The Acquisition of Motor Skills

A aquisição de Habilidades Motoras

La Adquisición de Habilidades Motrices

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ABSTRACT

The main aim of physical education is teaching children how to cope with situations that demand physical activity. The creation and organisation of such situations by the teacher is closely connected with his or her understanding of education and movement. If education is considered a means to enable a child to educate itself and if movement is seen as a means of communication between a child and its surroundings the acquisition of the necessary competences to deal with such situations can only be achieved by an active confrontation with the teaching objectives. This is particularly successful if the children take responsibility for their own learning process and the creation and organisation of their physical education lessons. Based on the conditions mentioned above the following article describes the authors' didactic concept of how to teach physical education illustrated by practical examples.

Keywords: Education; Movement; Acquisition of skills; Learning process; Physical activity

RESUMO

O principal objetivo da educação física é ensinar as crianças a lidar com situações que exigem atividade física. A criação e organização de tais situações pelo professor está intimamente ligada à sua compreensão da educação e do movimento. Se a educação for considerada um meio que permite à criança educar-se e se o movimento for visto como um meio de comunicação entre a criança e o seu meio envolvente, a aquisição das competências necessárias para lidar com tais situações só pode ser alcançada através de um confronto ativo com o ambiente. objetivos de ensino. Isto é particularmente bem-sucedido se as crianças assumirem a responsabilidade pelo seu próprio processo de aprendizagem e pela criação e organização das suas aulas de educação física. Com base nas condições mencionadas acima, o artigo a seguir descreve o conceito didático dos autores sobre como ensinar educação física ilustrado por exemplos práticos.

Palavras-chave: Educação; Movimento; Aquisição de habilidades; Processo de aprendizagem; Atividade física

RESUMEN

El principal objetivo de la educación física es enseñar a los niños a afrontar situaciones que exigen actividad física. La creación y organización de tales situaciones por parte del profesor está estrechamente relacionada con su comprensión de la educación y el movimiento. Si se considera la educación como un medio que permite al niño educarse a sí mismo y si el movimiento se considera un medio de comunicación entre el niño y su entorno, la adquisición de las competencias necesarias para afrontar tales situaciones sólo puede lograrse mediante una confrontación activa con el entorno. Objetivos de enseñanza. Esto es especialmente exitoso si los niños asumen la responsabilidad de su propio proceso de aprendizaje y de la creación y organización de sus lecciones de educación física. Basado en las condiciones mencionadas anteriormente, el siguiente artículo describe el concepto didáctico de los autores sobre cómo enseñar educación física ilustrado con ejemplos prácticos.

Palabras clave: Educación; Movimiento; Adquisición de habilidades; Proceso de aprendizaje; Actividad física

1 PROBLEM-SOLVING APPROACHES

1.1 Didactic Concepts

In Germany there essentially exist two different respectively contrasting positions concerning the objectives and methods of teaching physical education.

What we are talking of is on the one hand the so-called traditional concept focussing on the teaching of different types of sport and aiming to fulfil certain teaching objectives and on the other hand a concept that is based on experience.

Before looking more closely at the acquisition of motor skills we would like to outline the characteristics of these two concepts.

1.2 The "Sports" Concept

The aim of this concept is to teach children the different types of sport and their characteristics such as techniques, rules, tactics etc. The concept is based on the fact that sport has a social importance of which children and young adults need to become aware of. Moreover pupils have to be taught the competence for a lifelong commitment to sports. A pupil is competent when he has reached a technical and tactical standard, which he can reproduce at any time (Söll, 2003).

What we are talking about is the learning of specific motor skills and the development of the necessary physical and coordinative abilities. This is based on the theory of input and output, meaning the teacher gives information which the learner uses, and the assumption that learning follows instruction automatically.

These concepts of education lead to a form of teaching, which Funke-Wieneke (1995, p.12) calls "instructional teaching" meaning that the Physical Education teacher tells the pupil what he has to do and how he has to do it. Considering the characteristics of the specific skill or technique, he wants to teach, he chooses the most adequate teaching method. In this way he combines his instructions and demonstrations of the respective skills and techniques with learning sequences that follow the principles from "easy to difficult" and "simple to complex" Thus step by step the pupil is lead through the learning process in an effective way.

1.3 The Concept Based on Experience

The aim of a concept that is based on experience is to encourage a child's development by concentrating on movement. Funke-Wieneke (2004) has defined four dimensions of the human movement. These are:

- The instrumental dimension: Moving around skilfully and environmentally adequately with or without equipment.
- The social dimension: moving around with others cooperatively and comparatively.
- The symbolic dimension: expressing oneself through movement.
- The sensitive dimension: a constantly better and more precise perception of oneself while moving.

In reference to the theories of action and perception (Scherer, 2001) moving is understood as a subjective dialogue between the human being and his environment. Therefore it is necessary for a pedagogic understanding of teaching that individual

experiences are not only recognized but seen as an essential part of the learning process.

