

An Investigation of the Effects of Daily Physical Education in Kindergarten and Elementary Schools

Maurice Piéron, Marc Cloes, Catherine Delfosse and Maryse Ledent
University of Liège, Belgium

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At first glance daily physical education (DPE) might appear a physical education teacher's dream. Indeed, many are convinced of the potential benefits of such an approach for the balanced development of children and young people.

Over the last four decades several trials involving increases in the number of hours of physical education in the school programme have been performed around the world: France, Canada (Lavallée, 1984; Shephard, Jequier, Lavallée, Labarre & Rajic, 1980); Australia (Dwyer, Coonan, Leitel, Hetzel & Baghurst, 1983; Siedentop & Siedentop, 1985; Tinning & Kirk, 1991); Finland (Sarlin, 1992), United States (Carlisle, Cole & Steffen, 1991); Germany and Czechoslovakia (Naul, Parier & Rychtechy, 1990) and Belgium (Piéron, 1982). Nevertheless, there have not been as many of these programmes as one might have wished for or, indeed, expected. The reasons are easy to see: they require time, money and availability as well as enthusiasm from teachers, and rigorous organisation and implementation, in order that the research generated be substantial and worthwhile.

Thus, implementing DPE and researching its effects on pupils presents a formidable range of potential problems, especially when attempting analysis (e.g. number of subjects, teachers, classes and schools, sampling validity, duration of the programme, and patterns of assessment). The traditional design of comparing experimental to control groups presents a potential weakness if it is not accompanied by precautions to control the environment,

subject matter taught and the educational relationships in classrooms.

The organisation of DPE in the French Community of Belgium

1. Principles of application

In 1991, the Ministry of Education for the French Community in Belgium decided to launch a pilot programme increasing the time allocated to physical education in kindergarten and primary schools. A sample of pilot schools (those in which physical education was conducted on a daily basis) were selected to implement the DPE programme.

Delmelle (1991) outlined the philosophy and limitations of DPE programmes, taking into account children's needs, administrative structures of the educational system, together with human and budgetary constraints. The following principles were set out in order to establish whether it would be possible to bring about such a reform:

- 1) At the elementary school level every child should engage in physical activity for at least one daily session. If at all possible this should be set up without any major inconvenience for the school structure and organisation.
- 2) Activities must answer to the requirements necessary to promote the blossoming of a child's personality. Motor development must be embedded in a process of total education.
- 3) Teaching tasks should be set up by a team involving a qualified physical

education teacher and the classroom teacher working in close collaboration.

4) A good deal of information should be provided to parents, as well as other members of the educational community, regarding general aims, procedures and effects of the system in an attempt to convince them that the change would ensure the optimal development of every child.

Before any attempt was made to expand and generalise the application of the programme, the Ministry of Education issued a statement requesting strict control of the results of the programme. The research contract, to investigate the effects of DPE, was placed with the Department of Pedagogy of Physical Education at the University of Liège.

2. Setting up DPE and its operating criteria

The project began with the 1990-91 school year and was pursued during the two following years, 1991-1992 and 1992-1993. In the first year of implementation only kindergarten classes and the first two years of elementary school were involved. The progressive integration of the other classes was completed year by year (grades three and four in 1991-1992; grades five and six in 1992-1993). The implementation phase covered three school years in total.

Fourteen schools were selected for participation in the programme. Two schools from each of the seven districts of the French Community in Belgium represented the various types of institutions (e.g. urban and rural schools, large and small schools). The organisation and implementation of the DPE programme implied the voluntary assent of school personnel and the application of curriculum and methods suggested by school authorities.

During the 1990-91 school year, the programme required the allocation of a physical education teacher for two pilot schools or for two parallel cycles in the same school. During the three years, specialists worked in close collaboration with classroom teachers. The motivation, the availability and the spirit of

collaboration of all team members provided the basis for the quality of the work that materialised.

3. The curriculum materials (syllabi of contents)

Curriculum materials were specially developed for the implementation of the programme. These materials ('Répertoire d'activités pour une éducation globale des enfants de 2½ à 8 ans' and 'Education physique - Répertoire d'activités pour les élèves des 3e et 4e années primaires') advised on content and provided theoretical support aimed at easing the task of both physical education specialists and classroom teachers in choosing and structuring the activities. Due to their specialised nature the materials were sometimes difficult for classroom teachers to read and understand. However, specialist teachers were expected to help classroom teachers apply them.

With programmes requiring such close collaboration between specialists and classroom teachers, clarification of the objectives and principles of application was indispensable to ensuring the consistency of the project. Proposals of content, of varied activities adapted to pupils' abilities and interests, were necessary complement to the definition of objectives and principles. It is not our intention, here, to analyse the curriculum materials, but to recall their main features.

In the first kindergarten year, the theme of 'discovery', in terms of discovering the school, was aimed at settling the child into his/her new surroundings, encouraging adoption of a routine and working with others. Walking and running, support on the hands, balance, skills such as catching and throwing a mobile, formed the starting points for improving basic motor skills. These skills are used in daily activities and in leisure-sport activities and, eventually, in competitive sport.

The theme of 'discovery' continued into the second kindergarten year, utilising exploratory activities and body actions. In the third kindergarten year, and first grade year, the principal objective became 'learning'. Knowledge of the body, of its actions, its relationships with human and physical environments, basic motor

abilities like walking and running, were all developed towards more complex forms. Objectives of accuracy and amplitude were also proposed and different methods of throwing or striking a ball were among the activities suggested in the curriculum materials.

In grade two the development and maturation of the child led the authors of the curriculum materials to propose activities to approach the 'why?' and 'how?' of movement. The search, on the part of the children, for movement amplitude, strength, velocity and speed, endurance, efficiency, risk management, as well as personal contribution to movement, were proposed as objectives for this grade.

