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CLASSROOM DISCOURSE: CONTRASTIVE AND CONSENSUS CONVERSATIONS

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ABSTRACT

Researchers claim that classroom conversations are necessary for supporting the development of understanding and creating a sense of participating in the discipline, yet we know there is more to supporting productive talk than simply having a conversation with students. Different types of conversations potentially contribute differently to the development of student understanding and identity. We have been investigating the strengths and limitations of two such conversations: contrastive and consensus conversations. Within a contrastive conversation students have the opportunity to make their own thinking explicit and then compare and contrast their strategies to the thinking of others. Consensus conversations ask students and the teacher to begin to put ideas on the table for consideration by the whole group—much like a contrastive conversation—but then go on to leverage the classroom community as a group to build a temporary, unified agreement about what makes the most sense for the class to adopt and use. Here, we detail both types of conversation, their affordances and challenges, and investigate the conditions under which a teacher may want to orchestrate a contrastive or a consensus conversation.

Keywords: Classroom discourse, classroom practices, elementary education

When thinking about how to help a student grow into and understand the world around them, teachers have to consider many factors and a multitude of pedagogical options. One of the most important things to consider is the nature and character of one's interactions with one's students. Students may learn from books, computers, direct observation, and one another, but in the elementary classroom all of these experiences are typically mediated by the teacher through conversations with individuals, small groups, or the whole class. It is in these dynamic, complex, and at times highly personal interactions where students have

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opportunities to articulate and reformulate their understandings and teachers have opportunities to guide student development and thought.

Given the range, complexity and contingent nature of interpersonal interactions, how should a teacher who wants to help each child develop to his or her fullest potential think about and plan instructional conversations? While a complete answer to this question is beyond the scope of this paper, we wish to offer a few observations that will move us towards this larger goal. The types of classroom conversations we wish to focus on in this paper are ones in which the students are inventing, articulating, sharing, and critiquing their own solutions and strategies to intellectual problems. However, within this class of conversations there are many choices to be made. As students are developing new understandings about subject matter, how should the discussion be organized to help students share their own and learn from other's ideas? How do certain ideas and theories gain collective momentum, while others die out? How does a teacher ensure that every student is engaging with the material at a level that makes sense to him and at the same time is offered continuous opportunities to develop his understanding further?

Our interest in this subject began a few years back while working with a group of 7-9 year old students on mapmaking (Enyedy, 2005). We did not want to simply share the conventions of mapmaking with them, but rather, wanted them to make sense of the need for the conventions themselves. For example, in trying to help a partner find a hidden object, the students invented the concept of bird's eye view. They ran into problems when they drew their maps from a particular point of view because important objects and landmarks were hidden behind other objects. Several students brought up the idea that drawing the maps from a bird's eye view might be clearer. A debate then ensued, until ultimately the bird's eye view faction convinced the others that this solution indeed answered all of their concerns, and the class adopted this strategy in moving forward with their mapping.

In the same classroom, during mathematics, students engaged in conversations where they shared multiple strategies for solving a common problem. Students articulated their own strategies, compared them to their classmates', and attempted to solve the problems in new ways that pushed their understandings. In the math conversations each student used strategies that made sense to them and shifted to new, more advanced strategies when they understood them.

We noticed that both types of conversations with students were quite powerful, and started to consider when and how teachers orchestrated them. We began to think about when it was productive to guide students toward one understanding as we had in the mapmaking work, and when it was most productive to encourage multiple strategies, as we had in the mathematics conversations. In this paper, we hope to address both of these types of conversations, from the point of view of teacher role, costs and affordances.

THEORETICAL FRAMEWORK

Classroom talk clearly exists within every classroom. Researchers claim that classroom conversations are necessary for supporting the development of understanding and creating a sense of participation in the discipline. However, we also know there is more to supporting productive talk than simply having a conversation with students. We are beginning to

understand the different types of conversations that can occur in classrooms and how these conversations can support student learning. We now see the need for characterizing the types of conversations teachers and students can have, making explicit the goals and affordances of the conversations, and providing enough detail so teachers can see how to support the occurrences of such conversations.

There are some well documented structures for classroom conversations, but not all of these are productive. No one would deny that the most dominant classroom discourse pattern is the IRE pattern, where teachers Initiate a question, students Respond, and teachers Evaluate the response (Cazden, 2001; Doyle, 1985; Mehan, 1985). The IRE pattern exists in classrooms across contexts and content domains, but has been shown to push students to think of classroom discourse and the academic disciplines in terms of being right or wrong. We know that even in classrooms where teachers are attempting to teach for understanding teachers often maintain this pattern. Spillane and Zeuli (1999) found in their study of reform minded mathematics teachers that the teachers predominantly engaged in procedure bound discourse; they rarely asked students to do more than provide the correct answer. Teachers in this study were engaged with a reform minded curricula which supported engagement in conversations around students' mathematical ideas. Neither taking a reform minded approach nor following a rich reform based curricula enabled teachers to move beyond the IRE discourse pattern (Spillane and Zeuli, 1999) see also (Smith 2000). We recognize that changing long standing ways of engaging with students is challenging and we believe that if we are to help teachers engage in different forms of conversation with students we need to be explicit about what kinds of conversations they might have, why they are productive and what it takes to engage in them.

In the second edition of her book *Classroom Discourse*, Cazden (2001) points out that increasingly teachers are being asked to add non-traditional discussions to their repertoires to better support the development of students' higher level thinking. She also points out that the, "challenges of deciding, planning and acting together across differences of race, ethnicity and religion are growing...[so more than ever] we need to pay attention to who speaks, how we provide opportunities for varied participation and who receives thoughtful feedback." (p. 5)

We see two conversations as standing out as potential contributors to the development of understanding. In one of these conversations, we use coming to consensus as a classroom community to accomplish these goals. Consensus conversations ask students and the teacher to begin to put ideas on the table for consideration by the whole group and then build a unified idea of what makes sense together. We also see the potential to develop understanding through contrastive conversations. In contrastive conversations students have the opportunity to make their own thinking explicit and then contrast it with the thinking of others—providing opportunities for reflection and revision of thinking.

Both consensus conversations and contrastive conversations, as we define them, provide opportunities for students to make their thinking explicit. Explicit student thinking can then be used as the basis for further reflection and conversation. Contrastive and consensus conversations differ in the ways teachers make use of student ideas and orchestrate the class's making sense of the ideas. In a consensus conversation, orchestration involves supporting students as they compare and contrast the ideas on the table so that they can choose *the one* that works best for them in accomplishing their shared goals at that point in time. In a contrastive conversation, ideas are put on the table by individual students, and orchestrating the conversation around the ideas involves eliciting the full range of ideas and then helping

students to see the similarities and differences between the ideas. We argue that neither conversation is better than the other, but rather they serve different purposes and can be used to accomplish different goals.

We intend here to detail the similarities and differences around the conversation goals, and the nature and affordances of the conversations. To do this we first provide explicit examples of these two types of conversation, highlighting how these conversations occur and the teachers' role in supporting the conversation. These examples are provided with very little analysis. Our goal is to provide the reader with two concrete examples that illustrate some of the many similarities between these two types of conversations, and also demonstrate the breadth of difference between them. Given the similarities, we recognize that in some ways it might be more intuitive to talk about these conversations as one type of conversation, but we think if we are to help teachers and researchers establish ways to support the development of conversations in classrooms we must begin to tease apart and detail the various conversations that can productively occur.

EXAMPLE OF A CONSENSUS CONVERSATION

At a point about half way through a unit on mapping, a classroom of second and third grade students engaged in an instructional conversation that ended with a consensus about how to represent the height of buildings and other objects on a bird's-eye-view map (for a complete description and analysis of this activity see Enyedy, 2005). A day or so before this discussion the students had built a city out of wooden blocks and mapped it from the bird's-eye-view. At the end of the period they had cleaned up the blocks leaving only their maps and memories of their cities. Rebuilding the block city from the maps became the class's next activity.

However, before they went to rebuild the city the students discussed what was going to be hard about the task. They quickly discovered that they could not tell how high any of their buildings were just from looking at their maps. The class agreed to solve this problem so that next time they made a map they could note height. Because of our goals and pedagogical commitments, we did not tell them how to solve the problem. Instead, we let them invent their own personally meaningful ways to represent height on a two dimensional map.

The class invented three ways to do this. First, and most common, was to add shadows to an object on the map to show that it was not flat, but had some height (Figure 1a shows a representation of a step pyramid using shadows). The second invention was to draw the base of the object, the top of the object and a line in-between the two (Figure 1b shows a map of a cone using this method). The length of the line between the base and the top would be how tall the object really was, with a longer line showing a taller object.



