What Do Students Learn in Physical Education and How Do They Learn?

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The theme of this conference was "What Do People Learn from Physical Activity Programs?" The simple answer to the question is that students learn what we teach and they do not learn what we do not teach. People do learn from non-instructional environments. What distinguishes instruction from non-instructional environments is the idea of intended learning. Instruction is characterized by intended learning. A teacher defines the goal or aim and selects learning experiences most likely to achieve those goals based to a large extent upon a knowledge base of how students learn, and, more specifically how particular students learn particular content. The more complex answer is that students learn what we teach effectively.

The issue of what students learn is of course related to questions about how to instruct effectively. Or, how do we instruct so that students learn. As a teacher I have spent a professional career trying to understand the idea of effective teaching. I would like to share with you several themes or assumptions that guide how I think about the teaching and learning process and perhaps more importantly how I think about studying the teaching and learning process. These themes are:

The José María Cagigal Lecture presented at the 1999 International AIESEP Congress, Besançon

That which is not taught is not learned - teaching is specific.

There are effective generic skills of teaching that transcend "method".

The study of instructional methodology should be rooted in learning theory.

Some of these ideas were first developed for a book chapter in a book edited by Mick Mawer called *Learning and Teaching in Physical Education* (1999).

That Which Is Not Taught Is Not Learned - Teaching Is Specific.

The first idea that I think is critical to our understanding the teaching-learning process is that the outcomes of teaching are rather specific. Engaging students in learning experiences that have the potential to make particular contributions does not automatically produce that learning. We have to target what we want students to learn and teach for particular outcomes. Physical educators around the world are universally guilty of making claims that cannot be supported for their programs. It is not uncommon for us to talk about the contributions we make to health, and the social, motor and emotional development of children and youth. Although there are studies scattered throughout the literature that do support the idea that physical education and sport programs in general do contribute positively to the social and emotional development of children, (Emmanouel, Zervis, & Vegenas, 1992; Hasted, Seagrave, Moreau, & Hasted, 1985; Page, Frey, Talbert, & Falk, 1992), the large majority of studies that have attempted to draw relationships between our programs and social and emotional benefits in these areas have not been successful. The reality is that many of our programs centered around traditional physical education sport programs actually may decrease children's self-concept, moral reasoning, enjoyment of activity and altruistic behaviors and increase their aggressive tendencies, embarrassment and anxiety (Bredemeier, Weiss, Shields, & Shewcuk, 1986; Bredemeier, Weiss, Shields, & Cooper, 1986; Gibbons, Ebbeck, & Weiss, 1995; Mender, Kerr, & Orlick, 1982; Romance, Weiss & Bockhaven, 1986; and Wandzilak, Carroll & Ansorge, 1988).

Another area of support for the idea that learning is specific are the number of process product studies in our field that have been done to show relationships between teaching and particular products of learning with little success. Our research is notorious for showing no differences

between interventions (Rink, French, & Tjeerdsma,1996). On closer look one finds that a major reason the authors concluded no difference was because no learning took place with either intervention. While many of these studies conclude that it doesn't make a difference which method you use, I suggest that the real conclusion is that the instruction was equally ineffective. In fairness to these authors, it is difficult to show differences with so much within group variability, but, the major problem with most of these studies is that there was not sufficient time for learning to occur, particularly for outcomes that are complex and may develop over longer periods of time than most short term instruction. We may never know what intervention actually worked because the amount of time given for students to learn was not sufficient.

Our curriculums, particularly those in the United States, are encumbered with too much to teach in too short a period of time. We have been able to get away with this kind of program orientation because we have largely not been accountable for outcomes, and have not looked at assessment as an integral part of the learning process. When teachers are held accountable for student learning, or when researchers want to demonstrate student learning they do one of two things: either they decrease what they are willing to hold themselves accountable for, or they increase the amount of time in which to show learning. Most do both.

There is some good news in all of this and the good news is that when the outcomes of instruction are specifically defined, and when the teaching is specifically selected to achieve those outcomes, students do learn. In respect to the social and emotional development of children and youth there is research support that teachers can enhance the moral judgement and intention of youth, increase or decrease appropriate social behaviors, increase sportsmanlike behavior, change and increase attitudes toward physical education, intrinsic motivation, perceptions of content, self-control, and caring behaviors (Bredemeier, Weiss, Shields, & Shewchuk, 1997; Gibbons, Ebbeck, & Weiss, 1995; Giebink & McKenzie, 1985; Mender, Kerr, & Orlick, 1982; Patrick, Ward & Crouch, 1998; and Sharp, Brown & Crider, 1995). What differentiate programs that are effective in these areas from those that are not effective, is that in every case where programs were effective, there was a specific intent to target one of these areas and an instructional program that was specifically designed to achieve that instructional goal.