As the acquisition of movements always takes place through the confrontation respectively the dialogue between human being and matter, learning processes will only be successful if the teacher manages to balance the needs and interests of the children with the intrinsic value of the matter.

It goes without saying that such a form of teaching demands communication with the pupils and a mutual agreement of what the learning objectives should be.

Moreover it demands a common reflection of the experiences and the learning process in order to create an awareness about the learning process.

1.4 The Acquisition of Motor Skills through the Traditional Concept

As a starting point for our ideas concerning the acquisition of motor skills we are going to outline the learning process as it takes place in an education that is based on teaching objectives. We hereby refer to an essay by Landau and Brodtmann (1982).

The acquisition of motor skills can in this case be characterized as the adaptation of techniques as they are found in sports.

1.5 Critical statements concerning this form of creating a learning process

The example of the crouch start shows that the learner is forced to accept   a technique as it is.

This corresponds to a "problem free" procedure.

The pupils don't face the problem "what considering my own abilities do I have to do to run as quickly as possible?" but "How can I acquire the form which fast runners use to start successfully."

It is assumed that everybody who adopts the approved pattern of an expert will gain the best solution.But one must not forget that a start executed in such a way demands well-developed highly reactive muscles. That is the reason why it were the

well-trained runners who came up with the idea that it is much easier to accelerate from a crouched position than from an upright position.

What happens when pupils do not have the necessary physical abilities?

For them executing the "crouch start" becomes a conjuring trick. When watching physical education classes it becomes obvious that pupils can imitate the correct "On your marks" position but will take up an upright position right after the starting signal and will keep this position while sprinting.

The "crouch start" is exemplary of all learning situations in which the acquisition of standardized skills is central such as teaching techniques from track and field, swimming or games.

This example shows that through the choice of the learning objective and the way the learning situation is structured the pupils are not confronted with any problems they have to solve themselves. They have no chance of working on possible problems independently and responsibly.

In the following we would like to explain shortly why problem-solving learning should be preferred to a purely receptive learning in which pupils just adopt the knowledge from experts without beeing given the chance to reflect it.

1.6 Pedagogic Value of the Problem-Solving Approach

The demand that teaching and learning in schools should concentrate on problems is not new.

While Wagenschein (1991) has formulated the principle of genetic teaching and learning Freire (1980) has made a distinction between the "Banker's-method" which means the accumulation of knowledge presented by the teacher and the "problem-posing method" which understands the human being as a conscious subject. Freires's idea is that the relationship between teacher and pupil is not vertical but that teacher and pupils find themselves in a continuous dialogue between each other. Through this dialogue they create the necessary conditions that enable them to

gain knowledge and insights. Learning from problems means being confronted with problems concerning movements and solving them independently. This is an essential element of an education that leads to competence and independence and is a condition for the development of motor/physical self-esteem meaning skilfulness and an adequate use of the human senses.

Whoever follows the problem-solving approach will automatically question existing solutions. This is essential for the development of a critical position in regard to the existing attitude towards movement. The problem-solving approach demands from the learners that they are capable of acting in relation to sport as well as other more general subjects such as improvisation, thinking and acting productively and the ability to work in a team. By being confronted with sport-related problems the pupil will understand sport more deeply and permanently than through instruction and other types of teaching methods

1.6.1 Example of Learning Movements through Problems

In the following example we would like to illustrate what teaching physical education will be like if it is not limited to the teaching of given skill patterns or standardized rules but is to lead to a deeper understanding of movement, instead, by creating a learning environment in which pupils are encouraged to work independently.

Our thoughts are based on the principles of genetic learning (Wagenschein, 1991):

- The learners work on a problem and develop solutions independently (genetic).
- The teacher supports and guides the learners' independent process of problem-solving by posing questions that serve as impulses (socratic).
- The learning is performed through specifically chosen examples that guarantee basic insights (exemplary).

1.7 Playing Ball in Teams

The learning field of "playing ball in teams" is well suited to realize our understanding of education, teaching, and movement. First of all playing games has a great importance for the development of children. This is also true for all kinds of physical games. Generally they are characterized by their physical and social demands and on top of that by the fact that they initiate cognitive and emotional processes. The overall aim is the acquisition of a general ability to play games (Dietrich, 1984). This includes the ability to start a game, keep it going and if necessary change it. This is especially true for ball games that are played in teams as they enable children to make several important experiences (Dietrich, 1980).

Starting point for a genetically structured learning process is always a phenomenon that arouses interest in the learner and provokes individual questions and problems. Consequently the learners make the problem to their own. The basic idea of genetic teaching and learning is therefore that the learners do not present a model version or reproduction of an existing solution. Instead, they themselves are faced with problems and search for their own solutions. The solutions they find must always be examined and if necessary need to be revised or developed further. This procedure enables the different learners to find individual, varying solutions for a certain problem.

