

STUDIES IN PHYSICAL CULTURE AND TOURISM  
Vol. 14, No. 2, 2007

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## DECISION MAKING IN PHYSICAL EDUCATION: THEORETICAL PERSPECTIVES

**Key words:** physical education, decision making, decision sharing models.

### ABSTRACT

This paper gives an overview of decision making in Physical Education. The Teacher Decision Making Approach (TDMA) and the Shared Decision Making Approach (SDMA) used in research on teaching Physical Education are described and their theoretical background is delineated. Also, the literature on the effects of these approaches on physical and affective development of primary school students is critically reviewed. Also, comments are made on the basis of the methodology and the statistical analysis utilized in the study. Finally, based on the conclusions recommendations for future research into decision making are given.

### INTRODUCTION

Decision making is the process of choosing an alternative course of action in an efficient manner appropriate to the situation [44], or making choices among alternatives after gathering information and processing it in order to select the appropriate solution [32, 44].

It is contended that there are three types of decisions that an individual can make: conscious, unconscious, and decisions that are forced upon us [4]. The same authors conclude that decision making is an important aspect of human functioning.

There are a number of decision making theories such as *Alport's resolution of disequilibrium*, *Parson's dynamics of decision making*, *Cooper's forces and processes* and *Mancini and Martinek's decision sharing* [3]. Mancini and Martinek's theory has been used extensively in research on Physical Education (PE) teaching.

However, long before Mancini and Martinek's decision sharing, Mosston used decision making as the basis of his PE teaching theory. He stated that "teaching behaviour is a cumulative chain of decision making – of deciding among known choices" [28]. The essence of Mosston's work on teaching styles is the shift from teacher decision making to student decision making [21]. He believed that when students are given the opportunity to share in the decision making process, their progress toward achievement in the cognitive, affective, and psychomotor domain becomes great [29].

A number of scholars and theorists have emphasized the concept of having learners assume responsibility for their learning [18]. Certain benefits, such as promoting students' involvement in PE, motivating students with little interest, and developing students' attitudes are believed to be associated with the decision making process [18, 22, 35].

In the context of *Humanistic Education* teachers and students are active contributors to the development of the learning environment and they both have mutual responsibility for significant decisions. It has become the cornerstone of what is called "open education" [18]. However, there is confusion with regard to the issue of open teaching; the title itself might suggest that it allows for unstructured and unorganized learning. It is argued that there is a big difference between classes which are "student centered" and "student dominated" [26]. The teacher is still in charge of the learning environment when students are involved in some kind of decision making.

#### THE TDMA AND SDMA APPROACHES

A decision-making theory used in PE research is Mancini and Martinek's sharing decision. The two approaches that appear in Mancini and Martinek's decision sharing research theory are the Teacher Decision Making Approach (TDMA) and the Shared Decision Making Approach (SDMA) [22]. These two approaches were delineated by Mancini's initial study [20] and their patterns were used to validate teaching methodologies in similar studies [35]. In the TDMA, the teacher makes all the decisions, whereas in the shared decision making approach, both the teacher and the learner share in the decision making process. In particular, in a TDMA class, the students meet at the gymnasium door by the teacher, line up, and then are led to their assigned station. At each station the teacher specifies the skill to be performed, provides instruction, demonstrates to the student how the skill is to be performed, and explains the progressions to be followed. Next, each student performs the skill to the teacher's satisfaction, with the teacher assisting when appropriate. After all students in the group perform the skills, the teacher lines up the students and leads them to the next station [22].

In a SDMA class the students are encouraged to take part in the decision making process and are permitted to make some decisions. Prior to the start of any activity the teacher sits down the children in the center of the gym and discusses with them their role and responsibilities in the decision making process. Upon arriving at the gym, the students enter the gymnasium and proceed to the station of their choice. At each station, the student chooses

the skill to be performed as well as the skill progression, and have the option of either using a wall chart illustrating skills located at each station or soliciting the aid of the assigned teacher. The teacher is stationed at the apparatus with the children encouraged to move freely from one activity to another, consulting with the teacher on the choice of activity, progression, strategy, and safety procedures. The teacher is trained to accept the children's initiative while at the same time assisting children to make decisions [22].