The curriculum materials prepared for grades three to four and grades five to six dealt with the introduction of sports techniques aimed at improving physical and motor capabilities. Skill development was pursued, particularly in its relationship with spatial awareness, and, alongside these, the development of social relationships and skills. Techniques and strategies in athletics, gymnastics, dance, basketball, handball, volleyball, racquet games, judo and swimming were recommended. Climbing was added to this list in grades five and six.

4. The participants

The number of classes and children (Table 1), the geographic distribution of the schools participating in the programme and the representativeness of schools (in terms of their social and educational surroundings) ensured the validity of the data collected. The project presented some remarkable features. It included more than 3,000 pupils from all school districts in the French Community of Belgium. The schools covered a wide range of environments. They dealt with a population made up of young Belgians and of children from immigrant families. The three years duration was also the longest period for such a scheme according to the literature on the subject. These various factors made it possible to put forward plausible generalisations regarding the effects of the DPE programme.

Table 1

Descriptive data related to the daily physical education programme

	90/91	91/92	92/93
Classes	97	139	187
Pupils	1.772	2.563	3.386

Methodology

Evaluation procedures

The main objective of this research was to assess the effects of DPE on children. A comparison was made between children from pilot and control schools in order to account for the many other environmental and lifestyle variables. In addition comparisons were made according to the time spent in the DPE programme (one, two or three years).

Assessments were completed in the following areas: (1) children's motor behaviour and attitude; (2) relationships between the teaching process (what is really occurring in the class) and the change in pupils' performance in fitness and motor ability tests, their perceptions of physical education lessons and their attitudes towards sports participation; (3) effects of the DPE programme on teachers' perceptions towards their profession and towards the curriculum materials used in the programme.

Data were gathered in two steps: (1) at the beginning of the 1992-93 school year in October and November, and (2) at the end of the same year, in April and May. The first phase of data gathering enabled an assessment to be made after two years implementation of DPE in pilot classes. These data served as the initial level in the one year longitudinal comparison. The second set of data enabled the same kind of transversal comparison at the end of the third year of the innovation programme. Those data formed the final level of the longitudinal comparison.

In all schools, pupils from classes ending a teaching cycle were assessed. These classes were: the last year of kindergarten (5-6 year olds) and grades two (7-8 year olds), four (9-10 year olds) and six (11-12 year olds).

In the first step of the study the complete samples of children of the pilot and control classes, for each grade, were compared in order to obtain a global picture of the differences distinguishing children in the two types of classes. It was necessary to account for the grade level and duration spent in the DPE programme in order to reach the most suitable interpretation of the effects of DPE. With the exception of grade six, who entered the programme at the beginning of the school year 1992-93, children had spent one or two years in the programme at the time of the pre-tests. By the end of the year, during the post-tests, they had spent one, two or three years in the pilot schools.

The effects expected from such a large project should be observed in various aspects of the school-life of pupils and professional-life of teachers. Such multi-dimensional research, utilising multiple measurement and observation instruments, offered wide opportunities for analysis via the possibility of cross-checking the credibility of data (Piéron, Cloes, Delfosse & Ledent, 1994).

1. Pupil variables

a. *General and specific motor performance* (Cloes, Delfosse, Ledent & Piéron, 1994a). The following physical fitness and motor ability tests were utilised: (1) Fitness test: 30 sec. sit-up, shuttle run, standing broad jump, sit and reach; (2) Skill tests: catching a ball, throwing a ball, gymnastic roll, handstand against a wall, hockey-like slalom. They are part of a well-known battery of tests, either AAHPERD tests or the Eurofit test and, as such, do not need to be described (Ross & Gilbert, 1985). Rating scales based on observation in sports skill tests were also used (Neto & Piéron, 1993).

b. *Attitudes towards school, sports activities and physical education lessons* (Delfosse, Cloes, Ledent & Piéron, 1994a).

An attitude questionnaire previously validated in research involving children of the same age was administered (Delfosse, Cloes & Piéron, 1992). It aimed at identifying the following: children's attitude towards schools and the main reasons advanced to explain their choices,

their habits in matter of leisure (lifestyle), their favourite activities during school break, their attitude towards school physical education and the most enjoyable activities. The questionnaire was based on pictures. Every closed question showed a set of proposals shaped as explicit drawings. The reasons for a positive and/or a negative attitude towards school were presented in short sentences. Beyond the unquestionable advantage of its attractive character for children, this method of enquiry had limited the potential difficulties the children might have faced in comprehending questions; it does not penalise the children acquiring the written language with difficulty. The high proportion of immigrants in some classes also justified this form of presentation.

c. *Co-operative behaviour in relationship to other pupils, the perception of lessons, the teaching content that they appreciated the most.*

These were appraised by questionnaires administered immediately after physical education lesson. These are fully described by Cloes, Delfosse, Ledent and Piéron (1994b).

2. Teacher variables

Teacher variables concerned the following points: (i) attitudes towards their job and the difficulties that they met in their physical education classes; (ii) the perception of the DPE programme — especially modes of organisation, co-operation between classroom teachers and physical education specialists, use of curriculum materials, and the conditions for optimal working in this type of project. To appraise these variables, instruments utilised were those of observation and questionnaire that either already existed (Delfosse, Cloes & Piéron, 1992) or were developed specifically when the study required it (Table 2).