Diagram 1 – Diagram of genetic teaching and learning

phenomenon
↕
problem/question
↕
solution
↕
practice
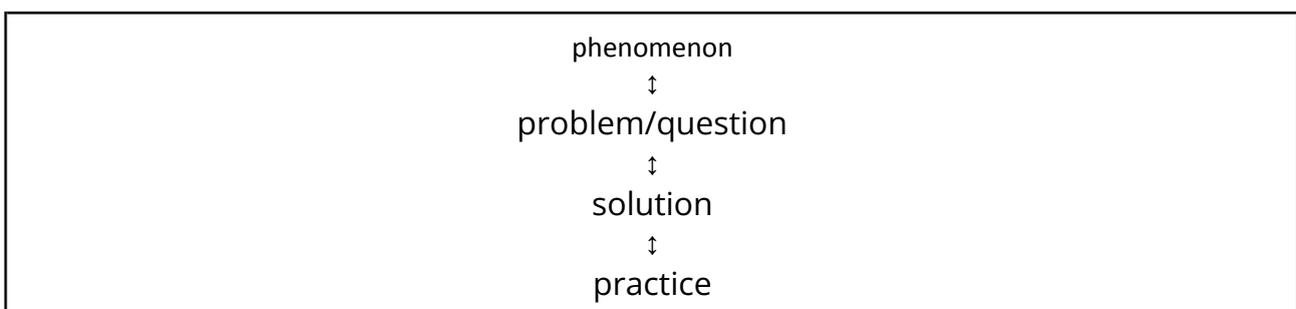
Fonte: elaboração do autor (2024).

1.7.1 Example "Protect the wall!"

The phenomenon that serves as the starting point consists of the solution of the problem "Protect the wall."

Two teams are asked to protect the complete wall of the gym (short side) from ball throws/attacks of the opposing team.

A volleyball or a softball is used as playing object. The following rules of the game are introduced.

- The ball is thrown from the centre line of the court. It's not allowed to move any closer.
- The pupil who has caught the ball runs with it to the centre line and tries to score a hit at the opposite wall.
- All pupils try to prevent the hit. In order to achieve this they can use any part of the body.
- If a hit is scored the pupil who did not stop the hit becomes the next thrower.
- Each hit wins a point.

Normally it doesn't take long until the pupils start complaining about this game. They point to problems that arise from the character of the game.

- "This is boring. I never get a chance to throw the ball."
- "I cannot throw the ball at the wall. It's such a long distance."
- "I cannot stop the balls that are thrown high. I am too small for them."
- "We do not score enough goals."

If the central aim is that all pupils or at least as many as possible are to participate in the game successfully and as equal partners the time has now come to interrupt the game and to determine the arising problems and discuss them. First of all the pupils are asked to describe their impressions concerning the development of the game. The critical aspects mentioned above are taken up and characterized as problems.

It has proved as useful to note down the pupils comments on the chalkboard respectively on posters or wall paper.

In the following the pupils make suggestions how to change the rules of the game. The rule changes are intended to overcome the defined problems. The possible solutions should also be recorded. It's not possible that all the different solutions that have been found by the pupils can be transferred to the game at the same time. The pupils must decide which problem has the highest priority.

The first change might be a reduction of the throwing distance to give all the pupils the chance to reach the wall. Additionally more balls could be used to increase the frequency of the throws. In order to solve the problem of limiting the height of the throws the pupils could set up wall markers that equal the reach of the pupils.

Then a new game session starts followed by another discussion about difficulties that have newly come up.

At this point pupils who had been given an observation task (work sheet) could be asked about what they have noticed. In this way the pattern of the genetic teaching and learning process repeats itself. Following further steps of game development, which might last for several lessons, a game will be created that satisfies (nearly) everybody. It may have the following rules and characteristics.

- The idea of the game remains to hit a certain area of the gym (short side) with a ball. This area is outlined and marked in its breadth and height.

- In each of the opposing teams the players take different roles. While some protect the hitting area other will try to win points by hitting the wall. The court is divided in such a way that there is a restricted area before each wall that can only be entered by pupils that defend the wall. The beginning of the restricted area is also marked as a throwing line for the players of the opposing team. These must not step on the line or enter the restricted area. The rest of the court meaning the center of the playing field is open for all throwers of both teams. In this area the ball is free. It must be secured by players. The players that are in possession of the ball pass the ball to each other and thus get

themselves into a good position to throw the ball. The players of the team that does not possess the ball can try to get the ball by catching the passes of the other team. There is a good chance that a game that is similar to team handball could develop.

This game – if it is played in class over a longer period of time - can also be changed and developed further if necessary.