Success in demonstrating motor outcomes shows a similar pattern. If you want to demonstrate learning you have to specifically target what kind of learning you want to produce and then allow enough time for learning to occur (Rink, French, & Graham, 1996). If we want high levels of skill in less complex contexts we will teach one way. If we want high levels of skill in more complex contexts we will teach another way. If we target affective or cognitive goals as well as psychomotor goals we will have to teach for these goals. Learning is specific and in order to know how to choose appropriate methodologies to target specific learning we will need to begin to target what it is we want students to learn at particular phases of the instructional process.

There Are Effective Generic Skills of Teaching That Transcend "Method".

When Daryl Siedentop first talked about teaching skills and published *Developing Teaching Skills* in the 70"s (Siedentop, 1976), the idea that there were discrete skills of teaching was new to many physical educators. Critics were concerned that the skills described such as teacher use of feedback, demonstration etc. dictated method, specifically direct instruction. Many years later most of us are willing to accept the idea that in order for students to learn, teachers have to have skills to effectively execute a variety of functions. These functions such as establishing a learning environment, maintaining a learning environment, developing content, and communicating tasks, are generic to effective teaching regardless of the content to be taught or the method chosen to teach that content. Teachers who do not have effective generic teaching skills are not likely to be effective at teaching anything intended using any methodology. What we have come to learn is that the teacher must be able to perform these functions effectively, but that there are many ways a teacher can do this (Rink, 1998).

Instructional Methodology Should be Rooted in Learning Theory

A lot of the research that forms our knowledge base is atheoretical - which means it compares or contrasts instructional strategies and teacher behaviors that are not necessarily based on any particular theory of why they might work or not work. They are not based on learning theory. A lot of discourse on instruction, particularly more recently, is philosophical in nature, treating issues regarding the selection of teaching methodology as primarily issues of belief. This is partially the result of a confusion bet-

ween legitimate curriculum issues involving questions of what *should* be taught, and issues of instruction involving how best to teach for particular outcomes once you have identified that outcome. One is legitimately an irrational pursuit. The other is not.

Placing teaching methodology as a philosophical issue limits the discourse and ends the notion that we can build a knowledge base for what we do. From my perspective we will not be successful in choosing appropriate instructional strategies for specific purposes until we begin to attach what we do to a theoretical base that can help us sort out what students are likely to learn under what conditions. I believe the theoretical base for what we do should be learning theory. All notions of teaching are in fact based on particular assumptions of how students *best* learn.

Most instructional methods/designs or approaches fall under a continuum of two orientations to instruction: direct to indirect teaching (Shulman, 1986). Direct instruction and the methodologies attached to it usually means that teaching is explicit, broken down, step by step and highly monitored. Indirect instruction, and the methodologies attached to it, usually is more implicit, involves larger chunks of content, and is more holistic in its approach to content (Berliner & Rosenshine, 1987). Generally speaking direct instructional strategies find their roots in more behavioral (Bandura, 1969) and information processing theories of learning and indirect instruction finds its roots in more cognitive strategy (e.g., constructivism) and social learning (collaborative learning) theories of learning.

Looking at Effective Teaching Skills From a Learning Theory Perspective

Most of us if asked could provide a list of teaching skills our knowledge base has demonstrated to have some relationship to student learning. My methods textbook, *Teaching Physical Education for Learning* (Rink, 1998) as well as most others are based on this set of teaching skills. I am going to assume that you know what these are and the history behind how they got to be identified as foundational abilities of the teacher. What I would like to do in this section is to revisit those teaching skills from the perspective of learning theory.