3. Process variables

With reference to the process-product paradigm, it is evident that pupil variables are central to the analysis of the effectiveness of any teaching programme. Pupils' behaviour during physical education lessons should be the mediating link

Table 2
Summary of data gathered, instruments used, and objectives of the assessment

Data	Instrumentation	Objectives
I. Children		
Anthropometry	Height & Weight	To provide an extended picture of pupils motor characteristics
Physical Fitness and ability tests	Eurofit tests Specific tests	
Attitude	Attitude questionnaire	To know pupils' attitude towards school and physical education To gather components enabling one to interpret pupils' performance and behaviour
II. Teachers		
Attitude	Attitude questionnaire	Feeling of teachers towards their job Perception of the experimental programme Evaluation - Cooperation Syllabus of contents
III. Teacher - Pupil relationship		
Planned Contents during school year	Questionnaire	Search of causality between pupils' performance results and experimental programme
Analysis of teaching process	Observation system: Quantity and Quality of participation	
Contents really taught		
Pupil's behaviour		
Perception of lessons	Questionnaires to pupils and teachers	

between the DPE programme and pupil outcomes in fitness, motor skills and attitudes towards physical education and school. The process variables dealt with: (i) pupil involvement in physical education lessons; (ii) pupil behaviour during lessons. The quantitative and qualitative aspects of the children's opportunities for practice were analysed on video-tapes. The observation system OBEL/ULg is comparable to the ALT-PE. It was used in several pupil behaviour studies (Piéron, 1982; Piéron & Cloes, 1981). The activities planned and delivered during the school year were provided by physical

education teachers using the curriculum materials provided for them. The raw data were collected by questionnaires. The actual content of the lessons as taught was recorded on video-tapes. The children's and teachers' perceptions of lessons were discerned from questionnaires filled in immediately after the sessions.

4. Sample

The distribution of the children in relation to the fitness tests and the attitude and lesson assessment questionnaires is reported in Table 3.

Table 3
Samples of pupils and teachers

	Pilot schools					Control schools				
	K	2P	4P	6P	Total	K	2P	4P	6P	Total
Pupils										
Fitness and motor tests	103	159	188	185	635	83	103	149	161	496
Attitude questionnaire	-	119	140	134	393	-	90	143	119	352
Perception of lessons questionnaires	-	65	140	127	332					
Teachers					152					139

5. Reliability and statistical treatment

Reliability of observation techniques was appraised by the Bellack percentage of agreement formula. It exceeded .90. This percentage was within the range of reliability of use for instruments like OBEL/ULg or ALT-PE.

Two statistical procedures were carried out: (1) Student test for unmatched samples in the comparison of pupil performances in fitness and motor ability tests; (2) χ^2 test for qualitative and non-hierarchical data in attitude questionnaire.

Results

With regard to the children themselves we shall focus on the significant changes in the motor domain and in attitudes and behaviours. Teachers' and physical education specialists' opinions, perceptions and behaviours were important contributors to the smooth working of the project. Teaching process variables identified by research in this field were also analysed (Cloes, Delfosse, Ledent & Piéron, 1994a).

1. The assessment of fitness and motor abilities in children

Analysis of fitness and motor ability tests centred on a comparison of children's performances and their development in control and pilot groups, level by level, on the one hand, and test by test, on the other. The discussion will focus upon the influence of time spent in the experience and, also, on gender differences.

In this paper, we dealt only with the statistically significant differences. We considered the measurements completed at the end of the school year and the relative development of pupils' performances between the two series of tests. In the comparison of fitness and motor performance of whole groups, children of pilot classes achieved better performances in most tests than children in control classes. All grade levels confounded; out of 36 comparisons, 15 significant differences were found in favour of the pilot group and only one in favour of the control group (Table 4).

Table 4

Synopsis of the performance comparison of pilot and control classes: Performance and progress. Statistical significant differences ($p < 0.05$)

Performance		Progress	
<i>Pilot</i>	<i>Control</i>	<i>Pilot</i>	<i>Control</i>
Kindergarten			
Agility	Rotation	Sit-up	Gymnastic roll
Catching		Hockey like slalom	Handstand
Throwing			
Hockey like slalom			
Grade 2			
Agility		Agility	Flexibility
Jumping		Jumping	Handstand
Rotation			
Hockey like slalom			
Grade 4			
Catching		Throwing	Sit-up
Throwing			Catching
Hockey like slalom			Handstand
Grade 6			
Sit-up		Agility	Handstand
Agility		Hockey like slalom	
Throwing			
Hockey like slalom			

The differences in children's performances were related to the mastery of motor skills more than physical development. Ten differences out of fifteen were observed in the motor ability tests. The control of a tool (hockey-like slalom) was better mastered by children of pilot classes at all grade levels. Children of the pilot group could move more quickly in changing direction and throwing for distance. It is tempting to explain these findings in terms of the supplementary practice gained by the children from the DPE group. However, the absence of improved performances in pilot classes in gymnastic tests was hard to explain, especially given that a relatively long period was dedicated to teaching this activity.

The analysis of the change of performances between the beginning and the end of the school year limits the favourable picture that we have just painted regarding the effects of the DPE programme. In most teaching levels, children of both groups progressed significantly in the same number of tests. We think that this could be due to a relative scattering of activities in physical education sessions. However, this does not allow room for a consequent improvement of the initial performance level, particularly when it is already high.

It is also possible that children from the control group have benefited from certain forms of learning as expressed by their progress in the test of reversing on the hands. We hypothesise that children of pilot classes were familiarised to this type of exercise requiring boldness. They would have mastered it since the pre-test while other pupils would have found a new challenge, thus increasing their motivation during post-tests.

Comparisons of performances and progress of control and pilot groups, according to gender, resulted in several findings. In girls and boys, performances achieved during the post-tests always favoured children from pilot classes. However, girls could be considered as more receptive to the effects of the programme; in sixth grade, they achieved the highest performance. This observation is especially noteworthy as girls of this grade level are generally entering the first

phase of puberty, a key period for the installation of habits for a healthy life.

The picture provided by the results clearly shows that the children's physical performance in the DPE programme overtook, in most of the aspects measured, the level of performance of children involved in the standard physical education curriculum. The superiority of children from pilot classes was more evident in motor skills than in physical fitness. This is not surprising, given that it is known that changes in fitness are only brought about slowly.

Several explanatory factors were advanced. Harmonious motor development was one priority of the DPE programme that teachers particularly adhered to. However, they forsook part of the fitness component of activities. Despite the supplementary time allocated to physical education, every aspect of the motor and physical development could not be covered simultaneously in depth. The analysis of motor engagement during the lessons confirmed this interpretation. A relative shortage of children's physical engagement during physical education lessons was underlined in analysing variables from the teaching process. Pupil motor engagement remained at a low level, especially when classroom teachers conducted the lesson. This could be a reason for the limited effects of the DPE programme on physical qualities and fitness.