#### EFFECTS OF THE SDMA AND TDMA MODELS

The development of self-concept/self-esteem and physical fitness is one of the most important outcomes of teaching PE and of great interest among PE teachers [31, 11]. Therefore, the present section will focus on studies which examine the effects of the SDMA and TDMA models on students' *self concept/self esteem*<sup>1</sup> and *health-related/skill related fitness*<sup>2</sup>.

Boston University studies involved seven research projects [17, 20, 24, 34], which tested empirically and expanded the TDMA and SDMA approaches [22]. Pirano's and Mancini's studies will not be reviewed for reasons mentioned in the previous paragraph. Also, three theses [17, 24, 34] appeared as research articles in sport journals later [18, 23, 35]. In the present review, the relevant information was taken from the corresponding thesis abstracts. It seemed important not to rely solely on abstracts but to refer to the entire articles.

All seven studies used elementary school children who came from similar socioeconomic backgrounds. Random assignments of individuals to the treatments were not used but instead intact classes were assigned to the two approaches. Only

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<sup>1</sup> *Self-concept* refers to the descriptions one attaches to himself/herself (e.g., I am black, I am a mother), whereas *self-esteem* refers to the evaluative or qualitative aspects of self-concept (e.g., I am the best runner in the class); that is to the feelings one attaches to the description of himself/herself [10, 16].

<sup>2</sup> It is generally agreed that *physical fitness* consists of two categories: *health-related fitness* (body composition, cardiovascular fitness, flexibility, muscular endurance, and muscular strength) and *motor- or skill-related fitness* (agility, power, speed, balance, and reaction time) [1, 10, 43].

in three studies were control groups employed [24, 34, 17]. The control groups did not receive any formal instruction. In each study the students followed the same PE programme (gymnastics) and the class time was for the same amount. The teachers who taught the classes were trained to use the teaching approaches appropriately. The teaching patterns were verified using *Cheffer's Adaptation of Flander's Interaction Analysis System* (CAFIAS). CAFIAS is an observation system for analyzing teacher behaviour. Pretest and post-test measures were given to all students and the variables tested were attitudes, self-concept, creativity and motor skill abilities. In all seven studies self-concept was measured with the *Martinek-Zaichowsky Self Concept Scale* (MZSCS). A detailed presentation of those studies is given below.

Martinek conducted a study to determine the effects of SDMA and TDMA on self concept and motor skills as measured with the Schilling Body Coordination Test (major emphasis is given to the areas of agility, coordination, balance, reaction time, speed, and power) [24]. The sample consisted of 345 students (boys and girls). The treatments were given twice a week (45 minutes each time) for a period of 10 weeks. The results showed that the SDMA was significantly superior to the control group in self-concept scores. This approach contributed to students' self-concept development. No significant differences were found between the two models. Also, the TDMA group did significantly better in motor skill performance than the control and the SDMA groups. The SDMA showed significant improvement over the control group. No significant treatment by gender interaction was found for self-concept or motor skill scores.

It was found that students in the SDMA group had significantly higher scores on the MZSCS [22]. Also, it was reported that students in the TDMA group did significantly better in the test of elementary gymnastics skills than students in the SDMA group [22].

A study was carried out to determine the effects of the two approaches on body coordination, as measured with the Schilling Body Coordination Test [SBCT], and self-concept of 285 male and female students [17]. Unlike the previous studies, this one provided less freedom and more structure to the act of student decision making [22]. This was achieved by giving to the students or the teachers task cards outlining the class activities. The results of the study showed that no significant differences

were found across the treatment and control groups in self-concept. Also, although the SDMA and TDMA groups did significantly better than the control group in the motor skill test, no significant differences were found between the two experimental groups.

Self-concept and motor skills were measured to determine the influences of decision making on students (208 boys and girls) [34]. Motor skills were measured with the Johnson Fundamental Skill Tests: (zig-zag run, jump and reach, throw, and catch and kicking). The duration of the teaching period was eight weeks (once per week for 45 minutes). It was found that the SDMA was significantly superior to the TDMA in the zig-zag run, throw and, catch and kicking. The two experimental groups outperformed significantly the control group in the jump and reach test. Also, students in the SDMA group attained significantly higher scores than the TDMA group on the self-concept scale. However, when the two treatments and the control group were compared, no significant differences were found. Also, no significant interactions between gender and treatments were found in either the motor skills or self-concept.