Providing Opportunity to Respond and Level of Processing

Time with the content was one of the earliest variables to be identified with student learning (Metzler,1989). Put quite simply, students who

spend more time with the content learn more. What initially started out as a concept of teacher allocated time has been refined over the years to include ideas of student success, appropriate content, and more recently high levels of student engagement with the content (See for example: Ashy, Lee & Landin, 1988; Brophy, 1979; Metzler, 1989; Silverman, 1990; Silverman, Devillier, & Rammirez (1991). The big theoretical issue from a learning perspective is currently not an issue of time with the content, but an issue regarding the level of student processing needed for learning to occur. Sometimes the idea of level of student processing is used simultaneously with the notion of student engagement. Practice that does not require a high level of student processing may not be the best practice that we can offer whether what is to be learned is cognitive or psychomotor (Magill, 1998). This suggests that rote repetition of responses is not appropriate practice. What we do not know is whether or not there is a difference in what students learn when responses are produced at a high level of conscious processing and when they are produced at a high level of processing but not at a conscious level

Although there are many versions of constructivism, constructivist theories are primarily based on the idea that students process information at a higher level in learning experiences designed from a constructivist perspective and therefore learn more (Brooks & Brooks, 1993; Philips, 1995). Of course it is not that easy for a teacher of groups of learners. One of the problems that we have when we look at level of student processing as an indicator of "good practice" or a good indicator of an appropriate learning experience is that you cannot predict the level of student processing from the methodology a teacher uses (Pintrik, Marx & Boyle, 1993). You cannot predict higher order thinking because a teacher uses a problem solving approach. You cannot rule out higher order thinking because a teacher uses a more direct methodology. A process that facilitates a higher level of processing in one student may elicit a lower level in another student. This means that students in a highly structured information processing or more behaviorally oriented pedagogical experience *could be* processing at a very high level and students who are in a problem solving or constructivist oriented learning experience *could be* processing at a low level. All of us have had personal experiences in lecture classes where we were totally engaged by what was going on, and likewise, experiences in group or problem solving learning environments where we were not. In

other words, there is no direct line from a method of teaching to a level of student processing, too many other factors are involved. What may differentiate more indirect methodologies of teaching from more direct methodologies is the idea that the more indirect methodologies intend that the learner engage in higher order processes. It is possible to teach directly and intend those same processes.

Although it is not always possible to observe or provide evidence for a particular level of student processing, skilled teachers are much more aware of the level of processing likely to be taking place in their classes. Teachers who are taught to understand the interactive nature of teaching and taught to focus on what is happening with the student in terms of level of processing have a better chance of eliciting the type of processing intended, regardless of methodology.

The idea of time with the content and the idea of level of processing is an idea that should be a part of all approaches to teaching. The key idea here is that all teaching, regardless of method should strive to engage the student at a high level of engagement for as long as possible. Understanding how to determine level of engagement and how to engage students at a high level is the responsibility of those of us who would understand teaching.

Teacher Clarity

The communication skills of the teacher are essential aspects of teacher effectiveness and usually involve issues related to teacher clarity, the use of verbal cues and demonstration in presenting information, and concerns related to the type of information the learner needs, how much information the learner needs and when information is needed by the learner. The results of the initial research on teacher clarity done in the classroom focused on the importance of the ability of the teacher to carefully select the information needed by the learner, organize that information, and communicate that information to the learner. Ideas such as clarity, step by step progressions, specific and concrete procedures and checking for understanding were identified early as having a relationship to effective teaching (Kennedy, Cruickshank, Bush, & Meyers, 1978; Rink, 1994; Rosenshine, 1987; Rosenshine and Stevens, 1986; Werner & Rink, 1988). There is no reason to assume that these characteristics of teacher clarity are not still important components of all effective instruction. All of the research indicating the importance of teacher clarity I consider to be part

of that group of teaching skills that transcend methodology - those generic teaching skills.

From a teaching methodology perspective a major problem with the teacher clarity research is that it is often interpreted as a recipe for direct instruction, and therefore is rejected by those who whose allegiance is to more indirect teaching styles. There is a tendency for advocates, and particularly novices at indirect teaching styles, to confuse being clear with telling students exactly what to do. Using an indirect teaching style does not abdicate a teacher from being clear. What is at issue here from a theoretical perspective is how much information the learner needs and whether or not the teacher should be communicating anything to learners on how to do a motor skill.

How Much Information Does the Learner Need?