On the other hand, practising sports activities outside the school was more widespread in control classes. It is presumed that this influenced the results of children in these classes. The emphasis upon competition found in sports clubs is generally reflected in higher performance requirements in a particular sport. This encourages participants to increase the intensity of practice. It is important to point out that the DPE programme offered the chance, especially to those children who had fewer opportunities outside school, to improve their motor skills. This is particularly valuable for girls who, by cultural tradition, use the existing sports structures and facilities less.

The influence of the time spent in DPE in pilot classes differed substantially from

Table 5
List of tests for which significant differences were found between
pilot and control classes

Experience 1 year	Experience 2 years	Experience 3 years	Control
Kindergarten			
	Catching Throwing Rotation Hockey like slalom	Agility Catching Hockey like slalom	Sit up
Grade 2			
Sit up Agility Catching Hockey like slalom	Agility Rotation-total	Agility Rotation-total Hockey like slalom	
Grade 4			
Throwing	Catching Throwing Hockey like slalom	Agility Catching Throwing Hockey like slalom	Handstand

one grade level to another (Table 5). From performance comparisons according to the time spent in the programme, it was observed that children involved in the DPE programme since year one did not achieve higher performances than those of their schoolmates in the control group, except in grade two, a favourable period for learning.

Children in their second or third consecutive year in the programme achieved significantly better performances compared to those of control classes (Table 5). The effect of DPE seemed to take place only after some delay of implementation.

Involvement in DPE in the school environment seemed to have two different effects, one working rapidly, the other more slowly. The first was shown in good performances achieved during the pre-tests by children from the DPE programme. This depended upon a good knowledge of the tasks. The second effect, underlined by the existing differences among the three periods spent in the pilot group, suggests that long term work is indispensable to achieve higher progress

than that which could arise independently as a result of maturation. In most motor tasks, the improvement of the mastery of criteria necessary to achieve a good performance and to show real progress required some specific learning. The diversity of content practised in one year did not always make this possible, nor was implementation systematic from school to school.

2. Pupil and teacher attitudes and perceptions

Data from questionnaires enabled the drawing of a picture of children's and teachers' attitudes, perceptions and motivation, in relation to the DPE project (Delfosse, Cloes, Ledent & Piéron, 1994a; 1994b). Several tendencies deserve further attention. In the first instance, we will deal briefly with attitudes of children towards school, the relationships that they establish spontaneously with their peers during break-times, their usual activities outside school time and, finally, their attitude towards physical education lessons. Secondly, we will look at the teachers' attitudes and perceptions

Figure 1:
Children's attitudes towards school in pilot and control groups

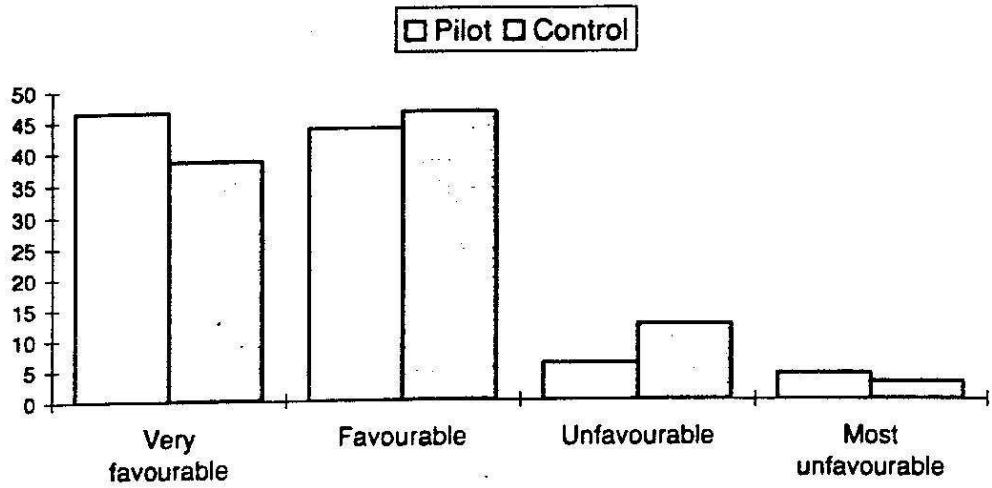
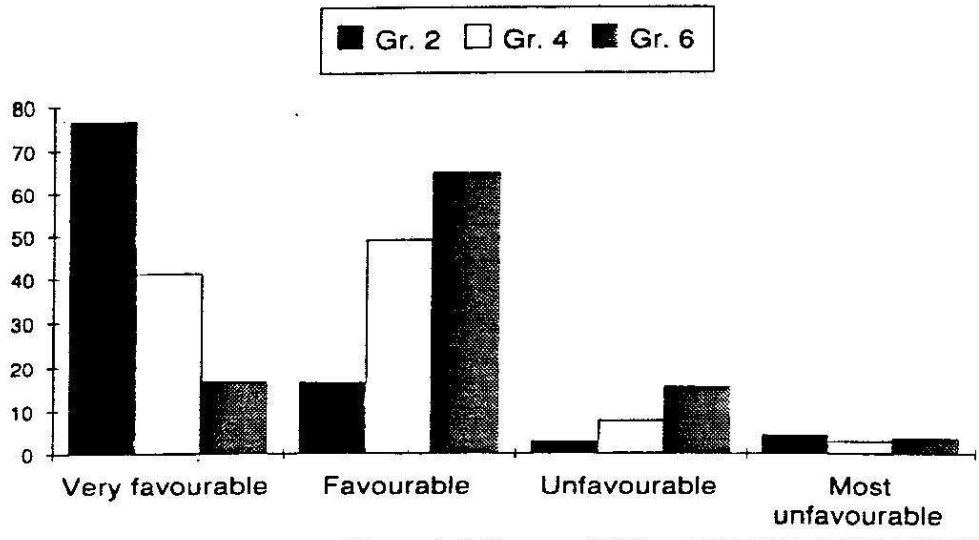


Figure 2:
Evolution of very favourable attitudes towards school in pilot classes



towards DPE in kindergarten and elementary schools.