Figure 1a, 1b, and 1c Three invented solutions to show height.

The third invention was to use concentric shapes, one inside the other, to represent the change in height, much the same way that contour lines are used in conventional maps (Figure 1c shows another representation of a cone using concentric shapes).

With three ideas displayed on the whiteboard the conversation spontaneously turned to comparing and elaborating the different ways of representing height. One student (the one who had invented the base-to-top method) stated that he thought the concentric shapes method could either be seen as being a tall cone or a tunnel. Other students agreed that it could be seen both ways, so the teacher asked if there was a way to change the method so that it would be clear one way or the other. After a few minutes, a student suggested using different colors and a key to the map to explain which color corresponded to each height.

This was an important turning event in the conversation. The problem that one student noticed about another's method led the class as a whole to revise the method. They could have abandoned the method, or moved onto debating the merits of other methods, but at the teacher's suggestion they worked together to modify the concentric shapes strategy. This co-authorship seemed to change the status of the method from a single student's idea to the class's idea, even if not all of the students had yet agreed that this was even a good method. The teacher then polled her students to see how many of them in fact thought this idea was a good idea, and then asked each and every student to go try out this new method and see how it worked. The students did and in the course of doing so several new refinements of the concentric shapes method occurred, including the conventional method in topographical maps where each new line/shape represents a specific change in height (e.g., each circle represents a one-inch change in height).

EXAMPLE OF A CONTRASTIVE CONVERSATION

At the beginning of mathematics class, Ms. P poses the problem $42 + 25$. The 42 is lined up above the 25 in columns written on the board (as is often shown in textbooks). She asks her second graders to tell her, "What is the problem asking you to do?" The students provide a range of responses. Ms. P focuses in on one student's response, "there are two numbers and you are going to add them up." Following the brief problem discussion Ms. P asks the students to work on solving the problem. They can work alone or with a partner. In sending them off to solve the problem she reminds them that they can solve the problem in whatever

way makes sense to them, that they can use counters or base ten blocks or any other materials around the room. She also reminds them that she will be asking them how they solved the problem. The students work on their solutions and Ms. P moves through the group of students watching, listening and asking questions. If students are finished she asks the student to try and solve it another way or to share with a friend who is also finished. She lets the students work on the problem until they are all about ready to share. She gathers the students together on the rug to share.

Ms. P begins the contrastive conversation by saying, “Who wants to help me solve this problem? How did you solve it?” She calls on two boys who had worked together. One of the boys tells her, “We started here,” and points to the board. She repeats, “You started here? Explain to me how you did that exactly.” The boys describe their strategy and animate their drawing of the manipulatives they used earlier in the lesson. They drew four “tens sticks” and then two more and said that would be 60. They then drew five “ones cubes” and two more cubes and got seven. Ms. P asks a series of questions about how they got the 7. “How did you get a 7? How did you count those (the 2 and the 5)? You counted them altogether? Where did you start counting?” Through her questioning she learns that the boys can count on from 5, saying “6, 7” and do not need to count starting at 1. The boys then tell her they put the 60 and the 7 together and got 67. She asks, “What did you count first, the tens or the ones?” They respond tens. “The tens, okay.” Ms. P then turns to the whole group and asks if anyone solved it a different way. One girl responds that she added the 2 and the 5 and got 7 and then the 4 and the 2 and got 6. Ms. P asks if it is actually a four. The girl says it is a 40. And together they pursue what that means for how she describes her strategy. Ms. P asks for a third solution. Again two boys share. They write vertically “ $42 + 25 =$ ” They break the 42 into 40 + 2 and the 25 into 20 + 5. After three strategies are shared, Ms. P says, “Let me ask you this question, they (referring to the last pair sharing) put their tens and ones together, in what other strategy did someone else put their tens and ones together? The 40 and the 20 and the 2 and the 5? Whisper it to your partner, as a secret.” They then engage in a conversation that helps the students see that each strategy breaks the numbers apart into tens and ones. They compare what is written on the board carefully together. The conversation closes with Ms. P saying, “You all did the same thing in different ways. Did you all get the same answer? Yes 67, 67, 67.”

WHEN TO HAVE CONSENSUS CONVERSATIONS

In a consensus conversation, the group discusses multiple solutions or ideas about a common problem and comes to a collective reasoned agreement about how the group will proceed for the time being. Consensus conversations can take several different forms depending on what is being discussed and the context in which the discussion occurs. We see consensus conversations as useful for three basic purposes: to come to a reasoned best solution, to settle a conceptual argument between opposing camps, or to create an argument together to make explicit existing ideas that have not been named.

Sometimes one best solution to a collective problem exists that teachers want students to understand. Rather than simply show them the solution, teachers engage the students in a very open-ended consensus conversation geared toward sense making about the problem and the

criteria which solutions need to satisfy. In the mapping example these criteria were about quantifying height without distorting other information shown on the map. In these conversations, students generate many possible solutions to the collective problem and use deductive reasoning to come to an agreement about the best solution or solutions that meet the criteria, which may or may not be explicitly stated but guide the conversation nonetheless. While on the surface the discussion may look like it is about the students' invented solutions, it is in fact about understanding and applying the criteria that embody the big ideas of the lesson. Another example of this type of conversation would be asking students about how they would share a cake fairly among five friends. Students may come up with many ideas of how to split a cake, then come to consensus that fairness should be a guiding criteria in determining solutions. It is therefore not the individual "cake-cutting" strategies that are agreed to, but the criteria of what constitutes a good solution: use the entire cake and make sure the pieces are the same size. We are likely to engage in these types of discussions only when there are clear criteria necessary to adequately solve the problem.

Consensus conversations can also be used to push a fundamental understanding that only some students share. In this case, we are setting up an argument between opposing camps. Students on each side of the issue need to explain their thinking and try to convince the other side of the veracity of their claim. This usually occurs in reference to a property or convention that we want the students to buy into. For example, on the road to understanding the conventional use of the apostrophe, a teacher may push the students' understanding by discussing one child's claim that whenever there is a name followed by an "s", you should put an apostrophe. Besides those students who cannot decide, there will be only two camps on this issue, either students agree with this claim, or they disagree. Students might then spend a period of time garnering evidence to support their side of the issue, until at last someone finds a sentence that says "There are two Lisas in this class." Because it is the plural form of a proper name, rather than a possessive noun, it is counter evidence to the original claim. With this counter evidence, suddenly, the tide turns and the original claim loses support. There may be several of these discussions until the children come to the claim of a possessive apostrophe. Since there is only one right conventional answer to the question of why the apostrophe is being used in this particular way, all reasoning about this issue is done inductively by looking at evidence that already exists in the world. The conversation around the class' consensus creates opportunities for developing understandings about the use of the rules.

Finally, a consensus conversation may be used to make explicit things that the group is already doing implicitly. In this case, the focus is less on generating new ideas or solutions, and more on pushing how far students are willing to buy into or stretch a concept. For example, students may agree that for the specific case $2+3=5$, and $3+2=5$, but may not have come to any formal, generalized understanding of commutativity—that the order of terms *never* matters in addition problems. The consensus conversation allows students to make generalizations and prove them, allowing students to use their understandings to help them solve future problems. By having a conversation that builds upon a number of accessible examples, students begin to offer broader theories of how the discipline works that deepen their understanding of work they are already doing.

There are five components of every consensus conversation. First, the group must experience a problem that needs to be solved.

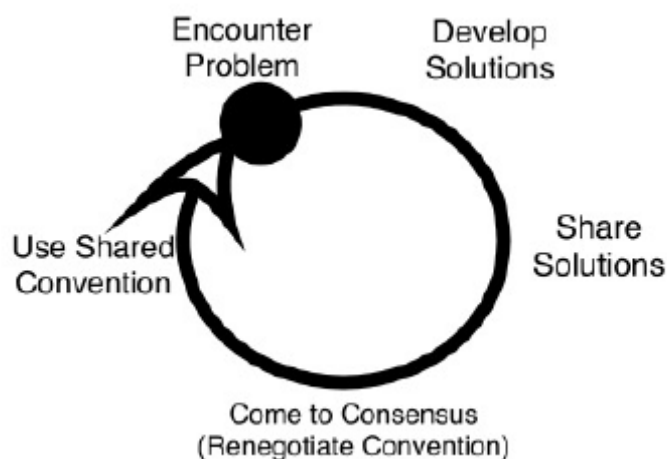


Figure 2. Steps to Consensus Conversation.