Figure 1 – Developing the game "Protect the wall!"
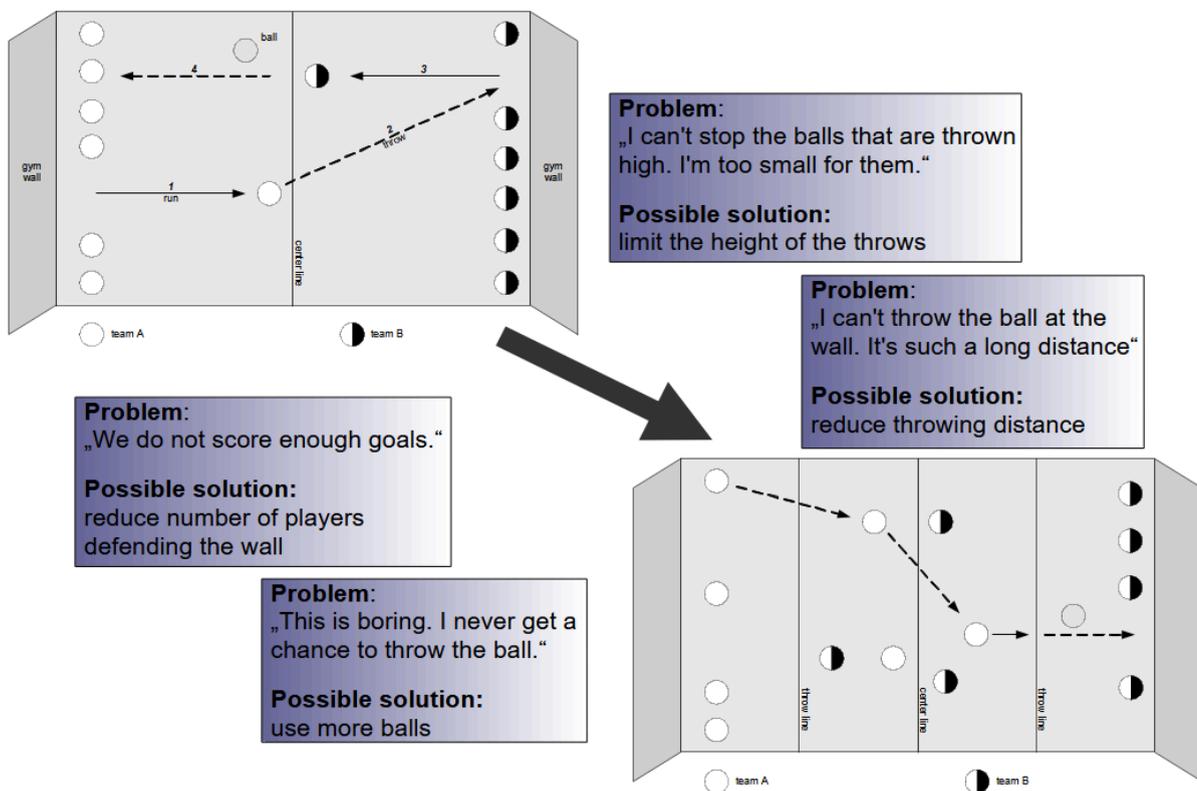
Fonte: elaboração do autor (2024).

2 GAME WORKSHOP

Teaching games is an essential objective of the physical education curriculum. For those working with students in the gym it is a recurring challenge. When looking at the present didactic concepts concerning the teaching of games, it becomes obvious that there is a certain tendency to focus on the educational potential of games and play rather than their physical potential (Bietz, 1998; Loibl, 2001). In the following article I am going to explain what the educational potential and its benefits in games and play are and how it can be used. The genetic teaching and learning method will be introduced and applied in a motion workshop, in this case a game workshop. As an example the development of target games characterized by shooting and preventing goals, which were created in a game workshop by university students, will be described.

2.1 Playing Games: "Experimenting with options"

Due to their complexity and difficulty as well as their various uses the terms "game" and "play" cannot be explained by giving only one definition. Instead, it will be more helpful to classify them by determining features which are typical of human play. (Warwitz e Rudolf, 2004). In the following the use of the term play always includes games that contain any form of physical activities such as games involving balls or games of hide and seek.

2.2 Features

Considering these assumptions Warwitz e Rudolf (2004) have listed the following characteristics of play:
- Playing voluntarily

Those who play want to do it by their own choice and without being pressured by others. Playing means experimental doings. If playing is instructed this characteristic will get lost.

- Tension

  The end of a game is uncertain, open and surprising. But its course can be influenced by skills. These facts create tension among the players. Success is the goal but failure is possible, too.

- Off the routine

  Playing is opposite to daily work and daily demands. It does not serve to fulfil human needs. Playing is said to have a compensatory function.

- Carefree

  Humans play just fort the sake of playing and not to fulfil any expectations or gain any profit from it. The experiencing of joy and the urge to move are the basic motives.

- Giving it a sense

  Humans play because it stirs happy and enriching emotions. Positive feelings might occur.

- Symbolic acts

  In play situations can be turned into imaginations. Objects and activities can receive a symbolic meaning. A climbing rope in the gym can become a liana in a tropical forest and a boy playing soccer might identify with his soccer idol.

