immediately when finishing the class has had a lot of impact and has helped me to realise my mistakes and that has helped...On many occasions I did not know why things happened and this type of assistance together with the talks with the teacher makes you think about the reason and to go into your errors more deeply in order to solve them"

"I am pleased I took part in this work because it makes you realise how difficult it is to plan well and to carry it out correctly"

These qualitative data confirm the development shown numerically by the software, and the effectiveness of the supervisory process.

Discussion and conclusions

Among the limitations of the study we would highlight the need to repeat this research with a greater number of teachers, although our initial intention was simply to put the software created in practice and check its efficacy. Equally, we have to confirm that comparative research shows that traditional supervision is less effective, although our teaching experience in the field of initial training of PE teachers has been along these lines.

The integration of new technologies in the initial training to help in the formative process of teachers has been recommended on previous occasions (Matos, 2005). Furthermore, in our research it gives an additional application to pedagogic and not only technical training. Since good time planning ensures a minimum rate of MET for the production of motor learning in PE, as shown by the Beginning Teacher Evaluation Study of Siedentop et al. (1979) or Telama et al. (1986), we can state that the application of this computerized time sheet in the PE teacher's initial training is going to contribute substantially to what s/he is going to be able to do in the future, as the time planned is going to match reality more accurately. Byra and Coulom (1994) also reported the effectiveness of good planning for classroom success in PE, so that it seems to us of prime importance to ensure an acceptable degree of

competence in this aspect of the initial training of future PE professionals, as we have managed to achieve with the use of this software in our research.

Similarly the work presented has demonstrated that using ICT collaboratively (PT-Supervisor, or PT-PT) is efficient, helps the process of analyzing pre-active and interactive decisions and fosters critical thought in teacher training, as mentioned by Lara (2006). The criticism of the small number of ICT credits in university education, resulting in little mastery in these technologies in the course of the profession (Matos, 2005) has been substantiated, as this research demonstrates the success in accelerating the process of training and skill acquisition in important competencies in the PE and sport areas. The results of our study confirm the comments of Brito and Duarte (2005), who highlighted the use of ICT in teaching practices as the prime factor with greatest impact in teacher training.

The main *conclusions* to be drawn, so responding to the hypothesis and objectives of the study, are the following:

- 1) The computerized time sheet is easy to manage and highly effective in training PE teachers. Therefore, we recommend its use to improve efficacy in acquiring basic competences, such as time management, in initial training.
- 2) The teacher in training values the experience positively and stresses the help given by the analysis of the data and the graph provided, becoming aware of planning mistakes and adjusting her/ his teaching accordingly.
- 3) The innovative supervision of teaching practice that using this system provides in the practice center of the school (with objective, immediate and graphic information about what the PT has done) is significantly better than traditional supervision and accelerates the training process, while at the same time it promotes the process of reflection in taking decisions in the difficult task of teaching.

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