Apart from these Boston University studies, there were other similar studies which used the two above approaches (SDMA and TDMA) as delineated by Mancini's initial study [20].

The effects of the horizontal or SDMA and the vertical or TDMA models on the development of motor ability (as measured with the SBCT and the Sekiso Harada Motor Ability Test) and self-concept (as measured with the MZSCS) of 4-6-year-old kindergarten children (N=101) were investigated [19]. The Sekiso Harada Motor Ability Test contains three batteries: The 20 meter run, the standing long jump, and the tennis ball throw. All children were pretested and post-tested. The treatments were given over an eight-week period, one class per week (30 minutes each). CAFIAS was utilized to validate the treatments. The investigator himself taught the classes. Apart from the two experimental groups there was a control group, as well. The statistical analysis showed that only in the lateral jumping test was there a significant difference between the control and the experimentals, favouring the control group.

However, when age was included as an independent variable in the analysis, significant interactions were found. Four to five year old children, taught with the SDMA approach, perfor-

med significantly better on the self-concept measure, balance, lateral jumping, and the 20 meter run than their counterparts in either the TDMA approach or in the control group. No differences were found among the groups of 5 to 6 year-old children with respect to self-concept measures. Moreover, the control group performed significantly better than the SDMA and the TDMA groups on the dependent measure of lateral movement. The SDMA and the control groups performed significantly better than the TDMA group on the 20 meter run measure.

Crowley did research to examine the effects of two teaching styles (a traditional approach centering on the skills and a cooperative approach, focusing on an all-inclusive philosophy) on the development of human fitness [physical, intellectual, social, emotional, and spiritual] of 38 fourth-grade students [5]. The physical dimension was measured by means of the AAHPERD life time health-related exercise test (distance run, sum of skinfolds, modified sit-ups, and sit and reach). The spiritual dimension was measured with the Sentence Completion Test [5] which consists of six subscales (self-concept, parental attitude, peer attitude, need for achievement, learning attitude, and body image). According to Crowley in the traditional approach, which can be classified as vertical model, the planning, the execution, and the evaluation of the students are controlled by the teacher [5]. In the cooperative approach, which is referred as horizontal model, the teacher and the student share in class decisions [5]. A 12-week curriculum was implemented and all students were pre-tested and post-tested on all the tests. Apart from the two experimental groups a control group was utilized. The author herself taught the three intact classes and CAFIAS was used to validate the treatments.

With respect to post-test scores, the results indicated that there were no significant differences among the three groups in the self-concept, distance run, and sum of skinfold variables. Significant differences were found between the two experimental groups and the control group in sit-up and sit and reach variables, favouring the experimental groups. With respect to gain scores, there was greater improvement in the cooperative approach for all variables in the physical and spiritual dimension than in the traditional approach and the control group. In the above study no random assignment of the individuals to the treatment groups took place (intact classes) which must have

contaminated the results. Also, the small sample size (N=38) may have been responsible for the non-significant differences found.

The studies mentioned so far can be considered to be well designed in the sense that quite long treatment periods (around 10 weeks) were utilized – although it is suggested that longer periods than that may be more desirable to detect differences [25] – the treatments were verified through observation, the teachers were well trained to use the two approaches, and mediating variables such as gender and in some cases age and race were controlled for. However, there are certain methodological flaws that should be mentioned: In all these studies intact classes were used. When participants are not randomly assigned to experimental groups then the groups cannot be considered statistically equal in all possible ways [13]. This raises doubts about controlling possible extraneous variables. Also, the self-concept scale, used in these studies, was designed to measure global self-concept [23], whereas situation-specific self-concept scales (part scales) should be used as well. With respect to this point it has been argued that: “Perhaps self-concept is too large a parameter to measure with one instrument; perhaps instruments are not yet sufficiently refined; perhaps self-concept is not a stable human characteristic; perhaps our methods of testing self-concept are inadequate” (4: p. 235-236).