Direct teaching has most often been associated with explicit teaching - giving the learner very specific information on what to do and how to do it (Berliner,1987). We have enough support now to know that how to do a motor task does not always have to be communicated. As dynamical systems and newer research on implicit learning (Magill, 1998) has suggested, and some constructivist orientations to teaching physical education have utilized (Almond, 1986; Chandler & Mitchell, 1991; Gréhaigne & Godbout, 1995), a learner will organize a response to a task based on the organismic, task, and environmental constraints of the task (Newell, 1986). A study done by Sweeting and Rink (1998) contrasted the effects of kindergarten and second graders learning a long jump either directly or through an environmentally designed task approach designed to elicit the appropriate response from the learner. The environmental design put students in a variety of situations where they had to complete the task using the standing long jump skill with no teacher information on how to do the skill. The environmentally designed task clearly increased initial performance, particularly for younger and less skilled students but lost its effect with time and increasing skill. In this study specific differences in the process characteristics learned by both groups were identified, which again suggests the specific nature of outcomes using different methodologies.

A second study that attempted to sort out how much information a learner needs on how to perform was done in the context of volleyball progressions (Rink, French, Werner, Lynn, Mays (1992). One group was given helpful information during practice of how to best perform and another was

not. For most initial tasks in the progression the success levels during practice were similar. For a later stage of the progression the group that did not receive information from the teacher on how to make an adjustment to a task that had increased in complexity was not successful. This lack of success was maintained through later stages in the progression. This suggests that the learner didn't need or couldn't use specific information on how to perform the task at the early stages of the progression but needed information at the later stages of the progression that was used.

Advocates of a «games for understanding» approach to developing games players suggest that students should not be taught how to execute motor skills *prior* to needing them in the context of game play (Almond, 1986; Chandler & Mitchell, 1991). In a sense, «games for understanding» is another approach that is not supportive of giving a lot of information to learners on how to execute skills. The results of research investigating a games for understanding approach is mixed, particularly in terms of psychomotor outcomes (Rink, French & Tjeerdsma, 1996). However, the real issue for all of these orientations is not if, but when, the learner should receive information on how to execute a motor skill.

Does the learner need specific information on how to execute a motor response - not always - but clearly sometimes. Is not giving learners information on how to do a skill non-teaching and trial and error learning, or, is the teaching just different. If it is true that beginners do not need/or cannot use explicit information on how to perform a motor task, do learners who are refining skills profit from explicit teaching? Can learners use informtion that helps them understand why it is important to perform in particular ways (Wulf & Weigelt, 1997). Learning requires processing, regardless of whether information is given by the teacher. Knowing how to get learners processing what they are doing enough to "generate" appropriate motor responses and knowing when to intervene with more specific help and different tasks that elicit more advanced responses may be the art of teaching.

Selection of Information

Clearly there are times in teaching motor skills when the teacher wants students to learn a specific task and to do it in a specific way. The use of demonstration and the selection of learning cues are essential aspects of communicating to learners how to execute a motor skill (Landin, 1995; Lee, Swinnen & Serrien, 1995; Magill, 1994; McCallagh,

Stiehl, & Weiss, 1990). Sometimes these cues may be explicit cues on performance and sometimes these cues may be environmental cues necessary for implicit knowledge about how to perform. The notion of demonstrating (modeling) is an aspect of communication that has maintained strong support in the research done in a variety of fields including classroom research, research in social learning, motor learning research, as well as the pedagogy research that has been done in physical education (Martens & Zuckerman, 1976; McCullagh et al., 1990). Most of this research assumes that the teacher is attempting to communicate to learners how a skill is to be performed with the expectation that the learners will be attempting to closely approximate the demonstration. Teaching strategies that have been associated with more direct teaching have assumed that if the learner can verbalize what they are doing or should be doing than learning is enhanced (Kwak, 1993). Young and beginning learners are most likely picking up implicit cues from a demonstration without being able to verbalize what they are doing.

Most research has assumed that the demonstration should be accurate and in the case of new and complex skills should be done more than one time (Gould & Roberts,1982; Landin, 1995; McCullagh et al., 1990; Rink, 1998). More recent research has questioned that assumption and has suggested that a "learning" demonstrator, meaning a student who is also learning the skill who may not be proficient at the skill, might be equally as effective as an accurate demonstrator (Solmon & Lee, 1996). The support for this idea is again related to the notion that "learner"demonstrators may facilitate the learner processing more information. The parameters of this idea have yet to be explored. It is possible that learners who have a clear cognitive understanding of the intent of the skill can function with an inaccurate model. I would suggest that what we might find is that learners who have little cognitive understanding of what they are trying to do are unlikely to be helped by watching someone do a skill poorly.