This means students must encounter a disequilibrium as they are moving forward with their work, pushing them to need to invent new solutions or understandings. One way teachers create this disequilibrium is by seeding the environment with information that will challenge current conceptions (as was the case with the possessive apostrophe example). Other times teachers create situational constraints which make current solutions or understandings untenable (as was the case in the mapmaking example when students realized they would need to represent height to rebuild their block city). Regardless of what strategy teachers use, the creation of “trouble” with current thinking requires careful planning to encourage the development of new and thoughtful alternatives that will help the group progress.

Second, students develop alternative solutions to the trouble—like the three ways to represent height in the mapping example. During this time, teachers check in with individuals and groups as they are developing new theories or practices. Teachers may also scaffold students’ understandings during their local problem solving by asking them questions, making observations, and setting up additional challenges that students’ solutions must solve.

Third, students share theories and solutions. The teacher helps students compare and contrast ideas and asks questions that highlight the advantages and drawbacks of each solution. Through this process, the teacher is helping the group to continually redefine the criteria of a successful solution, thus deepening understanding of the discipline.

Fourth, the group comes to a temporary reasoned agreement, allowing one idea to gain collective momentum. This requires that teachers really listen to children’s agreements and concerns, providing counter evidence if necessary to push understandings.

Fifth, students have an immediate opportunity to try out their new solutions by engaging in authentic work which requires its use. For example, in the mapping example the teacher had all the students try the concentric shapes method on a new map right after they had collectively decided it was a good method.

It goes without saying that students play an active role in all the steps of consensus conversations. They are the agents by which ideas are brought to the table, refuted, and gain momentum. These are not fast discussions in which the teacher is seeking a student to present

one idea which she can quickly persuade the other students is “right”. Rather, in these conversations students grapple with defining the problem and detailing the criteria by which to measure success. In this way, students develop the agency of a practitioner in the field, understanding that current solutions are not “end all, be all” solutions, but rather current best understandings. Therefore, like practitioners they come to agreements that they know they may revisit as understandings of the problem change.

WHEN TO HAVE CONTRASTIVE CONVERSATIONS

Contrastive conversations are not new to many teachers. Contrastive conversations occur when the teacher involves students in sharing their thinking with each other in a public way and then uses what was shared as a way to investigate the similarities and differences across ideas. These conversations may vary in name and form across content areas (contrastive conversations might also be referred to as strategy conversations in mathematics and so on) but they share the core elements and principles that we focus on here. First, a problem is posed or a question asked that allows for multiple approaches to an important content-based idea. Second, students are provided ample time to engage with the problem or issue in a way that makes sense to them. Third, the students share their ideas with the other students in the class. Fourth, the class works together to detail the ideas shared. Fifth, the shared ideas are compared to highlight both similarities and differences. Sixth, students are given an opportunity to try their own or someone else’s strategy on a new problem. While there are always subtle aspects of the work that surround these elements, these elements taken together constitute a contrastive conversation.

Contrastive conversations occur when (a) the problem or issue addressed lends itself to detailing a range of responses, (b) the teacher is interested in engaging the students in sense making around a particular idea or (c) students will benefit from detailing their own thinking in relation to others’.

Contrastive conversations are particularly useful when the problem posed or issue addressed lends itself to a range of different ideas or strategies that one’s students can access. The content-based issue to be addressed provides openings for students to begin to work on it in their own way and thus, elicits a range of ideas. Often when contrastive conversations don’t get off the ground it is due to the problem posed, whether it lends itself to students using what they know to come up with a variety of ways of thinking through the problem or whether it was too easy or too difficult for the students.

Second, contrastive conversations support the development of an idea as students engage together in sense making. Contrastive conversations are not about three students and the teacher. They involve discussion that brings together all the students in the class to make sense of the issue being addressed. Students work together to unpack, often through discussion, the problem itself. They work on detailing their own ideas and comparing the different ideas that are shared. Students engage in individual sense making and then share and develop their ideas as they engage with the class. Contrastive conversations are not just about process. They are in service of learning particular ideas about the content. This requires consistent attention throughout the conversations to the content, both by the teacher and the students.

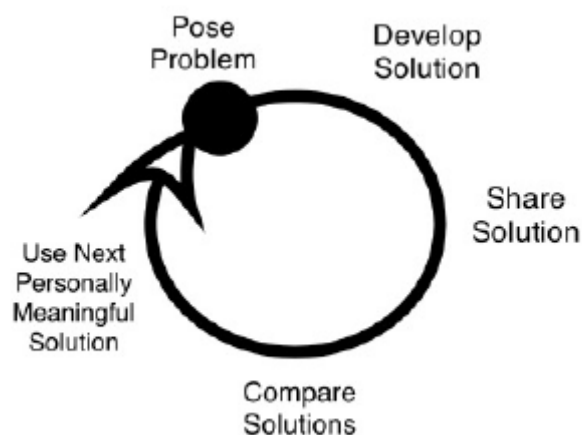


Figure 3. Steps to a contrastive conversation.

Third, contrastive conversations occur so that students can articulate their own thinking and compare their ideas to others, learning more about the content. Asking students to share their thinking means just that. Students publicly describe their ideas in oral and often written form. The teacher and students work together to detail the idea by asking questions or discussing a part of the idea. Typically sharing would not stop with one idea shared. Sharing a range of ideas provides students the opportunity to engage with an idea that might make sense to them and allows for a comparison across ideas. The comparison across ideas is the part of the contrastive conversation that is often skipped. However, this is also the aspect of the conversation that provides the most opportunity to make connections and develop understanding of the underlying content-based idea.

Contrastive conversations begin not with the sharing discussion, but when the problem is posed. The work that occurs by students and the teacher as they unpack the problem and begin to work through their ideas is critical to the success of the contrastive conversation. As can be seen in the example, after the problem is posed the teacher and students work through the problem and document their individual approaches and ideas in ways that they can refer back to when they share their ideas with the class. During a contrastive conversation students need opportunities to not only complete a strategy but they need to be working through how they would talk about their idea, what representations they will use to show what they did, and so on. The teacher can use this time to read the terrain, and find out how students have thought about the problem. The teacher can position students to share and engage students in talking in pairs with each other about their strategy. The teacher can challenge a students' thinking and scaffold movement to a new idea. The teacher can listen to student's explanations and support students in providing detail. This work all occurs as a part of contrastive conversations.

Contrastive conversations are not contrastive conversations without (1) student agency around the strategies, (2) active discussion that involves *all* students, (3) attention to the core content. Throughout the conversations students must maintain ownership over their own ideas. Each student needs to have the opportunity to make sense of the problem in their own way. Thinking through the problem in one's own way first provides access to learning more about the content embedded in the problem. It is difficult to listen to another's idea without

some notion of how to make sense of the problem oneself. It is difficult to ask questions or compare without something to relate it to for oneself. Positioning oneself in relation to a particular idea is what makes the contrastive conversation work.

COMMON FEATURES OF BOTH CONVERSATIONS

In order to make an informed decision about when to have a consensus conversation, a contrastive conversation, or a different type of instructional conversation, we need to fully understand the range of positive learning outcomes and potential challenges that might occur for each type of conversation. In this section, we will examine the potential of both consensus and contrastive conversations in terms of: a) the cognitive consequences to individual students from engaging in the process of these types of conversations; b) the value to individual students related to the products of these types of conversations; c) the emotional and affective potentials of these types of conversations; and d) the effect that these types of conversations have on the classroom community and culture.

Since the process of contrastive and consensus conversations begins in quite similar ways, it is not surprising that many of the benefits to student learning are also shared. Both types of conversations involve students actively constructing solutions, articulating them for the whole class, and comparing and contrasting their ideas. Engaging in this process may contribute to students learning in at least five ways. First, the benefits of actively constructing personally meaningful solutions to complex problems have been shown repeatedly.

Second, all students—even non-presenters—are actively involved in the conversation itself. Students who present and contrast their ideas with their peers articulate and externalize their thinking in ways that makes it visible to themselves and others. Non-presenters—having constructed their own personally meaningful solution—have an orientation towards the other students' presentations that make them active listeners.

Both types of conversations also lead students to compare their solutions to the other students'. This brings us to the third benefit, by comparing solutions students may come to see how their approach differs from other approaches. This provides students with opportunities to be exposed to and closely examine other ways of thinking about the problem. Some of these ideas may be borrowed, or they may simply be an opportunity for the students to rethink and revise their own solution in new and innovative ways.

Fourth, the students invented solutions are, at least at first, likely to be partial, or limited to a specific context. For example, in the discussion of mapping (above) the invented solutions of using shadows to show that an object was tall worked until the students needed to know exactly how tall the object was. Therefore, in comparing her solution to another a student might find that her solution doesn't work in certain circumstances where another method does. This reflection about the limits and generalizability of one's own solution is an effective way to focus a student's attention on the various parts of the problem and often leads to the iterative modification of a student's own ideas and understandings.