Another five studies, concerning the effects of the SDMA and TDMA approaches on students’ motor skill and self-concept, were conducted in Greece within a period of 20 years. A study was conducted to determine the effects of SDMA and TDMA teaching models on motor skill development, as measured with the Johnson’s Fundamental Skill Test, of eleven-year-old boys (N=66) [45]. The students were randomly assigned to the three groups (SDMA, TDMA and the control groups). The two experimental groups participated in 33 lessons, three times a week, over a period of eleven weeks. There was a control group which did not receive any formal treatment during that period. All students were pretested and post-tested on the motor skill test and CAFIAS was used to validate the treatments. The statistical analysis showed that the two experimental groups improved their performance significantly from pretest to post-test in the three of the four motor skill tests (zig-zag, jump and reach, throw, and catch). The control group improved only in the zig-zag and the jump and reach tests. Also, there were no significant differences between the two experimental groups in

the motor skill tests except in the jump and reach test. However, the TDMA group outperformed the SDMA group. Also, both experimental groups did significantly better than the control group in all the tests except in the kicking test where no significant differences were found. It was concluded that either the traditional or the decision sharing models offer about the same possibilities to improve children's ability to perform fundamental skills [45].

Although the above study was well designed (random assignment was utilized, treatments were verified by means of observations, pre- and post-tests were given, and a control group was employed), the number of participating students was relatively small, which might explain the non-significant differences between the groups [12]. Also, a longer treatment period might have been more beneficial in terms of motor skill performance.

The effects of a traditional and a decision sharing teaching model on motor skill development (measured with the shuttle run, the standing long jump, the ball throwing, and the complex coordination – throw and catch – tests) and self-concept development (measured with the Piers-Harris Children's Self-Concept Scale) of fifth grade students (boys and girls) were examined [6]. Measurements were assessed on three different occasions (pre- mid- and post-test). Intact classes were used and apart from the two experimental groups there was a control group which followed no regular PE classes. The groups received the treatments three times per week for a period of 20 weeks. CAFIAS was used to identify the teaching patterns. With respect to the motor skill tests no significant differences were found between the two teaching models. Both experimental groups improved their performance over time but the control did not. Also, no significant interaction between gender and treatments at the post-test was revealed. Furthermore, no significant interaction between gender and time was shown.

With respect to self-concept development, the control group did not improve significantly over time. Also, there was no significant interaction between gender and experimental treatments at the post-test nor was there any significant difference between the two treatments or between the two genders at the post-test. Moreover, only the decision sharing model group improved significantly over time, and there was no significant interaction between time and gender. The above

study was replicated [7] and similar results were found.

A study was conducted to examine the effects of a traditional and a decision sharing model on the self-perception (measured with Harter's Self-Perception Profile for Children) of 107 fifth- and sixth-grade male and female students [39]. Two intact groups, which received the treatments twice a week for three months, were utilized. All students were pre-tested and post-tested on the self-perception questionnaire. The investigator herself did the teaching and CAFIAS was used to identify the different teaching patterns. No control group was employed. The statistical analysis gave the following results: The decision sharing model group improved over time in perceived athletic competence whereas the traditional group did not. Also, the decision sharing model group was found to be significantly better than the traditional group in perceived athletic competence at the conclusion of the teaching period. Moreover, there was a significant interaction among time, gender, and treatments. In particular, boys and girls in the decision sharing model group significantly improved their competence over time. Furthermore, boys and girls of the decision sharing model group were significantly superior to their counterparts in the traditional group at the conclusion of the teaching period. The 1997 study was replicated [40] and similar results revealed.

When one reads the results from the above studies [39, 40], one should be careful with their interpretation because, although it was obvious from the analysis that there were initial differences (pretest scores) in perceived athletic competence, they were not considered in the statistical analysis. Also, although there were two age groups, age was not factored in the analysis. Moreover, intact classes were used and the teaching period was short. All these raise doubts about the validity of the results and might have biased them, to a certain extent.

Apart from the above decision making studies another two, which involve decision making on part of the students and are linked to the present research, will be reviewed. However, they did not use the two decision making approaches as delineated [20] but the importance of their findings warrant their inclusion in the review.