- Rules

  Games are based on a game idea as well as its underlying rules and agreements. The latter structure the game, guarantee equal chances and determine success. If a game is to be performed successfully its rules must be followed by all the participating players.

- Repetition

  In general, games are based on continuance. Players attempt to repeat a game soon and as often as possible.

When talking of play, not all the features listed above need to be fulfilled. Sometimes only a few characteristics will be sufficient to determine actions as play or games.

2.3 Educational Function of games and playing

When looking at the characteristics of games and play it becomes obvious that there are manifold educational functions to be considered. Warwitz und Rudolf say that at present in pedagogy play is seen as an inexhaustible reservoir of possibilities to assist children in developing their "motor, cognitive, emotional and social abilities and skills" (2004). By being physically active in games children gain experience concerning motor skills such as running, jumping, throwing, catching etc. They must observe, perceive and react. All of these demand coordination. They also experience their body, and find out about the success of their own doings as well as their personal limitations. Emotions can be enjoyed in case of success and have to be dealt with in case of failure. The handling of various game equipment expands the knowledge concerning materials. Mental processes are set in motion during different game situations as upcoming problems have to be solved: examples are understanding the idea of the game, recognizing rules and following them or thinking up new game variants. Whenever several partners play together they have to make arrangements, decide on rules and obey them. Thus children gain the social skill to be aware of the set of rules that has to be followed when interacting with others.

2.4 Learning to play

A major objective of physical education teaching is to enable children to determine their own play at any given time. This is to be achieved by encouraging them to modify the given rules as required in every single situation that comes up during play (Loibl, 2001). As a result the children learn to take responsibility for their decisions and actions in play. Independent and mutual agreements are necessary

concerning basic rules such as the use of materials, boundaries of playing area, duration of game and number of players as well as a code of conduct, which includes the promise to obey the rules that were agreed on. Strategic rules develop during play.

Traditional teaching methods follow the concept of instruction and practice. Technical and tactical skills are introduced and performed in a sequence of exercises. They are considered a precondition for playing a game. Such methods will not be very helpful to realize the objectives determined above. The disadvantages of these methods are that students on the one hand will only imitate rule and movement patterns provided by the teacher and on the other hand not recognize the interrelation between the game and its set of rules. This means that the children miss the chance to play a creative and responsible part in their own learning process. This is also true for other methodical concepts in which the successive games lead to the target game but are exclusively instructed by the teacher (Bietz, 1998; Loibl, 2001).

The aim to develop a general ability of playing ball, which especially includes social and cognitive processes and considers rules as alterable and "tactics and techniques as a means to solve a task in play in context with the game idea " (Loibl, 2001, p. 19), demands a concept that follows a more genetic form of developing a game (Wagenschein, 1991).

When applying the features and principles of genetic teaching and learning to the teaching of team ball games such as soccer, basketball, hockey etc. it first of all means the construction and development of the original game by referring to its basic idea. Rules are always considered as alterable. The phenomenon is the actual play which is initiated through the idea of the game. The players constantly have to identify game situations and act appropriately. The ball as necessary equipment must be controlled. Possible problems might be that in heterogeneous teams the participation of the different team members might be unbalanced and consequently unsatisfying. This situation must be discussed and the problem solved. This may be achieved by changing rules and thus will influence the course of the game. The modified game

situations must be reviewed and if necessary rearranged again to ensure that the needs of all the players are recognized. This process constitutes a constant change between physical activity and its reflection and planning. It becomes obvious that there is no certain order in which the problems might appear and have to be solved. The procedure as described here can be transferred to the teaching of any ball game. In this context the exemplary principle of genetic teaching and learning becomes clear, as well (Wichmann, 2005).

2.5 Motion Workshop - Game Workshop

The idea of genetic teaching and learning can also be found in the didactic learning workshop. The nature of workshop learning lies in the idea of gaining experience by being pedagogically supported in one's thoughts and actions and thus learn something that is related to one's own environment (Knauf, 2001). One is reminded of the motto "learning by doing", supposedly said by the American educationalist John Dewey (Knauf, 2001). Group work is prominent in workshop learning. Learners face problems and have to solve them independently. The teacher accompanies and moderates the learning and working process. He provides equipment and materials, offers suggestions, inspires the learners and supports them in their individual work.

Workshop learning can also be used when being confronted with topics concerning physical activity. In a workshop dealing with physical activities learners define their own intentions concerning movement and explore respective phenomena by personally trying out what they have developed. They invent and try out their building arrangements, which have sprung from their own plans of moving about. The principle that is followed is: Building and Moving - Thinking and Acting.

If the intentions of the learners relate to play, the workshop dealing with physical activities in general can easily be changed to a game workshop in particular.

2.6 Products of game workshop

During a game workshop physical education students were asked to develop a game, characterized by the idea of shooting and preventing goals. They were to split up in four groups and create, try out and present these games by using different ready-made equipment and materials. A further condition was to ensure that they were suitable for being used in the gym.