The pupils

Children who followed DPE showed significantly more favourable attitudes towards school than pupils from control schools. The higher rate of globally favourable attitudes was especially characterised by many very favourable

attitudes (Figure 1).

With the passage of time at school, a perceptible deterioration of attitude developed. Attitudes towards school became less and less favourable when shifting from grade two to grade six. This deterioration was also noticeable during the six months separating the two points of data collection. Figure 2 shows the development of very favourable attitudes

in pilot and control groups.

The DPE programme exerted a limiting influence in the aforementioned deterioration process. The effect differed according to the various school levels. Hardly noticeable in grade two, when attitudes towards school were the most favourable, the DPE project limited the deterioration of children's attitudes, in grade four especially. Its role seemed more 'rearranging' than 'constructing', particularly in sixth graders, when disaffection towards school was already well installed. The apparent explanation for the positive attitudes can be categorised into two particular influences: (1) the social relationships between peers, as well as with the teacher, and (2) dealing with pleasure and fun in school life. The attraction of peers was inversely proportional to the esteem given to teachers...The influence of friends gained in importance during schooling to become quite important in grade six.

The social relationships established spontaneously by children during breaks did not differ significantly between pilot and control groups. We attributed this absence of a difference to important divergences linked to grade level. The main differences were observed in grade four children. Those from pilot groups chose an organisation in small groups which was richer from a relational point of view. The free activities during playtime showed that children chose activities that they

practised less spontaneously in a school setting.

Children's attitudes towards homework suggested that those involved in the DPE project were in a better mood to complete their tasks and more able to start quickly after the return from school. Pupils from control schools felt a need for play activities before starting their homework.

Out of school activities showed that children from the pilot schools felt a lower need for participation in sport. This observation was substantiated by data regarding involvement in sports club activities: more children from control schools were involved in sports clubs.

Perception of the objectives of the physical education lessons provided some clues to the spirit of these lessons in pilot and control schools. The hierarchy of the objectives was similar in the two types of schools. The ideas of 'bodily development' and of 'health' were ranked in top positions whereas 'learning', 'socialisation' and 'pleasure' were ranked in the lowest positions. The notion of pleasure, in particular, separated the two groups (Figure 3). This suggests that teachers in the DPE project placed more emphasis on pleasurable activities than their colleagues in control schools. It appears legitimate to suggest that the extra time allocated to physical education prompted a more relaxed teaching approach, without affecting the main objectives, especially those of development and learning.

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Figure 3:
Perception of physical education objectives in pilot and control groups

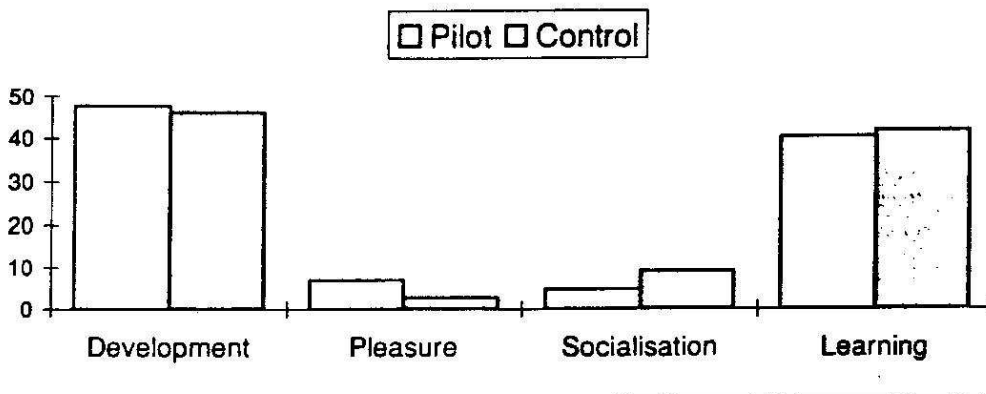
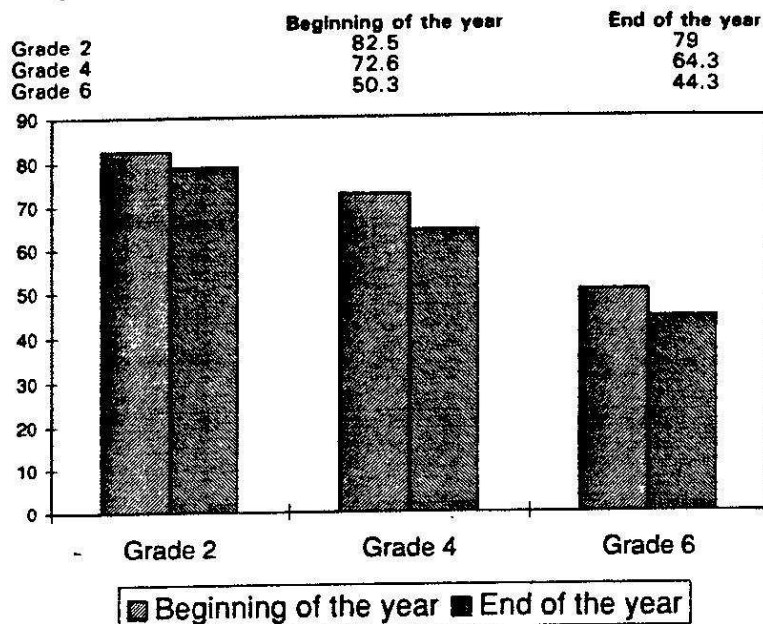


Figure 4:
Development of very favourable attitudes towards physical education lessons



Although the children were very favourably disposed towards physical education lessons, their attitude did not escape a certain deterioration from grade two to six and during the school year. The apparent effects of DPE depended very strongly on the grade level. In grade two, attitude towards physical education lessons was very favourable, whether children participated or not in the project. The favourable effect of DPE was particularly evident in grade four, just before the deterioration began to start. The involvement, limited to one year, makes us cautious in our interpretation of a DPE programme unable to modify unfavourable attitudes already installed. Figure 4 shows the deterioration in very favourable attitudes.