Fifth, hand-in-hand with a complete understanding of the problem, the comparison of solutions may lead to a better understanding of what it takes to have an effective and complete solution. That is, in discussing what makes a good solution, the student's attention becomes focused on the criteria by which one judges the effectiveness and adequacy of a

solution. Both understanding the problem and understanding what makes a good solution contribute to a deeper understanding and better solutions.

As in consensus conversations, during contrastive conversations students make their thinking explicit to the group, giving both themselves and others a chance to reflect upon and discuss the presented ideas. Both types of conversation provide students the opportunity to participate in an open exchange of ideas, compare strategies, position themselves in relation to others, and refine their thinking. They also allow students to build common language, and participate actively in the discipline.

Finally, while both consensus and contrastive conversations help students to more clearly understand the problem at hand, they do so in opposite ways. Whereas a consensus conversation aims at narrowing solutions to more tightly define the problem, a contrastive conversation widens solutions to more clearly define the problem. Although students are presenting many different ideas in a contrastive conversation, ultimately the discussion helps students see that the underlying content-based concepts appear in all the ideas shared. These five benefits to learning from contrastive and consensus conversations apply to all the students who are actively engaged in the conversations—both actively presenting and active in more legitimate peripheral roles such as active listening (Lave and Wenger, 1991).

Both consensus and contrastive conversations, however, require a safe and supportive environment where students are not afraid to publicly report their current thinking—even when it is likely that their thinking is “incorrect”. Embarrassment and the potential for embarrassment permeates everyday life and often lies at the heart of social organization and our efforts to regulate our own actions (Goffman, 1967). In typical school conversations the focus is on providing the correct answer, and students have developed ways of participating in and framing these types of conversations that minimize their embarrassment. In comparison, consensus and contrastive conversations can be very emotionally vulnerable spaces for children. This means that before having a successful conversation of this type a teacher must lay the groundwork that aids the students in their impression management, or as Goffman (*ibid.*) calls it “face-work”. Students must feel secure in the fact that a wrong answer, or a partially developed idea will not be held against them or diminish their social standing with the teacher and their peers. The students must come to perceive that their contributions to the conversation itself are what is valued and not just the final answer. The way in which face is managed socially—challenges, offers, expressions of thanks etc.—can be almost ritualistic, but very important if one wants to keep students involved in the conversation. As a result, during the conversation teachers must also be reflective of how they are summarizing, revoicing, promoting, or ignoring student contributions—even while they attempt to orchestrate the conversation in a productive direction.

UNIQUE BENEFITS AND CHALLENGES OF CONSENSUS CONVERSATIONS

What is unique about consensus conversations is that at some point the conversation turns a corner from sharing to discussing which solution they all agree to “try out” for their next activity. The additional benefits and challenges of this aspect of consensus conversations occur at the level of individual students.

Table 1. Benefits and Challenges of Consensus and Contrastive Conversations

	Benefits to Students	Challenges for Teachers
Shared Features	Active knowledge construction Legitimate and productive roles for non-presenters Access to new ideas Promotes an understanding of the problem (not just the solution) Helps students understand what constitutes an adequate solution	Negotiating (rather than dictating) the pace and direction of the conversation Creating a safe environment where students feel open to sharing their emerging ideas
Consensus	Coordinate future, joint activity Provide shared reference point Mark progress Leverage desire to belong to push individual change Promote an orientation towards knowledge building	Omitting opportunities to revisit and revise conventions Managing “face” (i.e., who’s ideas are promoted, etc.) Ensuring that students do not adopt ideas without understanding them
Contrastive	Provide multiple entry points for students at different levels Opportunities for individualized scaffolding Opportunities for students to learn from one another Promote the belief that there are many correct paths to a solution	Managing and organizing a large range of ideas into a productive conversation Listening to students without distorting or cleaning up their thinking for them Honoring where students are while at the same time pushing students to continually develop their ideas

A potential benefit to the more directed and critical comparison of ideas in consensus conversations is challenging individual students out of their “comfort zones.” The solution chosen as the community’s temporary norm, is likely to be beyond the current level of understanding of a few of the students. This may challenge students to go beyond themselves in their struggle to make sense of and use the new solution. It is possible that this would set the stage for fruitful collaborations within a zone of proximal development. However, students do not have to invent the solution in order to participate in a consensus conversation. These types of conversations have legitimate roles for peripheral participants (Lave and Wenger, 1991). As the mapping example shows, it is rare that one student will invent the solution that becomes the consensus without input from other students. Thus there is a legitimate role for students to modify other people’s ideas. Additionally, a student does not have to fully understand the solution when it is presented to participate. When the teacher facilitates debates and polls the students for their opinions, it provides a way for students who do not yet understand the solution to question it and/or change it.

This potential pitfall of consensus conversations—that students may feel pressured to adopt a strategy without fully understanding it—is mitigated only if consensus conversations are kept in the context of a longer conversation, where what is today’s consensus can be reopened for discussion in light of new developments, contexts, or changes in student understanding. If consensus conversations remain framed as temporary agreements they

provide multiple openings and multiple ways to participate in the conversation. For students who fully understand the convention, they can participate as full participants, using it, teaching it to others, and further modifying it as needed.

We believe there are also some unique benefits to consensus conversations in terms of the products of consensus conversations. The product in this case is a temporary agreement about what solution the community will use to solve its problems. One of the most pronounced benefits of a temporary agreement of the classroom community is that students can coordinate their joint activity on future problems. If the activities that take place after consensus require students to work together on a shared problem, a shared solution helps them to communicate with and understand each other and make smoother progress towards their shared goal. This is in part because the students can use the shared solution without having to stop to unpack it and to justify its value. Likewise, it acts as a shared reference point for communication in that it allows students to see and talk about the problem in similar ways. This shared reference point for communication can also serve as an informal assessment point. When a student talks about the solution in a novel way, in a way that doesn't make sense, or even uses the solution in an inappropriate way, this can be used as a signal and an opportunity to the teacher and other students to stop and discuss their different understandings.

Due to the temporary nature of a consensus, the current solution is an object that is expected to be modified as the need arises. When students encounter a new context, where the current solution does not make sense, the process of invention, sharing and consensus starts again. Revisiting an existing consensus becomes a perfect opportunity to engage in new creative activities and revisit students' old solutions in an effort to overcome the new difficulties. This aspect of the consensus cycle leads to a new orientation towards knowledge. In contrast to traditional instruction, here the students, and not the teacher or the textbook, invent solutions and make knowledge claims. The students also discover on their own that solutions are often partial, limited, context specific, and available for modification. This gives them a new perspective on the conventions of math, science, and other subjects; the students come to recognize that what is taught was invented much in the same way as their own invented solutions.

We also argue that there exists an emotional value to reaching consensus. First, while understanding a solution is ultimately a personal construction, consensus provides a legitimate active role to students who are not the inventors of an idea. That is, students who do not invent the idea still engage with the idea as critics, as members of the community that freely decide to adopt it, and as co-constructors as they modify the solution over time. In this way all students can claim ownership of an idea that has become the community's convention. Second, that act of coming to a consensus provides temporary closure on the issue, which students can use to mark their progress and accomplishments.

Finally, coming to consensus occurs only in a community as a group. A shared solution allows for students to work together in a joint enterprise, the hallmark of a community (Engestrom; 1987; Lave and Wenger, 1991; Wenger, 1998). Therefore, consensus conversations uniquely leverage the student's desire to be part of a community in a productive way. This works on two levels. First, students' desires to be part of the classroom community motivates them to engage in ideas on the conceptual plane. The mastery of shared ideas marks membership in the community and allows students to successfully interact with their peers. This creates a context where peers are motivated to understand each other's ideas, even those that do not make sense to them. Second, as students' conventions develop they become closer

and closer approximations of the normative disciplinary conventions. When this happens appropriating the classes' solution marks more than membership in the class, it also signals membership into the broader community of the discipline. A student who adopts concentric shapes to represent height on a map can think of herself as a map maker and can understand and use conventional topographic maps. Identification with academic disciplines and larger communities of practice like this can have long term implications for how students engage with ideas and with schooling itself.