2.6.1 Tasks of the game workshop

1. In your group develop a game using the given equipment (idea and basic rules)
2. Write down idea and rules.
3. Try out the game. Change idea and rules if necessary to play successfully.
4. Present the game.

2.6.2 Games developed in the game workshop

As instructed the following games were developed in the game workshop. Below (Figure 2), the equipment available.

Figure 2 – All equipment of the game workshop

Fonte: acervo do autor (2024).

Chart 1 – Group 1: Pocket-Bat-Ball

Equipment	6 bats with a hole in the centre, a pouch (made of cloth) is attached to the frame; 2 goal walls; 1 tennis ball.
Idea of the game	A team consists of 3 members. By using a pouch-bat a tennis ball is thrown, caught and intercepted in such a way that goals can be scored or prevented depending which team is in possession of the ball; possession of ball is open.
Basic rules	- Team of 3. - Court: gym. - Out of bounds: free throw zone below the basketball hoop. - If the out of bounds area is entered the opposing team receives the ball. - If the ball is out of bounds the opposing team receives the ball. - When carrying the ball in the pouch the player can only take three steps. - The centre line must be crossed before scoring a goal. - No body contact at all times. - After scoring a goal the game is resumed at the centre line; - Scoring: Hitting any spot of the goal wall = 1 point Large hole = 2 points Middle hole = 3 points Small hole = 4 points
Strategic rules	- Regular passing of the ball across short distances. - Attackers should be open. - Block passes.

	- Use chance of substitute play. - Use bounce passes.
Figure 3 – Equipment for Pocket-Bat-Ball Fonte: acervo do autor (2024).	

Fonte: elaboração do autor (2024).

Chart 2 – Group 2: Mop-Ball

Equipment	8 wooden mops; 1 wooden red puck; 1 wooden blue puck; 2 goals, one has a red target area and one a blue one.
Idea of the game	By using a mop the attacking team tries to score a goal. The defending team tries to prevent this and to get possession of the puck.
Basic rules	- Teams of 4. - Court: gym. 2 pucks of different colours are used. - It is a violation to play the puck with the back of the mop or foot.

	• The centre line must be crossed before scoring a goal.
	• No body contact.
	• No touching of the opposing mops.
	• After scoring a goal the game is resumed at the centre line.
	• Scoring:
	    The red puck is shot into the red goal = 2 points
	    The red puck is shot into the blue goal = 1 point
	    Scoring with the blue puck accordingly

Strategic rules	• Regular passing of the ball across short distances. • Attackers should be open. • One-on-one defence. • Outnumbering of the opposing team.
Figure 4 – Equipment for Mop-Ball	

Fonte: acervo do autor (2024).

Fonte: elaboração do autor (2024).

Chart 3 – Group 3: Frying-Pan-Ball

Equipment	• 8 wooden bats; • 1 gymnastic ball; • 2 mats.
Idea of the game	All players carry a bat. A member of the attacking team has to pass the only ball to another team member who is positioned in an enclosed zone. The defending team tries to prevent this and to get possession of the ball.
Basic rules	• Teams of 4. • Basketball court. • The ball must be balanced on the bat. In order to catch the ball the free hand may be used for a short time in order to safeguard the ball. • Passes only by bat. • As soon as the hand has touched the ball the player must not move anymore. • The ball may be taken off the opposing bat using the player's hand. • Points are scored when the ball is played to a team member who is standing on a mat, but must be passed and caught using the bat. • The mat is positioned in the free zone area of the basketball court which is also out of bounds for the other players. • After scoring a goal the game is resumed at the centre line.
Strategic rules	• Regular passing of the ball across short distances. • Attackers should be open. • Defence of the out of bounds area.

	- Outnumbering of the opposing team. - Quick change from attack to defence and back.

Figure 5 – Equipment for Frying-Pan-Ball

Fonte: acervo do autor (2024).

Fonte: elaboração do autor (2024).

Chart 4 – Group 4: Beak-Hockey

Equipment	- 8 wooden sticks with coloured marking; - 1 wooden puck; - 2 wooden goals divided in 3 parts.
Idea of the game	2 teams of 3 use sticks resembling beaks at their end and a puck in order to score points. Points are scored by transporting the puck in to the goal of the opposing team. Possession of puck is open. The aim of each team is to score as well as prevent goals.
Basic rules	- Teams of 3. - No assigned goal keeper. - Court: gym. - Goals are divided into three parts: Outer area = 1 point

	Inner area = 3 points
	- The centre line must be crossed before scoring a goal. - No other than the goal keeper is allowed inside the goal area (2m wide, directly in front of the goal). - After scoring a goal the game is resumed at the centre line. - The puck must be on the ground at all times. - The puck must not be touched by foot.
Strategic rules	- The player furthest back is the goal keeper. This position can be changed indefinitely. - Regular use of substitute players. - Safe passing of the ball across short distances. - Attackers should be open. - Defence of the goal area. - Outnumbering of the opposing team. - Quick change from attack to defence and back.