The use of verbal cues has been identified as one way in which teachers can give students a clear cognitive understanding of what they are trying to do (Landin, 1995). There is some support for the use of verbal cues and for encouraging students to verbally rehearse how they are going to do motor skills as part of task presentations (Kwak, 1993). Teachers can increase the likelihood of student success with a movement response by carefully selecting the cues they use to describe how a skill

is done and by sequencing (ordering) the cues for the learner to facilitate student rehearsal of the skill (McCollough et al., 1990).The issue is of course whether this initial acquisition success, elicited with teacher cues, supports or hinders learner processing critical to retention, and, whether elicited responses put the learner at an advantage or disadvantage when the teacher attempts to build on the complexity of the skill or the use of the skill at later time.

Students asked to verbally rehearse either through self-talk or out loud methods are likely to increase their attention to what is important and to increase the likelihood that they will process what they are doing more than students who are asked to just practice (Kwak, 1993; Lepper,1988). Newer research on the use of strategies by beginning learners would tend to support the importance of providing learners who are at beginning stages in learning skills with strategies for learning (Solmon & Lee, 1997). Strategies in this sense of the word means teaching students a cognitive process for how best to learn.

Related to the idea of the use of learning cues is also the nature of the learning cues the learner needs for particular skills at particular times. A recent study by Wulf, Lauterback, and Toole (1999) explores the advantages and disadvantages of giving the learner an external and internal focus for their practice. This study supports the idea that explicitly describing what the body should be doing during a motor skill may not be the best focus to give learners. The task used for this study was the golf chip shot and the external focus was on what was happening with the golf club. How generalizable the results are to skills that do not use implements remains to be seen. The important idea here is that learners do not always need explicit information on how to do a skill from a technique perspective. The work of Vickers and Bale (1996) with more highly skilled athletes has likewise been supportive of focusing the learner on task demands and decision making rather than explicit information on what to do with the body.

Selecting and Developing the Content in the Instructional Process

The selection of the learning task is perhaps the single most critical decision that the teacher has to face. What constitutes a "meaningful chunk" of content is a critical issue for learning theorists. Direct teaching styles based on more behaviorist and information processing theories of learning have largely advocated breaking skills down into step by steps

patterns for acquisition (Berliner, 1987).More constructivist theories of learning are concerned that the content the learner is asked to work with has "meaning" in and of itself and is not just a fragmented part of something else (Anderson, Reder, & Simon, 1996; Kirk & McDonald, 1998). Likewise, motor learning theorists have vigorously suggested that it is the whole skill that should be practiced when possible and not the individual parts (Magill, 1998). In addition, current thinking regardless of where you are on the continuum of direct to indirect teaching, clearly asserts that skills should be practiced in the context in which they are going to be used. Both orientations would support the idea that students are not likely to use in meaningful contexts what they have learned in conditions that are fragmented and out of context.

In the context of physical education content, is a meaningful whole the individual skills of a sport, the game, or something in between? What constitutes a meaningful whole? Does this change with age and experience? At a more micro level the issue for sport skill instruction becomes an issue of whole part whole learning: should the teacher break down individual skills? Ample evidence exists to support the idea that unless safety is an issue, practice of the whole should precede any attempt to temporarily fragment the skill and practice part of a skill. At a more macro level the notion of progressions also involves reducing the complexity of the context in which skills are learned and practiced. No one is suggesting that the learning of motor skills occur in a game. As a matter of fact research done on skill improvement over time would suggest that players do not improve their individual motor skills by playing the game (French & Thomas, 1987; Parker & O'Sullivan, 1983). Research also supports the idea that reducing skills and learning contexts is essential when students are not successful. In some of the studies done by the author, students who practiced a final skill task in a volleyball study (receiving a pass from one direction and sending it to another direction) were not as ultimately successful as those students who practiced with a progression that initially reduced the complexity and then gradually added it (Rink, French, Werner, Lynn, Mays, 1992; French, Rink, Rickard,, Mays, Lynn & Werner,1991).

The selection of an appropriate task will largely be based on the teacher's ability to balance the need for student meaning and the need for student success. While many behavioral models of step by step instruction

may have overemphasized the need for immediate success and become mindless and meaningless exercises for many students, learning theories which are overly concerned with meaning for the learner may choose too large a chunk of content for learner success. Designing learning experiences to promote challenge and processing without putting the learning task out of reach of the learner would seem to be the teacher's challenge.