The effectiveness of a personalized fitness module and a traditional fitness unit on cardiovascular endurance (measured with the one-mile run/walk test) of 95 fifth-grade students was

compared [30]. Students in the personalized approach (individualized fitness assessments and programmes, task sheets, and feedback of performance) were encouraged to select their own fitness activities – including free-choice fitness stations – and also decision making was facilitated. In the traditional unit a command or direct approach was employed. Intact classes were used and all students who participated in the fitness programme twice a week for seven weeks, were pre- and post-tested. A statistical difference between the two groups on the gain scores for cardiovascular fitness, favouring the personalized approach, was found. Also, students in the personalized unit significantly improved their performance, but that was not the case for the students in the traditional unit.

However, because intact classes were used certain extraneous variables might have biased the above results. Also, it is argued that a seven-week period is a short time span and that a longer period of time is needed for the personalized fitness module to be effective [30]. Moreover, the investigators calculated gain scores which were used later in the statistical analysis but using gain scores entails certain drawbacks (see 36 for a discussion). This casts doubts on the results of the above study.

A study was carried out to examine the effectiveness of a performance versus a mastery oriented approach on perceived competence (measured with the Athletic Competence subscale of Harter's Self Perception Profile for Children) and on wushu skill (operationalized through performance of the forward jump kick) of 8 to 12-year-old children (N=119) [38]. In the mastery method both the teacher and students were involved in decision making and partner or small-group exercises as well as variations of tasks were included. In general, students were encouraged to share decisions with the teacher. In the traditional group children followed the decisions made by the teacher, and the authoritative role of the teacher and individual exercises were emphasized. The students were randomly assigned to the different treatments. The duration of the programme was three weeks. Measures were administered before and after the intervention phase of the study. The results of the statistical analysis showed that children in the mastery group scored significantly higher on the wushu skill than did those in the traditional group. Although the quantitative analysis showed that there was no significant difference between the two groups in perceived athletic competence, the

qualitative analysis (interviews) indicated that children reported higher levels of perceived athletic competence, whereas children in the traditional group showed less pronounced effects.

According to the investigators a longer treatment period might have been more beneficial in terms of students' feeling competent in wushu. Moreover, although students from different age groups were employed, no attempt was made to control for this mediating variable.

## DISCUSSION AND CONCLUSIONS

- In the above studies learners were pre-tested and post-tested, treatments were verified through observations, teachers were well-trained to use the different approaches, the treatment period was relatively long [it varied from 8 to 20 weeks, only two studies lasted for three months], and mediating variables (gender, age, race) were controlled for. Also, in most cases a control group was employed. However, in the majority of the studies intact classes were used which allows certain threats to the internal validity to contaminate the results [9].
- Participants were elementary school children, except in [19] where kindergarten children were used.
- Self-concept was measured by means of unidimensional scales in which the child is presented with a number of items which tap different contents (i.e., schoolwork, sports, music etc.). Then a total score is calculated, by summing across all items and giving them equal weight. This conceals valuable information about a child's evaluations of separate domains of his/her life. Only in three studies was a dimensional scale utilized [38, 39, 40].
- Motor skill abilities were measured with reliable and valid instruments, but the tests used and the abilities measured were not the same all the times.
- In two cases [5, 30] health-related fitness components were measured.
- Of the 16 studies reviewed, 9 were conducted in the USA while the rest were conducted in Europe.
- Research findings related to self-concept measures show that gains in self-concept can be achieved by means of allowing students to make decisions in the areas of content selection and the teaching/learning process [5, 6, 7, 24].

The SDMA model seems to be superior to the TDMA model and to a control group which did not receive any formal PE programme [6, 7, 19, 24, 34]. Clearly, affective development, as reflected on self-concept scores, can be promoted by having students have input into classroom decisions [3, 22, 29]. However, in six of the reviewed studies [5, 6, 7, 17, 19, 24] no significant post-test score differences were found between the SDMA and TDMA models.

- An instructional approach in which the students share decisions with the teacher seems to be more effective in enhancing their perceptions of competence [38, 39, 40].
- Research findings related to motor skill abilities are mixed and are not as clear as those for other variables. Students in the TDMA scored significantly higher than students in the SDMA [24, 34] whereas the opposite was found in [19, 34]. Moreover, four studies [6, 7, 17, 45] did not find significant differences between the two models. Perhaps, these conflicting findings are due to the different tests used to measure motor development or due to differences in the design of the training programmes. For instance, some studies report the duration and the frequency but not the intensity of physical activity [45].