Figure 6 – Equipment for Beak-Hockey

Fonte: acervo do autor (2024).

Fonte: elaboração do autor (2024).

After explaining the features of playing and emphasizing the importance of playing I have outlined a way showing how the potential of play and playing games can be used in a educationally valuable sense. The focus lay on physical games and in particular those that aimed at the shooting and preventing of goals. It was pointed out that the genetic form of teaching games can be applied to using workshop learning.

Thus four different types of games all characterized by the idea of shooting and preventing goals were developed and presented. The university students involved were given the opportunity to exemplary get to know a teaching and learning method, which will help children to learn independently.

3 HOW A HAND-BALLGAME DEVELOPS

Problems in games are ignored far too often. But they can be a starting point for incorporating creative ideas of students. An example of how problems can be turned into chances.

Following the concept of team teaching a group of physical education teachers has planned together a unit of "Team Handball". It was decided that one team member would teach the particular lesson while the others would observe and record its course for later evaluation.

After a warm-up phase with games, followed by an instructional stretching the teacher and his students sit down in a circle. Using a coaching board he explains the movements of the players in a 6:0 defense formation. He points out corridors in which the players should move on the playing field into their respective offense positions and back into their respective defense positions. Three teams (A, B, C are formed) and the game starts with A against B, then A-C and B-C. The teacher is the referee. Now and then he interrupts the game and corrects the defending players e.g. if they do not take their positions at the perimeter – with their backs to their own goal – quick enough or do not follow the agreed order. To the observers it seems as if the games are taking place in an orderly form. If a team has won the ball the players run

towards the opposite side of the field, where the defending players are already waiting, and pass the ball to each other in the back court. Once in a while the ball is thrown at the opposing goal. But shooting a goal remains an exception, as the attacking players' strength is mostly not great enough to make the throws from a longer distance a real danger for the goalkeeper. The number of players who actually have ball contact is rather low. Especially the players on the wings receive the ball only rarely, but accompany the attack. After losing the ball, generally due to unsuccessful shots at the goal, the players run back to their defense positions to await the attack of the opposing team.

Having discussed the lesson, the team comes to the following conclusion:

When looking at the game performance superficially everything seems to be okay. But there is a feeling that something is not right. The order in the game is misleading. The game is incomplete. There is no direct confrontation between the attackers and the defenders. The players obviously do not understand the open possession of the ball during which the attackers are protecting the ball and the defenders are constantly trying to possess the ball. The defense is too passive. 1:1 situations do not take place very often. There is no ball-oriented movement of the defenders. There is actually no necessity for the defenders to do so, as the distance to shoot at the goal is too large for the attackers. The attacking players avoid the positions at the circle. A game focussed on the circle runner and a defending tactic preventing it can therefore not take place.

Moreover, the methodical approach of the teacher is not successful as the students only imitate the actions he tells them to perform. This becomes especially clear when looking at the restrictions concerning the corridors of the attackers and the position of the defenders. A problem-solving, creative and responsible participation of the students in their own learning and exercising process is hardly possible.

This analysis is the starting point for the development of a different didactic-methodical concept. The process, which will lead to a team handball game

competence, support an independent confrontation with problems turning up during the game and include self-determined as well as social respectively cognitive processes demands the concept of genetic learning.

The starting point for a genetically structured process is always a phenomenon which catches the learners' interest and provokes them to ask questions and identify problems. Thus the learners recognize the problem as their own. The basic idea of genetic teaching and learning therefore is that the learners do not present the imitation or reproduction of a given solution. Instead they independently identify problems and search for solutions.

The solutions found must always be re-assessed, if necessary be revised or further developed. In this process rules are always considered as alterable. The phenomenon is the actual game which is initiated through its objective. The players constantly need to identify game situations and act appropriately. But this also means that different players might find various solutions for a certain problem.

If one applies the features and principles of genetic teaching and learning to the analysis of the lesson described above, the game of the students will become the phenomenon, which as a problem illustrates the restricted action when considering the game objective of team handball. It is necessary to orchestrate the lesson in such a way that it allows us to discuss the fact that on the one hand the attackers are not aggressive enough and on the other hand the defenders as a consequence do not show enough action, either.

The team decided to start the teaching sequence with a game task that has a similar game objective than team handball and provokes a development in terms of genetic learning. For the following 90-minute lesson the team came up with the following game task (see Chart 5 - Protect your wall). 2 teams get the task to protect the whole wall of the front side of the gym from balls thrown by the opposing team. The equipment used is a foam ball.

Chart 5 – Protect your wall

Objective	To create a handball-game genetically.
Age group	Grade 8.
Duration	1-2 90-minute sessions.
Material	Foam balls, hand balls, poster boards and felt tip pens.

Fonte: elaboração do autor (2024).

