


Effectiveness indices evaluating time in physical education: Example in Motor Games

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ABSTRACT

The time devoted to Physical Education classes is limited, but for many children and young people these classes are the only occasions on which they engage in physical activity and exercise. Since exercise is vital for health, it is important to use indices that provide information about the effectiveness of time invested specifically in the practice of motor activities during PE classes. We have proposed certain effectiveness indices that relate the time planned to the time actually spent in different categories: time for information, time for organisation, time for physical or motor activity and time for physical or motor activity fulfilling an objective. Various sessions of Motor Games have been evaluated, all of them corresponding to the university degree of Physical Activity and Sports Sciences. The results show that the proposed effectiveness indices could be very useful in managing time devoted to motor activity during PE lessons more effectively and in improving time planning in terms of the content of PE lessons. **Key words:** EFFECTIVENESS INDICES, PHYSICAL EDUCATION, MOTOR GAMES, TEACHER-TIME COMPETENCE, ALT-PE.

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INTRODUCTION

In teaching, time planning and management plays a vital role in maximising the amount of time devoted directly to education and training, since the time available for classes is limited. Learning time in Physical Education classes or training sessions is especially important in that the appropriate planning and management of time can lead to improvements in the health of those attending sessions, by enabling them to spend more time exercising (Fernández-Revelles, 2003, 2008a; Fernandez-Revelles & Delgado-Noguera, 2009, 2009; Perez Cortes, Ramirez Jimenez, & Fernandez-Revelles, 2009; Viciano, Fernandez-Revelles, Zabala, Requena, & Lozano, 2003).

The importance of engaging in exercise or physical or motor activity for a set number of hours per week must be borne in mind. Education systems dedicate a very limited amount of time to physical education and specifically to exercising due to the funnelling effect (Fernández-Revelles, 2003, 2008a).

Focusing on PE classes and their time restrictions, it is evident that some lesson content includes exercise or physical activity but some other content involves none, and even when physical activity is involved, it is of very low intensity.

One of the most popular types of PE class content at all educational levels, both in training sessions and in high performance, is motor games. Motor games, as closed content in their own right, with a beginning and an end, can be considered a key element within any other content related to physical or motor activity and exercise.

Therefore, Motor Games, like Physical Education sessions, can have their own temporal structure.

Different temporal structures and categories are used for analysing time in physical education classes. The most popular are System for Observing Fitness Instruction Time, which goes by the acronym SOFIT (Avresky, Geoghegan, & Tapadiya, 1998; Capio, Sit, & Abernethy, 2010; Cardon, Verstraete, De Clercq, & De Bourdeaudhuij, 2004; Curtnersmith, Chen, & Kerr, 1995; Chow, McKenzie, & Louie, 2008, 2009; Falson-Hodge & Porretta, 2004; Faucette, McKenzie, & Sallis, 1992; Friedman et al., 2003; Honas et al., 2008; Huang, Hogg, Zandieh, & Bostwick, 2012; Jeng, Kim, & Watada, 2006; Lieberman, Dunn, van der Mars, & McCubbin, 2000; Lopez, Ochoa-Martinez, Terrazas, & Ramirez, 2017; McClain, Abraham, Brusseau, & Tudor-Locke, 2008; McKenzie, Sallis, & Nader, 1992; Mersh & Fairclough, 2010; Pope, Coleman, Gonzalez, Barron, & Heath, 2002; P. Rowe, van der Mars, Schuldheisz, & Fox, 2004; P. J. Rowe, Schuldheisz, & vanderMars, 1997; Scruggs, 2007; Scruggs et al., 2003; Schuna, Lauersdorf, Behrens, Liguori, & Liebert, 2013; Senne, Rowe, Boswell, Decker, & Douglas, 2009; Sharpe, Forrester, & Mandigo, 2011; Sit, McManus, McKenzie, & Lian, 2007; Skala, Springer, Sharma, Hoelscher, & Kelder, 2012; Stone et al., 1996; Taylor & Yun, 2006; van der Mars, Vogler, Darst, & Cusimano, 1998; Verstraete, Cardon, De Clercq, & De Bourdeaudhuij, 2007; Wadsworth, Robinson, Rudisill, & Gell, 2013) and Academic Learning Time in Physical Education, abbreviated to ALT-PE (Block & Obrusnikova, 2007; Byra & Coulon, 1994; Ensign, Woods, & Kulinna, 2017; Hastie, 1994; Tempte & Walkley, 1999; Tzetzis, Amoutzas, & Kourtessis, 2003; Vandermars, Darst, Vogler, & Cusimano, 1994; Wiskochil, Lieberman, Houston-Wilson, & Petersen, 2007).