The Nature of Practice

Another factor involved in teacher decisions about the development of content is related to the nature of the practice. We know that success in practice is important but we are not quite sure what the limits of this idea may be. There is some evidence to support the idea that students who are most successful at the beginning stages of acquisition may not be the most successful when actual learning is measured (Sidaway, Fairweather, Powell, & Hall, 1992; Schmidt, Young, Sinnen & Shapiro, 1998). This research would indicate that students who have a very high level of success at practice, particularly that achieved with high levels of dependency on knowledge of results, may not be the students who ultimately learn more.

A lot of our knowledge base on the practice and learning of motor skills comes from motor learning research. Motor skill learning has often been associated with "drill like" practice. While there may be merit in developing some level of consistency in performance at particular stages of learning, for most situations repetition of the same movement discourages high levels of processing, and in the case of open motor skills reduces the variability of practice essential to prepare the learner to use a skill in a more complex context. For beginners who do not have any consistency, there may be enough "variability" to encourage processing in repetitions of the same skill because beginner's responses tend to be inconsistent (French, Rink & Werner, 1990). The higher skilled player who can perform consistently may need to practice particular skills in complex environments including unpredictable environments that require decision making (Vickers & Bales, 1996). The beginning learner who is highly involved in processing may need to gain some consistency of response through repetition in less complex environments before high levels of decision making are required (French et al., 1991; Rink et al, 1992).

The Teacher's Role in the Process - Content Development

The process the teacher uses in instruction to manipulate the level of difficulty to establish progressions, refine learner performance, and apply

and assess what the student has learned has been referred to as content development (Rink, 1998). Teachers do this through a series of different kinds of tasks (extending, refining, applying) during the instructional process. There is not a great deal of research on content development. Several studies have documented the role of refining and extending tasks in learning (Masser, 1985,1993; French et al., 1991; Rink et al., 1991). Good refining tasks have a prescriptive focus and can focus the learner on what is important to improve performance. It is likely that refining tasks increase learner processing of what they are doing and create accountability (motivation) for good performance. As stated earlier, extension tasks establish progressions that are important for the development of complex skills and the use of complex skills in more difficult contexts. The nature of the appropriate hunk of content for particular learners at particular stages of learning should dictate the nature and the importance of the extension task. Like all aspects of instruction, the content development of the teacher is part of an interactive process. The teacher's decision of what to do next is based on what the students do. Again the major issue here is when the teacher should intervene and whether that intervention should supply the learner with more information or increase or decrease the level of a task. Clearly there are times when the teacher's best choice is not to intervene - the learner is able to make the appropriate adjustments without conscious processing of what they are doing. It is also true that there are times when learners need help and the teacher should be playing an active role in providing that help or finding a way to increase the level of learner processing. The real question should be *"under what conditions and in what way should the teacher intervene?"*.

Guidance and Teacher Feedback

Teacher feedback is another issue related to the amount of information the learner needs on how to do a task. Teacher feedback has come in and out of favor as a critical variable in the instructional process. Classroom work with effective tutors has demonstrated the value of a learner receiving information on their performance, encouragement, situationally specific guidance, eliciting responses from students etc., as supportive evidence of the fidelity of meeting learner individual needs (Lepper, 1988). Originally introduced from motor learning theory, the relationship between teacher feedback and student learning in pedagogy research in physical education has not been strong (Silverman, Tyson,. & Krampitz,

1993). There are several potential reasons for this lack of anticipated relationship. First, it is most difficult to find relationships with learning for single teacher behaviors, particularly those that are more critically individually applied and content specific. Second, it is also unlikely that a single teacher in a large group instructional setting can meet individual needs for feedback, even if feedback did have a high relationship to student learning in a one on one situation. Third, teacher feedback may not be the essential ingredient of learning it was once thought to be.

Motor learning theorists have concluded that the use of augmented feedback is very much dependent upon the individual learner and the skill being taught (Magill, 1994a, Magill, 1994b). There are some skills and some situations where a learner does not need a great deal of feedback, and feedback may even create a dependency on the part of the learner. This dependency has the ultimate effect of reducing learner processing (Starkes & Allard, 1993). When learners have a clear idea of the skill they are trying to perform and when they can access information on their performance, then teacher feedback may not be necessary. Where learners cannot access information on their performance and where they do not have a clear idea of what it is they are trying to do, feedback may be essential. However, all learning is enhanced if teachers can get students to change aspects of their performance needing changing, and for many learners and many skills in physical education classes, appropriate feedback should improve learning. It is inappropriate to make the learner dependent upon teacher feedback to the extent that they do not learn to use information inherent in the task to guide their performance. It is also inappropriate to assume that learners can assess all the information they need from the environment at all times to improve their performance.