UNIQUE BENEFITS AND CHALLENGES OF CONTRASTIVE CONVERSATIONS

The unique benefit of the contrastive conversation rests on the premise that the conversation values individual student's reasoning in relation to the group's reasoning. This creates a setting where students can successfully enter the problem. Since every accurate idea is acceptable in a contrastive conversation, everyone has a place to start. From there, teachers scaffold individual children's understanding by nudging them to explain their ideas to someone else, compare ideas or try the next most sophisticated solution. Unlike a consensus conversation, this individualization allows a student to move from her understanding and adopt the next strategy when it makes sense to her. The class as a group has access to a range of content based ways of considering the problem's solution and an opportunity to make sense of their thinking in relation to others.

Often in contrastive conversations, the teacher will also ask students to come up with multiple ways to approach an idea or problem. Students benefit from being pushed towards understanding by providing access to more shared ideas, and by allowing them to compare their thinking around a particular strategy with the thinking of others.

Contrastive conversations have some important benefits for classroom culture as well. First, they reinforce the value that there is more than one path to the right answer. This allows students to view themselves as problem solvers even if they don't know how to use the most conventional solution. Second, it reinforces a value of explaining one's thinking, which makes the process more explicit to the student himself, and to other students that may use that strategy.

Finally, contrastive conversations have benefits to teachers inasmuch as they help teachers understand children's thinking about the content area, and the trajectory that children's thinking follows. The more a teacher engages students in these discussions and resists the temptation to re-formulate their thinking, the more nuanced the teacher's understanding of student's thinking becomes. As this understanding deepens, teachers can improve their instructional practice by carefully inventing problems that will push children's strategic thinking, and scaffolding individual student understandings.

We have identified two broad types of challenges for teachers in conducting productive contrastive conversations. First, laying a foundation for the whole class discussion raises a number of challenges. These include cataloging students' ideas, planning who to call on, and trying to push students to explore new ways of reasoning and to externalize new strategies. Second, there are challenges associated with the contrastive conversation itself. These challenges center around issues of management—listening to students, letting the students

retain ownership of the ideas, and to some degree letting students control the direction of the conversation.

A productive contrastive conversation requires significant work. Prior to the whole class discussion the teacher supports the students to either articulate their reasoning, or think about the problem in a new way. The teacher checks in with the class to see how they as a whole are thinking about the problem and begins to plan who to call on, in what order, and how to attempt to push the conversation towards new and fertile intellectual ground. It is possible to meet these goals without spending a long amount of time with any one student. In fact, to meet the teacher's goals it is necessary to circulate around the room quickly categorizing students into recognizable strategies. This is also productive for the students as the teacher takes the opportunity to suggest new problem variations, suggest that the student compare their strategies with another student, or share an idea that may help the student see the value of the next most sophisticated strategy.

Knowing what to listen for and having a plan for how the conversation will unfold are also critical. Through the research literature or personal experience with student reasoning, teachers often find that students tend to raise a finite number of somewhat predictable ideas on a topic. For example, in a contrastive conversation around addition of whole numbers teachers find that first grade student responses fall into one of a finite class of strategies: direct modeling, counting strategies, derived fact or recall strategies (Carpenter, Fennema, and Franke, 1997). With experience, teachers quickly come to realize which strategy a student is using based on a few cues either in the way they talk about their strategy or in the ways that they graphically represent it. Moreover, teachers typically find that student explanations are not always clear, efficient or easy to follow. But drawing on their experience and knowing the principles underlying the ideas students are engaged with they will find that student ideas often follow a logical pattern.

When it is time to have the contrastive conversation with the whole class it becomes important to listen to students as they fully articulate their reasoning. One of the most significant challenges to orchestrating a successful contrastive conversation is the inclination for teachers to prematurely think they understand the student's reasoning and rephrase the strategy in such a way that it is no longer recognizable to the student. It is easy to fall into this trap, because as a teacher one must balance the need to efficiently progress through the material with the goal of having every student understand the material. While this is often warranted when working with individual students it is often problematic in the whole class discussions.

A related challenge for teachers is to not cut off the discussion after a few minutes in order to move the conversation where the teacher wants it to go or to simply end the conversation by telling the students the correct strategy. In managing the contrastive conversation there is a tradeoff between trying to involve every student in the conversation and the limited amount of time that can be devoted to slight variations of similar strategies that inevitably arise. This is why the teacher needs to have a good understanding of the range of student ideas before the whole class discussion. Typically she has observed and noted the students' various ideas when she circulated around the classroom while the students were inventing their solutions. The focus of the contrastive conversation should be centered on comparisons of strategies and the elicitation of the rationale behind why the strategy works and makes sense. This certainly requires a range of strategies to be presented on the public floor, but it does not necessarily require that every student present his or her idea. It is

important to remember that because every student has adopted some personally meaningful strategy prior to the conversation, even those who do not present their ideas will be engaged in the discussion identifying with one of the public strategies or contrasting a public strategy with their own private strategy. This sort of active listening or intent participation, although understudied, has been shown to be both common and quite effective ((Rogoff, Paradise, Mejia Arauz, Correa-Chavez, and Angelillo, 2003).

A challenge for teachers is to walk a fine line between helping students articulate their ideas and changing those ideas to such a degree that the student no longer recognizes them as her own. This means that even though it is important to have a plan for how the conversation will proceed, teachers cannot rigidly adhere to the plan. As we have stated previously one of the benefits of contrastive conversations is that students construct a personally meaningful understanding of the strategy. Part of this meaning construction entails a certain amount of ownership over their reasoning and being given the authority to invent, present, and defend their own ideas. In short, part of the way that they construct personally meaningful understandings is by being allowed to engage in knowledge production (Wells, 1999). A common and often productive move for teachers to make in any discussion is to revoice students' ideas—to make sure other students hear them, to “clean” them up to help other students understand them, or to rephrase them in academic terms or in terms of the normative ideas of the discipline (O'Connor and Michaels, 1996). However, if in cleaning up an idea the idea is changed to the degree that the student no longer feels ownership over it, part of what makes a contrastive conversation an effective learning conversation has been sacrificed for an illusionary sense of efficiency. Likewise if the teacher's revoicing of a strategy is a subtle or not so subtle endorsement of that strategy it can freeze the development of that idea or limit the degree to which students who are not yet ready for it have a chance to fully understand it. It is important to note that for us efficiency can only be gauged in terms of having every student understanding at least one effective strategy, and every student having an opportunity to advance to a more sophisticated strategy if one exists. Ironically, from the student's perspective, it is often the traditional sense of efficiency—how fast and accurate their current strategy is—that pushes students to try out and adopt new ways of thinking.

OPPORTUNITIES FOR TEACHER LEARNING

While the main benefit and rationale for engaging in either a consensus or contrastive conversation is to improve student understandings, we believe that engaging in these conversations also can provide a long term benefit to teachers as well. Consensus and contrastive conversation are both examples of what Pea (1994) termed *transformative communication*. These are conversations that are not predetermined nor scripted. Therefore, they engage the teachers in a genuine intellectual exchange with the students. Anytime one engages in such an exchange, it has the potential for all the parties, including the teacher, to be transformed by participating.

First, as mentioned earlier, these types of conversations require thoughtful planning ahead of time. This planning often is grounded in the conceptual domain and can often help the teacher to gain a deeper knowledge and understanding of the disciplinary content. A prime example of this is when the teacher would prepare for a conversation by considering

what criteria will be used to judge more sophisticated and less sophisticated ideas. Will students be held accountable to the accuracy of their strategy? Is efficiency or generalizability important? In considering these types of questions, one is in fact reflecting on the commitments and values of the disciplinary community in relation to this particular concept. Researchers have argued that students develop deeper conceptual understandings of the content and more beliefs about the discipline when classroom discourse mirrors the discourse of the professional community (Lemke, 1990). For example, in mathematics there is a premium on accurate and elegant/efficient strategies. In science there is often a commitment to causal theories that are general in nature, but that may or may not provide exact answers in any particular concrete instance where additional factors come into play (e.g. the two objects of different weights accelerate at the same speed, until wind resistance is a factor). In deciding which criteria the class will critically evaluate their own ideas against, the teacher is engaging with and perhaps coming to understand better the core ideas of the discipline which s/he is teaching.

Second, and perhaps more importantly, instructional conversations such as consensus and contrastive conversations offer a much greater potential to provide teachers with real feedback about the students' thinking. In classroom talk based on transmission models of communication—such as the IRE pattern—students don't have many opportunities to express their thinking, and teachers have very little feedback beyond the number of students who can and cannot answer correctly. As a result teachers do not have access to the ways in which students conceptualize the topic or the ways that their current thinking is coloring or distorting the intended message of the lesson.