Other works also exist which are related to a different technique directly linked with play, System for Observing Children's Activity and Relationships, acronym SOCARP (Pollard, Hornby-Turner, Ghurbhurrun, & Ridgers, 2012; Powell, Woodfield, & Nevill, 2016; Ridgers, Fairclough, & Stratton, 2010; Ridgers, Stratton,

& McKenzie, 2010; Roberts, Fairclough, Ridgers, & Porteous, 2013; Woods, Graber, & Daum, 2012; Woods, Graber, Daum, & Gentry, 2015).

There are also recent studies in the field that address the issue of time devoted to learning and time in physical education classes (Hernandez & Hernandez-Martinez, 2016; Hita & Canto, 2017; Irigoyen, Mendieta, Negro, & Irigoyen, 2016; Lopez et al., 2017; Martin, 2017; Moreno et al., 2017; Urrutia-Gutierrez, Otaegi-Garmendia, & Gabilondo, 2017).

However, the research studies that serve as a reference for our work are

For motor games or PE sessions we follow the model suggested by Fernández-Revelles et al. (2017), a simple model of time structure:

- Session Time or Motor Games Time (ST): When we use a single motor game for a session or want to establish a time structure for that motor game. It is the total time devoted to that motor game or to the whole session.
- Information Time (IT): The time spent on giving information or finding out results when the participants are not practising any physical activity; if exercise is going on at the same time, this is not considered information time but time devoted to physical activity.
- Organization Time (OT): The time devoted to organising material and students, provided that the activity is not included as part of the game and physical or motor activity is also practised.
- Physical or Motor Activity Time (MT): The time devoted to physical or motor activity; that is, when participants are engaged in some form of exercise and are not stationary. If they are stationary, even if waiting for a relay or otherwise waiting to participate, the fact of not exercising during that period means that it will not count as physical activity time. It could only be considered physical activity time if the inactivity were due to a recovery period following a long spell of intensive activity, provided that time for recovery was required in order to continue.
- Physical or Motor Activity Time meeting an Objective (MTO): The time devoted to physical or motor activity that is also meeting the motor objective of the session or of the motor game.
- Motor Inactivity Time or unforeseen downtime (MIT): The time during which no physical activity takes place for some reason particular to the game, such as a participant's fall, or for an external reason such as an unauthorised person entering the game zone.

There is a measurement tool for this time structure (Fernández-Revelles, 2017), see figure 1.



Figure 1. Application for the recording of time in motor games

By this method, the overall time of a session or of a motor game would be made up of the following times:

$$ST = IT + OT + MT + MIT$$

MTO would be added to MT.

For the purposes of adequate time planning and management, we would also work out the following Planned Times: P_ST, P_IT, P_OT, P_MT, P_MTO.

MIT cannot be planned since it is unforeseen.

It is also necessary to consider how to link the planned times of a session or Motor Game to its corresponding recorded times: ST, IT, OT, MT, MTO, MIT.

By relating the different categories of planned times to their corresponding recorded times we can obtain time indices showing the effectiveness of time planning for motor games.

And if we relate the different categories of registered times with overall registered time of the session we can obtain time indices showing effectiveness of time management for motor games.

The calculation of these indices will follow the patterns for PE classes established by Fernández-Revelles (2003).

Objectives

The aim of this study is to implement the time assessment of motor games and propose effectiveness indices according to planning.

MATERIALS AND METHODS

In order to assess time we follow the guidelines established by Fernández-Revelles et al. (2017), choosing the same video of a motor game for its analysis - the motor game Tic Tac Toe (Fernández-Revelles, 2016) whose YouTube link is; <https://youtu.be/IONuwPd8Wn8>

The calculation of the planning indices is based on the following times:

- Planned Times:

P_ST: Planned Session Time or Planned Motor Game Time

P_IT: Planned Information Time

P_OT: Planned Organisation Time

P_MT: Planned Motor Time

P_MTO: Planned Motor Time fulfilling Objectives

- Recorded Times:

ST: Recorded Total Session or Motor Game time

IT: Recorded Information Time

OT: Recorded Organisation Time

MT: Recorded Motor Activity Time

MTO: Recorded Motor Activity Time fulfilling Objectives

MIT: Motor Inactivity Time

- Calculation of the Planning Indices:

TI: Time index:

– If $ST_P \leq ST$; $TI = P_ST/ST$

– If $ST_P > ST$; $TI = ST/P_ST$

I_PI: Information Planning Index:

– If $P_IT \leq IT$; $I_PI = P_IT/IT$

– If $P_IT > IT$; $I_PI = IT/P_IT$

O_PI: Organisation Planning Index:

- If $P_{OT} \leq OT$; $O_{PI} = P_{OT}/OT$
- If $P_{OT} > OT$; $O_{PI} = OT/P_{OT}$

M_PI: Motor Planning Index:

- If $P_{MT} \leq MT$; $M_{PI} = P_{MT}/MT$
- If $P_{MT} > MT$; $M_{PI} = MT/P_{MT}$

MO_PI: Motor time fulfilling an Objective Planning Index:

- If $P_{MTO} \leq MTO$; $MO_{PI} = P_{MTO}/MTO$
- If $P_{MTO} > MTO$; $MO_{PI} = MTO/P_{MTO}$

MI_PI: Motor unforeseen Inactivity Index:

- $MI_{PI} = MIT/ST$

RESULTS

Table 1 gives the planned and recorded times of the motor game, clearly showing the discrepancies between them.

Table 1. Planned and recorded times

	Information	Organisation	Physical or Motor Activity	Physical Activity Objective	Inactive
Planned Time	0:02:00	0:02:00	0:11:00	0:08:00	
Recorded Time	0:03:54	0:02:59	0:05:48	0:02:03	0:01:55

Table 2 shows Planning Indices in the various categories, their values ranging between 0 and 1 – 1 being the value at which planned time and recorded time coincide, while values close to 0 indicate a significant difference between planned and recorded times.

Table 2. Planning indices

	Information	Organisation	Physical or Motor Activity	Physical Activity Objective	Inactive	Timetable
Planning indices	0.513	0.670	0.527	0.256	0.128	0.973

DISCUSSION

The results indicate that motor games suffer the funneling effect just as PE classes do proportion of the time.

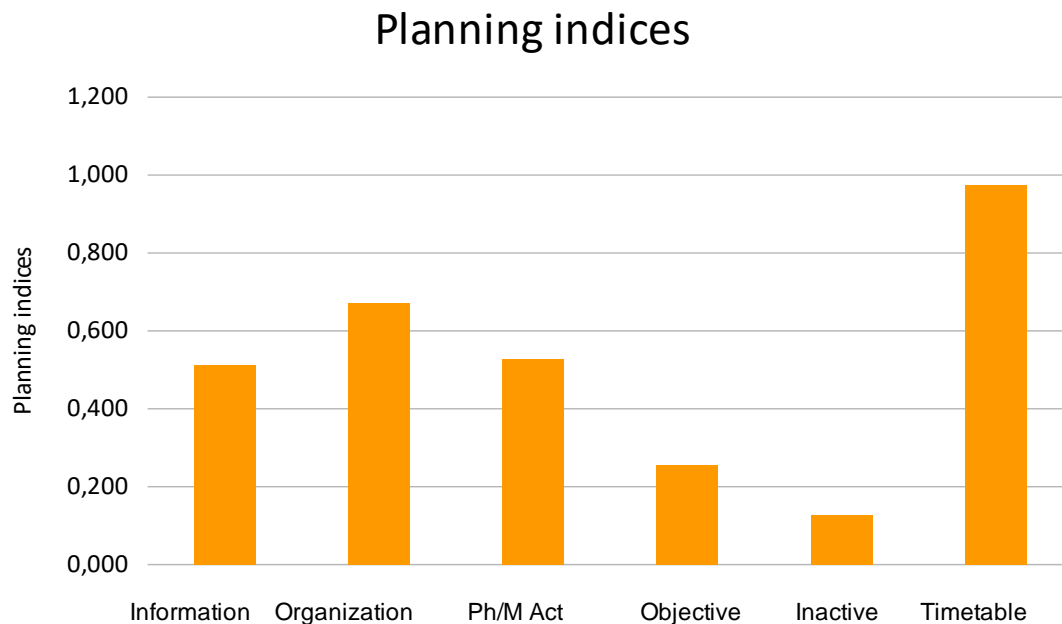


Figure 2. Planning indices

A motor game is defined as a game involving movement. In order to qualify as a motor game, a game has to meet the motor objective; thus, when planning it, one must take account of the fact that movement is required most of the time. These indices are therefore a valuable indicator of the percentage of movement performed in the motor game in relation to what was planned. As we can see in this case, the index of motor time meeting an objective is only 0,256; in other words, the planning in relation to the recorded motor time meeting an objective has approached a 25.6%.

The timetable was observed with a timetable index of 97.3.

CONCLUSIONS

The assessment of time in motor games has been implemented, and effectiveness indices have been suggested and calculated according to planning for each of the time categories in use.

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CONFLICT OF INTEREST

The author has no conflicts of interest.

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