The teachers

We will deal with teachers' perceptions of the teaching profession and of its difficulties, with their perception and real involvement in the DPE programme, with the collaboration between classroom teachers and specialists (Delfosse, Cloes, Ledent & Piéron, 1994b) and finally, with the utilisation of curriculum materials specially prepared for the project (Delfosse, Ledent, Cloes & Piéron, 1994b).

The enhancement role played by the DPE project was also illustrated by teachers. Teachers from pilot schools declared that they approached work with greater anticipation of pleasure than teachers from control schools. In addition, they appeared happier to meet colleagues outside the school setting. In spite of some co-operation difficulties, involvement in the project may also have contributed to a reinforcement of the broader social relations among the adults involved.

The perception of objectives pursued through the DPE programme highlighted the presence of expectations related to the usual views about the impact of sports practice. The improvement of motor performance, and effects directly related to sports activities, was mentioned before eventual social behavioural or cognitive effects. Classroom teachers were more likely to view physical education as an integral part of the total education experience than their specialist colleagues. This suggests the existence of a real opportunity for the improved integration of physical and sports activities in the educational context. This would be an essential contribution for classroom teachers.

In general, the classroom teachers responded favourably towards the project and were eager to see it continued. They found more advantages than inconveniences in the project. Nevertheless, their active involvement was not guaranteed beforehand nor guaranteed long-term. Teachers in pilot schools, mainly classroom teachers, admitted experiencing more difficulties in preparing, organising and delivering physical education sessions than their colleagues in control schools. The increase of time allocated to physical education probably obliged them to search more to find pleasurable and varied activities meeting the children's interests, even when they had particularly rich curriculum materials at their disposal.

Teachers participating in the programme experienced a feeling of being better regarded by their pupils since these teachers provided physical education lessons. Collaboration between classroom teachers and physical education specialists was not set up systematically but was done on a fairly informal basis. Some wavering existed in the establishment of the contacts. It is important to point out that talks between classroom teachers and specialists were principally centred on the child (e.g. pupils with behavioural problems and with learning difficulties) rather than on criteria for the convenient organisation of lessons.

The utilisation of the curriculum materials seemed to present several difficulties. The criticisms offered by teachers underscored problems of accessibility. This might be of a practical nature (caused by the unavailability of documents for consulting) or of a conceptual nature (terminology which bewildered classroom teachers and, sometimes, even specialists).

3. The content of the sessions and the teaching process

The analysis of the teaching process — carried out principally in the pilot schools — brought to our attention a factor that may need substantial modification. Results underlined that pupils' behaviour, such as motor engagement, as well as teachers' feedback during the lessons, did not match criteria of teaching effectiveness as

identified by research or by observation of 'master' teachers (Phillips & Carlisle, 1983; Silverman, 1988). The time children spent in inactivity was too important to warrant measurable gains in physical fitness tests. It is necessary to draw the attention of all who are concerned, not only classroom teachers, but also physical education specialists, to the need for children to have sufficient quantitative and qualitative involvement in motor activities.

4. Working conditions in the DPE project

The active involvement of classroom teachers in the experimental project proved capable of bringing important benefits to the school staff and pupils. Beyond the budgetary consequences of DPE, the involvement of classroom teachers offered several advantages:

- i) as child specialists, they embrace more easily the idea of total education than physical education specialists;
- ii) their concerted interventions with physical education specialists resulted in a successful multi-disciplinary project;
- iii) pupils developed a higher opinion of their teachers due to their active involvement in physical education lessons: they appeared to value their teachers more highly.

However, the data dealing with the real involvement of classroom teachers in the project showed that the assignment was not without difficulties; feelings of inadequacy in various aspects of physical education, a relative lack of understanding of curriculum materials, difficulty in assessing pupils' progress were all inconveniences that some found hard to accept in addition to the usual teaching load. Data from the teaching process showed a considerable need for change in their educational practice (Piéron, Cloes, Delfosse & Ledent 1994). This would appear to support the claim of Tinning & Kirk (1991, pp.12-13) that, 'The implicit assumption that a generalist primary teacher has sufficient knowledge and skills to effectively implement the curriculum materials remains problematic'. We

suggest several strategies aimed at improving the likelihood of effective practice:

1. It is necessary to convince teachers that they are capable of playing an important role in a DPE project. Our findings were somewhat similar to Tinning & Kirk (1991), reporting that 39% of the teachers expressed the sentiment that they were not confident about teaching physical education. One of the arguments that might be offered, based on our results, is the aforementioned increase in teachers' esteem in the eyes of the children receiving DPE. Some studies undertaken in other countries show that convincing teachers is not only essential in the first steps of such a project but remains fundamental throughout its development. There is evidence that teachers' good-will and motivation weakens, leading to a drastic reduction in the time allocated to the physical and sports activities (Tinning & Kirk, 1991). The answers given by teachers involved in the Belgian project indicated a similar trend. They expressed a wish for strong support and felt they had difficulties in assessing their own teaching performance by appraising their pupil's progress.
2. As well as providing information on the curriculum materials prepared to help teachers to fulfil their tasks, it is necessary to encourage the acquisition of new teaching competencies in physical education. This new expertise would improve the use of information provided to teachers. We think principally of the ability of ensuring the effective and intense engagement of children in activities and in learning and developing their communication skills. In-service training to update, revise or replace existing approaches should be an indispensable means of helping teachers acquire the new expertise. The limited formula of a few lectures seems too abrupt. Generally, teachers appear to view this approach as more akin to the recommendations of school authorities rather than practical and research based professional advice. Using the idea of 'educational counsel', popular in Quebec Province (Canada), we favour

an approach revolving around 'consultation — diagnosis — prescription' written into in-service training (Spallanzani & Robillard, 1993). As suggested by Kirk & Tinning (1991, p.13): 'The presence of the specialist physical education teacher is a favourable starting point for classroom teacher in-service training while implementing the curriculum. Organised reflection, monitoring and evaluation of the programme and an attitude which regards the physical education curriculum as problematic are essential counters to this potential aspect of de-skilling. Given an environment which supports critical review of practice and dialogue concerning curriculum, it would be possible for teachers to become skilled in curriculum evaluation at the same time as becoming skilled in curriculum implementation.'