Once engaged in the give and take of instructional conversations such as the ones discussed in this paper, one's attention is naturally drawn to the students thinking. In order to engage the student in a productive conversation, the teacher has to listen to and think about where a student is, rather than thinking about where the student should be according to the curriculum guide or someone's expectations (including one's own). This allows teachers to gather knowledge about the details of student thinking. Both during the lesson and afterwards, teachers categorize students' ideas into the known intuitions for that domain, and attempt to devise activities and probing questions that are designed to challenge the specific ways of thinking that this group of students is employing. This is a typical example of what is often called pedagogical content knowledge (Shulman, 1986). We know from the research in mathematics and science education, that teachers who know the details of their students' thinking have students who learn more about the content (diSessa, and Minstrell, 1998; Hatano, and Inagaki, 1991; Jacobs, Franke, Carpenter, Levi, and Battey, 2007).

DISCUSSION

Supporting teachers in making use of instructional conversations requires that we continue to unpack the conversations in ways that make explicit the details surrounding what constitutes the particular type of conversation, what the type of conversation can afford, and the potential limitations. We have begun that process here, building on the work of Cazden (2001) and others, to detail two types of conversations within classrooms. Although we have presented examples from across a number of disciplines, it is not yet clear the degree to which

the benefits and challenges of these two types of conversations will vary with the discipline and topic. Even so, we have laid out some guidelines to help educators choose when these two different types of conversations might be appropriate for a given topic or as a means to develop different kinds of classroom community. Additionally, we have detailed the benefits—to teachers as well as students—that are shared and unique to both contrastive and consensus conversations. To help practitioners who may be interested in engaging in one or the other of these types of instructional conversations, we have also roughly sketched out the steps to each conversation and the important roles for teachers and students. While many other types of instructional conversations offer similar potentials to engage teachers in reflecting about their own practice, students' thinking, and the big ideas of the disciplines that they are trying to teach, we hope that the ways that we have mapped out the choices, rationales, benefits and challenges of consensus and contrastive conversations will provide analytic tools for teachers to begin to engage in these types of reflections on their own.

We see this line of inquiry as both the work of research, as we continue to document and detail the benefits for teachers and students, as well as the work of practice as teachers begin to stretch our notions of what can happen in different instructional conversations. More work in this area, in both directions, is needed. We believe there is a need for research in classroom discourse to grapple with the details and consequences of different forms of classroom discourse and move beyond the broad strokes of argumentation, co-inquiry, knowledge building, and critical discussion. Of particular importance will be to empirically test the validity of the careful theoretical analyses of the type presented here. As our nuanced understanding of the different classroom discourse structures grows, so will our ability to help teachers with the practical aspects of successfully orchestrating productive instructional conversations.

As we eluded to in the beginning of this paper when we quoted Cazden (2001), understanding the details of classroom conversations also has important implications for creating more equitable learning opportunities for our increasingly diverse classrooms. Because classroom discourse is central to the learning that goes on in elementary school, it is also central to our attempts to make learning opportunities more equitable for our students. There are a number of educators who argue that too often classrooms are mono-cultural—that classroom conversations are rooted in white middle class discourse patterns (Heath, 1998; Lee, 2003; Warren and Rosebury, 1995). A better understanding of current and potential classroom discourse structures is a first step towards creating equitable opportunities for all students to learn and develop. We believe that the close attention to student thinking, which is an important aspect of both contrastive and consensus conversations, is a necessary but not sufficient component of any equitable classroom conversation. Without attending to where individual students are and what they are saying, we don't see how to create conversational opportunities that challenge students to grow into their potential.

However, attending to individual students alone is likely to lead us to overlook persistent patterns of who is learning, when, and how. Work Like Carol Lee's (2003) and Shirley Brice Heath (1998) show that for some students the existing conversational repertoires that they have already mastered do not overlap much with the structure of classroom discourse (e.g., typical patterns like the IRE, or potentially with the more reform minded patterns as presented in this paper). In these situations an important first step is to make the language game of the classroom explicit, and to help the students map their existing ways of participating onto the less familiar academic discourse. Making the language games of the classroom explicit to

students requires that we as educators understand the details and nuances of the discourse structures we employ, what opportunities they afford for student learning, and who is likely to be able to seize those opportunities.

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EXPLORING EXTENSION PROGRAMME NEEDS FOR DISABLED TRAINEES IN A NIGERIAN REHABILITATION CENTRE

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ABSTRACT

This study focused on the exploration of rehabilitation centres for disabled people, using a Nigerian rehabilitation centre at Moniya Oyo State as a case study. The trainees, instructors, principal and vice principal were engaged as respondents. The source of data was through questionnaire interviews and direct observation. The study revealed that majority (74 percent) of the trainees are adults, mostly females 52 percent, mostly Muslims and single 95 percent. Majority of them 96% are literates (at least can read and write).

The coping mechanisms employed by the trainees are training by trainers and the encouragement they share among themselves. The major needs of the trainees concern medical, psychological, special education, prevocational training and vocational training need.

The study further revealed that the trainees are not enjoying the services of extension agents. Their constraints also include lack of fund, basic equipment, materials and human resources for training, inadequate means of teaching, expert instructors, and the problem of marketing outputs. Needed agricultural extension roles in the centre include that of linking the disabled with research institutes and non-governmental organizations, as well as helping them to solve some of the problems in the areas of agriculture and vocational skills. Based on the finding of the study, it is recommended that agricultural extension agents should be sent to the centre to provide quality training which in turn will facilitate a more result oriented rehabilitation programme for disabled persons.

Keywords: Exploring, extension, programme, needs, disabled and rehabilitation.

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INTRODUCTION

Agricultural extension in Nigeria has a long history, which dates back to 1893. To a layman, extension simply means “something extended or projected”. However to a professional, the real meaning of extension is deeper. Extension education, is a voluntary out of school education programme for youths and adults. It employs teaching and learning principles that affect changes in the life of children, their parents and farmers. It is generally carried out in an atmosphere of mutual trust and respect between agricultural extension workers and their clientele.

Extension is concerned with three basic educational tasks (Williams, 1990). They are:

- (i) dissemination of useful and practical information related to agriculture and home economics
- (ii) practical application of such knowledge to help farmers and house-wives analyse their problems for possible solutions and
- (iii) assisting them in using the technical knowledge gained to solve their own problems.

Over the years, extension activities have been concentrated on the able-bodied beings/farmers. In fact, the training received by extension agents does not equip them to relate with disabled people or trainees. With the government emphasizing on equalization of opportunities for all categories of people disabilities notwithstanding, efforts should therefore be geared towards making disabled trainees in rehabilitation centres enjoy the services of extension agents.

Disability is a condition (physical, mental, vocational or social) which limits or is capable of limiting a person’s proper functioning or activities unless it is corrected (Mba, 1985). It may include deviant behaviours characterized by inability to carry out normal relationships with family and community, chronic health problems such as “candida” disorder and epilepsy and disabling defects such as poliomyelitis, diabetes mellitus as well as orthopedic malformations (Spencer and Mitchell, 1971).

The International Labour Organization (ILO, 1983), viewed a disabled person as an individual whose prospects of security, retaining and advancing in suitable employment are substantially reduced as a result of a duly recognized physical or mental impairment. This definition thus identifies the following as disable persons: the deaf and heard of hearing, visually impaired, the crippled, other health impaired and mentally retarded.

Rehabilitation efforts in Nigeria is indeed expected to be a team work aiming at restoring disabled individuals to a better condition. This team must comprise a comprehensive number of professionals which include physical and occupational therapists, social workers, orientation and mobility specialists. These specialists must be in the team to sufficiently meet diverse needs of their disabled clients. Rehabilitation is an activity designed to assist the disabled persons to shift from the position of dependency to independence, inadequacy to adequacy so that they can happily contribute their own quota to the society they belong (Abosi and Ozoji 1984).

World Book Encyclopedia (1998) sees rehabilitation as a term signifying any programme of ameliorative exercise, guidance, or instruction afforded those with a physical deformities, and of psychological or social defects. In addition, special education dictionary defined

rehabilitation as the process of helping a non-productive deviant person towards restoration of the desired standard through education or re-training which often are vocational or physical in nature. Thus, to re-establish, or restore to previous condition and set up again. This simply means that in rehabilitation process, vocational training is required to re-established new condition which had been lost or not there before. With this strategy, a disabled person can acquire skills capable of sustaining him/her to live and earn a living.

Presently, in Nigeria, disabled individuals have to some extent been deprived of their human rights – right of dignity, legal process and to work among others. Interestingly, in the developed countries, the rehabilitation process is usually complimented by other agencies/mental, health mental retardation, vocational education) which also had responsibility for the provision of services to the physically and mentally disabled.