Feedback in a class instructional setting is important not only because it has the potential to provide learners with critical information on performance. More than likely, feedback tends to improve learner processing and motivation (Rink, 1998). By helping students to maintain their focus on what they are doing, feedback should improve learner processing of what they are doing. By creating some kind of accountability for good performance, feedback can also serve to improve learner motivation to learn.

The Learning Environment

The issue for research on the learning environment from the perspective of learning theory is related to the kind of learning environment that facilitates learner processing and engagement. The early research on teacher management clearly illustrates the need for a well managed learning environment (Brophy & Good, 1986). What is new about the present discussion of learning environment, is the issue of whether learning is a social or an independent process. Much of the research on learning has taken place from the perspective of the individual learner and has been concerned with studying how individuals acquire knowledge and skills which may be facilitated by another or others. Learning from this perspective is primarily constructed as an individual process. Research done from a social learning perspective is more concerned with the manner in which learning is actively constructed by a group of learners in particular environments (Salomon & Perkins, 1998; Vygotsky, 1978).

An active construction perspective and an individually acquired perspective on learning can coexist as explanations for different phenomena. Individuals can learn alone. They can acquire skills and knowledge from a facilitator whose role it is to help them acquire particular skills and knowledge (teacher or tutor). They can also learn in group environments devised to encourage interactive processes that help groups construct meaning. Physical education has been studied from the first two situations: individual learning and facilitated learning. Some work on sport education and games for understanding approaches a group learning situation and this work would indicate that group learning environments are effective in physical education (Hastie, 1996,1998; Hastie & Siedentop, 1999), particularly in terms of more affective concerns.

We know very little about the nonverbal and verbal interaction that takes place in a gymnasium where groups of learners are trying to acquire individual skills but have access to knowledge of the performance of others. We know less about the verbal interaction process between learners that might facilitate the process. Group learning environments are not without their problems and like most recommendations for pedagogy should not be considered universally effective for all students in all situations. The research on the effects of group learning environments on students with different characteristics is conflicting. For instance there is some support for the idea that less aggressive students (many girls) and

the average student are more likely to not be as involved in the process as males and more highly aggressive students (Saloman & Perkins, 1998). When grouped heterogeneously these students are not likely to be as involved in the interactive process and therefore not likely to learn as much as other students (Salomon & Perkins, 1998). Although most of the research clearly supports the positive effect of heterogeneously grouped groups on low skilled and below average students, there is some beginning evidence to support the idea that the key to using collaborative learning may be in the nature of the group the teacher selects to work together. Above average students do not benefit from arrangements where they do not have an opportunity to interact with those of their own ability (Fuchs, Fuchs, Hamlett, & Karns, 1998). The indiscriminate use of heterogeneous collaborative groups for learning experiences is not supported.

Conclusions

So what is the point of this discussion. Put quite simply, there is no single theory of learning that would explain learning or the lack of it in all situations, and therefore, there can be no single approach to instruction. Each theory of learning is used to support an approach to instruction. Each has but a piece of a very complex phenomenon we call learning. A lot of the research done on instruction has been framed, not to establish theory or to understand learning, but rather, to establish direct links between what a teacher does and what a student learns. Often this research looks at a particular kind of learning, rather than viewing learning more holistically. The advantage of using learning theory to talk about pedagogy is that you get to test the assumptions of the theory - what it is based on. For instance, is it true that constructivist learning environments are more motivating to learners? Is it true that students process more when practice is not rote? You don't want to know simply that something works - you want to know why it works. Knowing why it works allows you to develop pedagogy that is consistent with that why. When you build a knowledge base on theory you can test the assumptions of a theory. I am not advocating that we do not do methods studies. I am advocating that we ground our work in the theories that are the underlying basis of these methods so that we have a better way to build a knowledge base. This kind of thinking changes the question that we ask from "Which is Best" and what do I believe to "For what purposes, under what conditions, and in what way should I use this instructional methodology?"

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