The following rules are given:

- The ball is thrown from the center line of the playing field. Players must not move closer to the opposing wall.
- The student who has caught a ball runs to the center line and tries himself now to hit the opposing wall in order to shoot a goal.
- All students try to prevent a goal. The ball can be fended with all parts of the body. If a goal is scored the student who was closest to the spot where the ball hit the wall becomes a thrower.
- Each goal gains one point.

Diagram 2 – Advantages

• Advancement of problem solving competence.
• Advancement of independent learning competence.
• Advancement of learning through experience and self-realization.
• Advancement of social competence.
• Tactics and techniques only serve as means to independently solve a game task.
• Game rules are understood as changeable.
• Individual solutions are possible.

Fonte: elaboração do autor (2024).

In this game it doesn't take long until the students start complaining. These complaints point to problems resulting from the game.

- Problem 1: "I can't throw far enough to hit the wall."

The students start their game at once. As expected many of them have difficulties throwing the ball over a distance of half the gym let alone being a danger for the opposing wall.

If it is the aim that as many students as possible participate in the game successfully, with the same chances and joy, the time has come to stop the game and identify and discuss the problems. It is advisable to note down the students' statements on a chalk board or poster.

The teacher asks the students to come up with suggestions to solve the problem. Their ideas are also noted down. Ideas to use a tennis ball which would be smaller and harder are given up because of the risk of injuries.

Instead the suggestion to reduce the distance to the wall for the girls by setting up a throwing line which is closer to the wall is chosen. This gives them a greater chance to hit the wall. The boys continue to throw from the center line. This solution turns out to be successful. Everybody is able to hit the opposing wall with one throw.

- Problem 2: "This is boring. I never get a chance to throw a ball."

  The problem that the individual player does not get much activity is obvious as only one student gets the chance to throw at the wall. To solve this problem the students again get together to collect ideas. The suggestion to keep a certain order in the teams so that everybody gets a chance to throw the ball is not considered as useful. Instead the students decide to increase the number of balls. They plan to play with four balls at the same time. This measure noticeably increases the frequency of throws as well as the physical activity.

- Problem 3: "I can't defend balls that are thrown high. I can't reach them."

  It soon becomes clear that the more skilled players score more goals, because they throw the balls so high that the defending players can't reach them. Consequently, there is no chance of defense. As a possible solution the reach height of the players is used to mark and thus restrict the goal area by applying

tape strips. This measure is efficient due to the fact that balls thrown high do not lead to hits respectively goals anymore. But it also creates a new problem.

- Problem 4: "We don't score enough goals."

  Although the frequency of throws/shots has been increased by using more balls the number of successful hits remains low. The reason is that many students still protect the wall so that there are hardly any gaps for a successful shot. This problem is also discussed in the group.

  As a solution the students suggest to reduce the number of defenders to four per team and to assign them as goalkeepers. All the other players stay in the area between the two throw lines close to the goal.

  As a consequence a remarkable game develops. The attacking players pass the balls to each other to get one of their players into a good position at the throw line. Team members that are not in ball possession try to prevent passes or catch the balls, by intercepting the path of the ball. They also try to block shots. On looking back the students express that by changing the rules of the original game step by step a game similar to team handball has developed.

3.2 What has been created in this way?

In the end a game was developed whose game objective still is to hit a certain area at the front sidewall of the gym. This area is defined and marked in height and if necessary width. Among the teams playing against each other there are certain roles assigned to the players. While some try to protect respectively defend the wall others try to gain points by shooting at the wall. The playing field is divided in such a way that on both front sides there is a line which on the one hand marks the area which can only be entered by the defenders and on the other hand serves as the line from which the opposing players can throw/shoot at the wall. The remaining space in the center is open for the throwers of both teams. In this area the ball is free. It must be protected by the players. The players that have ball possession can pass the ball to each other

and consequently get into positions from which they can throw freely and without interception. The players that do not have ball possession try to gain ball possession by intercepting the passes and catching the ball. In the end a hand-ball game has developed.

The observer will notice that in this particular game offensive and active defense activities are taking place in that area of the playing field in which there is open ball possession. The players that do not have ball possession constantly try to be ball-oriented and intercept the passing among the team members. The players that have ball possession try to get into open positions in order to be prepared to receive passes. The game competence of the students has noticeably been enlarged.

3.3 Results of the game development

Rules:
- A throwing line which is closer to the opposing wall is set up.
- The room between the wall and the throwing line must not be entered by the throwers.
- Each team is split up into throwers and defenders for a certain time in the game.
- In the center area the ball is free (open ball possession), it can be passed to others as well as intercepted.
- A point is gained when the ball hits the opposing wall.
- A hit gains one point.

4 CONCLUSION

We have compared the sports-concept and the problem-solving approach, which is based on experience. This was shown by examples. The result is that the sports-concept leads to the adaptation of techniques as they are found in sports,

while the problem-solving approach has a special paedagogic value. By this the pupils will understand movement and sports more deeply and permanently.

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