3. Results of the DPE programme showed that the co-operation between classroom teachers and physical education specialists could be improved. Far from rejecting this co-operation, it is imperative to prepare the ground for it with educational counselling for the specialists, in order that they might play their own counselling role. They should not limit their role to that of simply providing a model for imitation.

4. Concerning practical aspects, classroom teachers pointed out that lack of time and difficulties of organisation were major barriers to optimal working conditions. Adapted timetables and availability of facilities and equipment were identified as important factors in practical organisations. In relation to this, 60% of classroom teachers observed that the additional physical education lessons replaced other subject matter, especially that of an artistic nature.

5. Another possibility for improvement lies in the area of curriculum materials. Several difficulties could be classified in two categories under the overall heading of 'accessibility', i.e. material and conceptual. Curriculum materials must be easily available. Several classroom teachers criticised the strenuous nature of the materials drawn up for the project —

a point noted by Tinning & Kirk (1991, 7): 'Curriculum guides have been produced which provide a wealth of information but class teachers are under ever increasing strain. To have to plough through books to work out activities for lessons certainly discourages all but the most conscientious'.

6. Difficulties of organisation were mentioned often by teachers from pilot schools. They were confirmed in the video-taped lessons.

Summary and Conclusions

The project used different methods of data collection: tests, questionnaires and systematic observation of pupils and teachers. In developing a multiple viewpoint approach, we attempted to sketch a detached view of the implementation of DPE and of its results. Goals were as follows:

1. Exploring the possible effects of the programme in various areas of children's life that do not arise directly from their activities during physical education lessons.

2. Identifying children's school-life context, in order to identify factors influencing several effects of DPE. This notion of global background is important, since schools are also concerned with children's out-of-school activities (especially sport) in relation with the family and social background. It must be restated that one could not hope for a total shift in pupils' behaviour, attitude and fitness as a consequence of extra time allocated to physical and sports activities.

The various viewpoints considered, the results, and the knowledge of external variables all allowed us to identify a convergent package of indications, thus allowing us to think in terms of causality. Often, the benefits came from the children's involvement in the experimental programme.

Improvements of motor performance in primary school age children arise from a maturation process and from practice and learning. Nevertheless, it is particularly

hard to identify the relative contributions of these two sources. Tracing pupil's development, from the starting level at beginning of the school year, appeared to allow isolation of the part played by children's activities within the school environment. In all grade levels, comparisons confirmed pilot classes superiority. Performances were significantly better in many tests. However, during the year, it seemed that the development of performance due to maturation masked the potential effects of physical activities.

A decline in favourable attitudes was observed in every school at the beginning and the end of the school year. A slide from very favourable attitudes towards simply favourable attitudes was observed. However, attitudes towards school were more favourable in children attending the pilot schools. Deterioration in attitudes were most pronounced in control schools. According to Bloom (1979), 'affect' exerts a strong influence on school effectiveness. Bloom attributed about 25% of the variance of this 'affect' in outcomes of children. When school failure is a fundamental problem for school authorities, the significance of these results can be appreciated.

The development of co-operative behaviour was regularly cited as a probable benefit of the project. The relationships that the children established spontaneously with peers during break-times were among the elements of differentiation between children in pilot and control schools. The notion of pleasure discriminated children's perceptions of physical education lessons main objectives. As one might expect, attitudes towards physical education lessons were more favourable in children from the pilot schools. The development of these attitudes towards physical education during the school year could be combined with attitudes towards the school in general. As pupils advanced through school, very favourable attitudes decreased and unfavourable attitudes increased, even if children maintained a positive global attitude.

The DPE project seemed to exercise a positive influence on the teachers'

perceptions of their work. This observation appear to sit neatly alongside favourable attitudes to school expressed by children from pilot schools. It is possible that the carrying out of such an educational project played a role in encouraging both adults and children. Children's and teachers' opinions appear to converge to report a more convivial atmosphere in pilot schools.

The preparation and animation in physical education lessons created more problems in pilot than in control schools. In spite of the support provided, evidently teachers must deploy significant effort to provide their children with varied and attractive activities every day. Maintaining the enthusiasm could be a key problem. Tinning and Kirk (1991, p.21) observed that, 'Without doubt there has been a gradual diminution in teacher enthusiasm towards the teaching of physical education'.

Teachers' interest in the project was obvious. They acknowledged more benefits than inconveniences and they wished that the DPE programme would continue. However, the translation of their interests into practice was not automatic. Teachers identified difficulties mainly in terms of practical organisation (timetables, facilities, availability) but also felt some inadequacy in teaching physical and sports activities. The co-operation between classroom teachers and specialists focused more on children than on practical organisation of the sessions or on their content. In this area it could be argued that the co-operation between classroom teachers and specialists and the didactic syllabi were sufficient to enable classroom teachers to become completely involved in the project.

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- expérimental; (5) une observation systématique des comportements de l'enseignant et de ses élèves pendant la leçon d'éducation physique. Un échantillon de 675 enfants des écoles pilotes et de 559 d'écoles contrôles présentant les mêmes caractéristiques fut concerné par les tests d'habileté motrice. Seules quelques variables relatives à la condition physique différaient entre les deux groupes.
- Une détérioration progressive de l'attitude vis-à-vis de l'école fut mise en évidence. Cependant, les élèves des écoles expérimentales ont conservé de manière significative une attitude plus favorable vis-à-vis de l'école et vis-à-vis des deux types d'enseignants, que dans les écoles contrôles et ce, à chaque niveau de scolarité considéré. L'observation systématique indique des différences significatives de temps d'engagement moteur en faveur des classes dirigées par les spécialistes.