STATEMENT OF THE PROBLEM

In spite of the fact that the Nigerian National Policy on Education (1981) provides for the training of those with physical, mental and learning defect in the educational system. This category of people have not been adequately taken care of (Theresa, 1981). There is a still general belief that the disabled people, especially those who are mental retarded or are physically deformed (who are the focus of the study) are neither trainable nor educable. Another misconception is that mental retardation is infectious. Many people believe that mental retardation is a condition that can spread from one person to another (Baroff, 1974). Also, it is misconceived that physically disabled persons are not to be associated with, since they are regarded as either outlaws or out casts.

It is evident that extension system which is a delivery system for packaging innovations for farmers (Williams, 1989) has not taken into consideration the latent and innate abilities of persons with disabilities in contributing their quota to the nation's agricultural and industrial development.

Over the years, extension activities have focused on the able-bodied farmers (not disabled ones). In fact, the training received by extension agents hardly prepare them to serve disabled persons (Olujide and Oyesola, 2000). It is rather disheartening to note that disabled trainees who are undergoing rehabilitation programme in various centres and who engage in some agricultural activities do not have access to agricultural extension services and programmes. This will assist them during their training and in the process of re-integrating them into the larger society (Olujide and Oyesola, 2000).

It could therefore be envisaged that the involvement of disabled individuals in agriculture would trigger extension in developing a comprehensive package, which would make farming a more interesting vocation for them and also to enjoy the services of extension agents in the Ministry of Agriculture and Natural Resources.

It is against this background that the following questions are posed. They are:

1. what are personal characteristics (age, gender and educational level) of the trainees in the centre?
2. what are the coping strategies employed by the trainees during training?
3. what are the needs of the trainees?

4. to what extent can extension programme be of benefit to the trainees in the centre?
5. what are some constraints militating against the trainees and their instructors?
6. what are roles expected of agricultural extension workers?

OBJECTIVES OF THE STUDY

The general objective of the study is to exploring extension programme need for disabled trainees in a Nigerian rehabilitation centre using the Moniya rehabilitation centre as a case study.

The specific objectives include:

1. identifying the personal characteristics such as age, gender, and educational level of the trainees in the centre.
2. determining the coping mechanisms employed by the trainees during their training programe.
3. identifying the needs of the trainees in the centre.
4. determining the extent of agricultural extension services required at the centre.
5. examining the constraints being encountered by the trainees and their instructors and
6. ascertaining the role of agricultural extension in rehabilitation centre.

METHODOLOGY

The Study Area

The study area is the rehabilitation centre for the disabled persons located at the Temidire village of the Moniya axis in Akinyele Local Government Area of Oyo state. It is situated on 2.5 square hectares of land. The centre is bounded by other villages such as Lapite, Ketepe, Isabiyi, Igbagbo, Akinyele and Onidundun.

The centre has eighty-six trainees; who were all engaged as subjects for the study. Also, the principal, vice principal and 10 instructors were also involved. The instrument used for the study were structured questionnaire, interviews and direct observations.

RESULTS AND DISCUSSION

Personal Characteristics of the Respondents

Table 1 shows that most of the trainees (37%) were within the ages of 21-25. Twenty six percent were between 16-20 years, 32 percent falls within 31-35 year and 3 percent were between 41-45 years old.

Table. Frequency Distribution of Personal Characteristics of Trainees

Personal Characteristics	Frequency	Percentage
i. Age	22	26.0
16-20	32	37.0
21-25	27	32.0
26-30	2	2.0
31-35	2	2.0
36-40	1	1.0
41-45		
Total	86	100.0
ii. Gender		
Male	41	48.0
Female	45	52.0
Total	865	100.0
iii. Religion		
Christianity	41	48.0
Islam	44	51.0
Traditional	1	1.0
Total	86	100.0
iv. Marital Status		
Married inmates	1	1.0
Single	82	95.0
Separated	3	4.0
Total	86	100.0
v. Educational Status		
Primary School	58	67.0
Secondary School	25	29.0
None Formal Educational	3	4.0
Total	86	100.0

Source: Field Survey, 2004.

In terms of gender, the males accounted for 48% while the females were 52%. The close range between the males and females indicated that there is no gender barrier discrimination in the enrollment of trainees into the centre. Most of the respondents were Muslims (51%), Christian 48%, and 1% of the trainees practice traditional religion. This implies that admission into the centre was not based on religion. This can be attributed to the fact that the centre is owned by government.

Majority of the respondents (95%) were single, 4% were separated and 1% were married. On an educational level, 67% of the respondents attended primary school, 29% attended secondary school, while 4% had no formal education. This implies that only a few of the trainees (4%) could not read and write while majority 96% can read and write.

Coping Mechanisms Employed by the Trainees

Respondents were diverse in their response to the subject of coping mechanisms. Some believed that since they have been taught on how to carry out the activities doing them has become part of their life. The only coping mechanism is often derived from the words of encouragement they shared among one another.

Needs of the Rehabilitees in the Center

The needs of the trainees according to their response are as follows:

1. *Proper identification and diagnosis of their disabling conditions:-* Full evaluation of the disabled persons referred to the centre to determine the extent of their disabilities and to relate their assessment to the type of work they may be fit to do.
2. Adequate provisions or services to meet their various needs such as occasional by their medical, psychological, educational and vocational requirements
 - (i) *The medical needs include:* surgical, psychiatric, hospital care/treatment and therapy when necessary to alleviate some attendant problems associated with their disabilities.
 - (ii) supply of artificial limbs and other prosthetic or orthodox devices.
 - (iii) *The Psychological needs:* providing guidance and counselling services to assist the trainees to achieve good vocational adjustment needs when they eventually take up jobs.
 - (iv) *Special Education needs:* The needs of the trainees with respect to education are as varied as the types and degrees of their disabilities. Special education should be regarded as the 'first stage' in the rehabilitation process (Mba, 1985).
 - (v) *Pre-vocational Training:* Apart from the normal general education, special schools are expected to provide pre-vocational training for disabled persons who will later be admitted to the centre. This should be patterned along with what is considered to be the most adequate future vocation for the disabled and strictly organized on individual requirements of disabled persons.
 - (vi) The rehabilitation process often begins at school. The quality of education which the disabled persons gets to a large extent, determines his vocational aspirations. According to Mba (1985) "studies have shown that most disabled school leavers do not work in vocations for which they received training at school.
 - (vii) *Vocational Training:* The attainment of adulthood in any society is equated with the achievement of self sufficiency and independence. To be self sufficient and independent, a disabled person must be successfully placed on a job. Vocational training is particularly important for disabled persons who, after completing their career in special schools are unable to engage in further academic pursuits such as attending secondary schools, polytechnics and universities. Therefore, the ultimate goal of rehabilitations is to place a disabled person in a gainful employment. For rehabilitation programme to be considered adequate, the trainees should be placed in employment which commensurates with their

abilities and training. Follow up assistance and guidance should also be provided until they are well adjusted to their jobs.

NECESSARY AGRICULTURAL EXTENSION SERVICES REQUIRED AT THE CENTRE

The study revealed that the trainees are not enjoying the services of the agricultural extension agents whose services cannot be over-emphasised in such centre. If available, extension services would provide necessary and adequate information on how to practice mechanized farming and introduce them to how they can improve their farm yields.

Extension agents would be familiar with the problems which the trainees are facing in the agricultural unit, analyse them and inform them on how to overcome them. They would serve as the link between the new innovations in farming and help them to put those innovations into practice. These services would have afforded the trainees the opportunity of having the knowledge of mechanized farming and enable them to produce in large quantities of farm produce thereby contributing their quota to the development of agricultural sector in the national economy.

Constraints Faced by the Trainees and Their Instructors

The result showed that the trainees are facing some constraints. Prominent among them is lack of adequate funding of the centre. This has led to lack of basic equipment, materials and human resources. Other constraints include lack of adequate means of teaching and training of the trainees.

Also, shortage of instructors, proper information dissemination flow required for undertaking basic functions, problems on moving from the hall of residence to classes or workshops by some crippled trainees without crouches and lack of services from the extension agents. In addition, problem of marketing of their products like leather shoes, bags, batik, dye and tie fabrics, others coupled with inavailability of potable water, stable electricity supply and accommodation space.

The constraints faced by the instructors include the site of the center. It is located at a remote outskirts of Ibadan city. They also complained of not being able to enjoy amenities they would have had it been residing in the city. They normally travel to other villages nearby before they could buy some household items which are not available in the centre. This problem could be minimized if they centre is provided with staff buses or loan or credit facilities to their own cars. The instructors complained of lack of recreational facilities in the centre. Furthermore, the instructors expressed insufficiency of teaching and training materials and lack of conducive training/learning environment. For instance, there is no library in the centre. They expressed dissatisfaction on inadequate instructors, poor sanitation condition and lack of enough computers in the computer unit of the centre.