In spite of these results, it is that argued that with respect to motor skill development the SDMA can become a viable teaching approach, when students are given some guidance and the lessons are structured [22]. In the same vein, it is contended that when it comes to teach fundamental motor skills, the teacher should not make all the decisions for the children but, instead, they should be allowed to explore and learn by doing and ask for assistance when necessary [46]. Another interesting finding was that the SDMA and TDMA outperformed the control group, which did not receive any formal treatment [6, 7, 17, 24, 34, 45]. This implies that formal and structured teaching in PE is necessary if learners are to improve in motor skill development.

- With respect to certain health-related exercise components, a decision sharing model can substantially improve students' fitness compared to a traditional approach or a control group [5, 30].
- No significant interactions between gender and treatments were found except in [39, 40]. It seems that when decision making models are used, gender is not a confounding factor that can influence self-concept or motor skill abilities.

## RECOMMENDATIONS FOR FUTURE RESEARCH

So far sixteen studies in decision making have been conducted and strides have been made to understand the effects of decision making on students' physical and affective development. However, there are still questions that should be answered and assumptions related to the decision making theory need to be investigated. The following recommendations for future research are given:

- Further decision making research should be conducted in other areas of Europe and elsewhere. Research conducted in different geographical areas will give valuable information about the application of the decision making models around the globe and the universality of the results of the reviewed studies.
- Different populations should be included in future research (i.e. secondary or high school students as well as college students) to examine the effects of decision making models on varied age groups.
- Because physical fitness is a variable which is often neglected in decision making research more studies which utilize other physical fitness components are suggested (i.e., cardiorespiratory endurance, muscular strength, speed and coordination).
- Any future research on decision making should consider participants' familiarity with the teaching models and the teaching learning conditions they introduce. Prior to the start of any research the investigators should make sure that the participants understand their roles as learners in a specific decision making model and are able to make certain decisions.
- Any future study should last long enough for the new behaviours to manifest. However, the investigator should bear in mind that too long treatment duration can have a negative impact on the effectiveness of the instructional methods [27] due to boredom or lack of motivation on the part of the participants. However, how long a study should last is an issue still open to discussion.
- Because the small sample size is a factor which can influence the results, future research should utilize big sample sizes. This can allow the researcher to detect significant differences. See

- [41] and [42] for further information on calculating the sample size.
- If self-esteem is one of the variables to be considered, then the domain specific approach should be utilized. Within this approach, it is acknowledged that individuals can have different evaluative perceptions of themselves across various domains of their lives such as physical appearance, academic abilities or social relationships [8]. Furthermore, the self is presented as a profile of evaluative judgments across the various domains, while separate subscales are utilized for each domain. For example, Harter's perceived competence scale for children, which utilizes specific-domain subscales as well as a global self-worth scale, is recommended.
  - Any future research should employ a randomized design where individuals are randomly assigned to the different treatments and not intact classes. This can assure that threats to internal validity are controlled [9].
  - Apart from quantitative methods, qualitative methods should be included in future research. With qualitative methods different kinds of questions are answered; questions regarding the meaning of events to participants, teachers, and students. Their use can shed light on the teaching process and on what is going on in the gymnasium that may not be readily apparent [33]. For example, any decision making model needs to be examined through the eyes of the learners. It has been argued that we learn new things that we never knew we did not know when we ask the learners [15].
  - It is suggested that: "The interrelationships among teaching style, teacher behaviour, student engagement and practice, and achievement seem a particular fertile area for investigation in the effectiveness stream" (37: p. 359).

Therefore, in future research mediating variables, such as practice or engagement time, should be considered when the effectiveness of various models is examined. Research related to time and student engagement variables has given promising results for predicting achievement [14, 37].

Moreover, Aptitude Treatment Interactions, where individuals high in some aptitude profit most from an instructional method whereas individuals low in the same aptitude profit from another instructional method, seem to be a fertile area for investigation, as well. It is argued therefore that:

"By not focusing on the individual aptitudes, styles, personality, and traits of students the effects of teachers are masked, thus making it almost impossible to establish empirical relations between teaching behaviour and student outcome" (2: p. 10).

### Acknowledgement

This paper is dedicated to Irene.

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