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Résumé

Recherche sur les effets d'une séance d'éducation physique dans des écoles matérielles et élémentaires

Un programme d'éducation physique quotidienne (leçons de 40 minutes) fut mis en oeuvre dans 14 écoles (maternelles et primaires) pendant trois ans. Ces écoles étaient situées dans la Communauté française de Belgique. Plus de 3,500 enfants furent impliqués dans le programme. Celui-ci exigea une coopération étroite entre l'instituteur titulaire de la classe et le spécialiste de l'éducation physique. L'évaluation des effets du programme quotidien d'éducation physique s'est faite sur la base d'une collecte de données qui provenaient de plusieurs sources: (1) des tests de condition physique et d'habileté motrice; (2) des questionnaires validés au préalable et déterminant l'attitude des enfants vis-à-vis de l'école et des activités physiques; (3) des rapports relatifs aux activités extrascolaires de loisirs; (4) des questionnaires et des interviews portant sur les relations entre l'instituteur et le spécialiste de l'éducation physique ainsi que leur perception du contenu et des aspects pédagogiques du programme

M. Piéron

Zusammenfassung

Ein pädagogisches Experiment über täglichen Sportunterricht in Kindergarten und Grundschule

An 14 Schulen (Kindergarten und Grundschule) wurde drei Jahre lang täglich Sportunterricht durchgeführt (40 Minuten pro Einheit). Diese Schulen waren verteilt über das gesamte französischsprachige Gebiet Belgiens. An dem Experiment nahmen mehr als 3500 Kinder teil. Die Durchführung erforderte eine enge Zusammenarbeit zwischen den Klassen- und Sportlehrern. Der Einfluß täglichen Sportunterrichts wurde mit Hilfe einer multidimensionalen Datengewinnung bestimmt, wobei folgende Aspekte ausgewertet wurden: (1) körperliche Fitness- und motorische Fertigkeitstests; (2) valide Fragebögen zur Erfassung der Einstellung der Kinder gegenüber der Schule und gegenüber sportlichen Aktivitäten; (3) Angaben über Freizeit- und außerschulische Aktivitäten; (4) Fragebögen und Interviews zur Erfassung des Verhältnisses zwischen Klassen- und Sportlehrern sowie deren Eindruck von

den inhaltlichen und pädagogischen Aspekten des Experiments; (5) systematische Beobachtung des Verhaltens der Schüler und Lehrer während des Sportunterrichts.

Mit einer Stichprobe von Schülern der Experiment-Schulen sowie vergleichbarer Kontroll-Schulen wurden die Tests und die Fragebogenaktionen durchgeführt. Die wichtigsten Ergebnisse sollen hier präsentiert werden. In bezug auf die Fertigkeitstests wurden statistisch signifikante Unterschiede zugunsten der Experiment-Gruppe festgestellt. Bei den körperlichen Fitnessstests unterschieden sich jedoch nur wenige Variablen.

Eine progressive Verschlechterung der Einstellung der Schüler gegenüber der Schule wurde augenscheinlich. Die Kinder der Experiment-Klasse jedoch zeigten in jedem der untersuchten Bereiche eine signifikant bessere Einstellung gegenüber der Schule, der Schulklasse und den Sportlehrern als Schüler der Kontrollklassen.

Die systematische Beobachtung ergab signifikante Unterschiede in bezug auf das motorische Engagement der Schüler in solchen Klassen, die von Klassen- und Sportlehrern geleitet wurden.

A. Daalman

Resumen

Una experiencia pedagógica basada en la clase diaria de educación física y desarrollada en el jardín de infancia y la escuela elemental

Durante un período de tres años se desarrolló un programa diario de educación física en 14 escuelas de nivel jardín de infancia y primaria. Dichas escuelas estaban ubicadas en el territorio ocupado por la comunidad francesa en Bélgica, de la cual más de 3,500 niños fueron involucrados en el programa experimental. El desarrollo de dicho programa requirió un amplio grado de cooperación entre los profesores generalistas de aula y los especialistas en educación física. La evaluación de los efectos del programa diario de educación física se realizó en base

a un modelo multidimensional que incluía los siguientes instrumentos: (1) Test de condición física y de habilidad motriz; (2) cuestionarios validados para analizar la actitud de los niños hacia la escuela y hacia las actividades físicas; (3) informe sobre las actividades extraescolares o las actividades realizadas en tiempo libre; (4) cuestionarios y entrevistas para valorar las relaciones entre los profesores generalistas de aula y los especialistas de educación física, así como su percepción de los contenidos y aspectos pedagógicos del programa experimental; (5) observación sistemática de los comportamientos del profesor y del alumno durante las sesiones de educación física.

Para el proceso experimental y la administración de los cuestionarios se estableció una muestra de alumnos para el grupo experimental, y otra muestra de alumnos para el grupo de control en escuelas de similares características. En el trabajo se presentan los datos con mayor grado de significación. En la mayoría de los test de habilidad se observaron diferencias estadísticamente significativas a favor del grupo experimental. Respecto a los test de condición física, sólo unas pocas variables tuvieron capacidad discriminante entre grupos.

Por otro lado, se pudo comprobar un progresivo deterioro en la actitud de los alumnos hacia la escuela. Sin embargo, los niños pertenecientes a las clases del grupo experimental mantuvieron una mayor y significativa actitud favorable hacia la escuela, hacia la clase y hacia los profesores especialistas que los niños pertenecientes al grupo de control en cualquiera de los niveles escolares investigados.

La observación sistemática del comportamiento del profesor y del alumno permitió constatar la existencia de diferencias significativas en el compromiso motor del alumno en la clase en función de que ésta fuera dirigida por el profesor especialista de educación física o por el profesor generalista.

J. Campos Granell