In their opinion, the instructors in the centre should be encouraged through training and retraining relevant to acquire more knowledge in their various disciplines.

Role of Agricultural Extension in the Rehabilitation of Disabled Persons

For the disabled to benefit from new technology in agriculture, the following services of the agricultural extension should be provided. Innovative services to trainees in the centre. This could be achieved by making them to be aware and understand new ideas. There are several and various extension education methods at the disposal of the extension agents for creating necessary awareness. Mass media methods such as radio, television, bulletins and leaflets could be used generally to create awareness. Any of the above mentioned methods can be used for the disabled persons depending on their disabilities.

Agriculture extension workers are to provide linkage for disabled people needs and problems to flow to the research institute. The special needs of the disabled people must be well analysed by extension agents and brought back to research institute. For example, the special needs of the visually-impaired will be different from that of the hearing impaired, the mentally retarded different from socially maladjusted. They are to obtain feedback from disabled people about the new technology in agriculture designed for persons with disabilities. Feedback from the disabled trainees on the adaptability, durability, lost to the researchers via the extension agents is highly dispensable.

Extension workers would help the disabled persons to help themselves. This is one of the philosophy of extension work which is based on working with the farmers and not for them in fulfilling this role, the extension agents should help provide alternative solutions for the problems of disabled persons. This will enable them realize the resources at their disposal and leave the final decisions to them. They should act as facilitators of agricultural production improvement programmes. This may be achieved by trying to influence the definition of the problem objectives (goals) and strategies. The disabled people should be helped to realize the need to participate in necessary agricultural and vocational training improvement programmes.

The roles of agricultural extension agents call for a unique blend skills and attitude. They must have the competence to understand and apply technical information related to their work as well as the ability to diagnose problems and come up with possible solutions especially those associated with the disabled people. They should plan and organize extension activities and willingness to interact with others.

SUMMARY

This study focused on the exploring extension programme needs for disabled trainees in a Nigerian rehabilitation centre as a case study. The study revealed that majority of the trainees are adult mostly females 52 percent mostly muslims, and unmarried, 95 percent and majority of the trainees 96% can read and write. The coping mechanisms employed by the trainees include training by the instructors and encouragement they shared among one another. The needs of the trainees are many. They include proper identification and diagnosis of disabling conditions, assessment of the needs of the disabled person include medical, psychological, special education, pre-vocational training and, vocational training needs.

The study further revealed that the trainees are not enjoying the services of agricultural extension agents. The constraints identified by trainees include lack of fund basic equipment,

materials and human resources, inadequate means of teaching and training, instructors and information experts. There is also the problem of marketing their products such as agricultural products, leather shoes, bags, dyes and tie fabrics. Also, these instructors faced some constraints among which is the remoteness of the centre, inadequacy of training materials, conducive environment for learning, poor sanitation and insufficient instructors.

The relevance of agricultural extension services in the rehabilitation of the disabled persons is also stressed. Similarly, the roles of research institute, non-governmental and other relevant bodies in alleviating the problem of trainees were discussed. These agencies if available will help them to tailor research results towards solving some agricultural problems that are peculiar to the disabled trainees. For the disabled people to have contact with extension activities and programmes, extension agents should be drafted to rehabilitation centres for the disabled persons. Apart from the fact that extension agents would be there to educate the disabled people (with the assistance of specialist teachers) on the new-improved technology in agriculture and the extension agents will have the opportunity or privilege of interacting with them.

Farm settlements can be created for the disabled farmers as we have for the able-bodied farmers or better still get disabled farmers integrated into the present day farm settlements. This will make it easier for the extension agents to make enough contact with them as well as to monitor them adequately. The research activities should be included in programmes for the disabled persons. Modification of various agricultural tools and implements should be done to suit the disabled farmers. The training of extension agents should equip them with required skills to work with the disabled persons.

The disabled trainees are making the best out of the limited resources provided in the centre. Based on the findings of the study, the following recommendations are made:

- Agricultural extension should be extended to the trainees.
- The rehabilitation centre for disabled should be adequately funded by the federal, state, local government and non-governmental organizations
- The scope of activities in the centre must be expanded with a corresponding publicity for the public to be aware of services and products available at the centre.
- Trainees should be placed on post training and gainful employment in order to ensure that the inmates are useful to themselves and their immediate environment.
- There should be more meaningful relationships between the centre and the ministry of Agriculture in order to ensure that the trainees have access to extension services that can be provided by the extension agents from the ministry.
- Provision of specialized equipment should be done.
- Soft loans should be given to the trainees after training to enable them establish their ventures. A monitoring team should be set up to supervise the proper usage of the loan. This will go a long way in achieving objectives for engaging in rehabilitation programme.
- The environment should be made more conducive for the trainees. This can be done by providing recreational facilities within the centre to enable trainees relax, play games and engaged in other activities that will benefit them socially.

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COUNTRY CHANGES AND STUDENT LEARNING: CHINA'S ECONOMY, FAMILIES, AND CULTURAL VALUES

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ABSTRACT

Mainland China has transformed itself from a poor, equal country to a rich, unequal country with weaker family ties and more hierarchical, individualistic cultural values. These massive changes have improved many students' learning but threaten to abandon disadvantaged students.

China's rapid economic growth increased her children's learning both directly (e.g., public schools) and indirectly (e.g., health care). Students with more educational resources have more learning opportunities on which they can capitalize to learn more, while healthier students can use these resources more effectively.

However, economic reforms that facilitated corruption, favored coastal cities, and opened markets reduced equality and student learning via five inequality mechanisms: (a) less sharing among students and teachers, (b) less educational investment, (c) greater corruption, (d) poorer student discipline, and (e) diminishing marginal returns.

China's unequal economic growth was concentrated in coastal cities (e.g., Shanghai), which encouraged internal labor migration into these cities. Through migration, parents earn more to give their children more physical educational resources (e.g., books) and learning opportunities. However, labor migration worsens schooling for migrant children, increases divorces, and disrupts family ties, all of which can reduce student learning.

Meanwhile, family planning policies and programs (culminating in the one-child policy) have sharply reduced births. Smaller family size enhances learning by reducing sibling competitors for limited family resources. On the other hand, smaller families reduce the size of extended families and access to their available resources.

China's greater inequality, internal migration, and weaker family ties shifted China's cultural values to become more hierarchical and individualistic. As a result, governments, schools, and schoolmates share fewer resources with poorer students. Although China's economic growth and family planning improved student learning overall, her rising inequality, weaker social ties, and changing cultural values threaten her poorer students' learning opportunities. Possible measures to redress the harmful effects of inequality on learning include (a) a flat, refundable tax credit for each dependent child's schooling (b) random allocation of students to classes within a school, (c) mixing rich and poor students together, (d) diverse teaching duties, and (e) ending urban housing subsidies.

INTRODUCTION

In the last three decades, the People's Republic of China (henceforth "China") has transformed itself from a poor, equal nation to a rich, unequal nation. After Mao's death and the arrest of the Gang of Four, Deng Xiaoping wrestled power from Mao's successor Hua Guofeng in 1978 (Evans, 1995). Thereafter, Deng Xiaoping, Jiang Zemin, and Hu Jintao implemented many economic reforms. These included special economic zones that allowed foreign investment, foreign trade, and open markets to gradually transform and modernize China's socialist economy into a capitalist economy (Evans, 1995). Together, these reforms sharply increased China's economic growth and inequality, resulting in massive migrations into coastal cities, weaker family ties, less collectivism, and less egalitarianism. Meanwhile, social changes have reduced family ties, lowered birth rates, and altered cultural values. These massive changes have re-drawn the education landscape, improving many children's academic learning but leaving behind disadvantaged children.

ECONOMIC GROWTH

Reforms that Increased Economic Growth

Deng's reforms helped China acquire capital and advanced technology, motivate its labor force to work harder, and ignite its rapid economic growth. In contrast to Mao's attacks on capitalists, Deng embraced market approaches and encouraged foreign investment and trade to acquire valuable technology and management expertise (Hsü, 2000; MacFarquhar and Schoenhals, 2006). Deng also gradually replaced guaranteed jobs with open markets, which increased incentives to work hard and improve firm profits (Hsü, 2000).

Along with economic incentives, Deng added education incentives. The previous government's orthodox communism elevated unskilled labor and devalued education; for example, they heralded Zhang Tieshang's 1973 blank university exam in the official *People's Daily* (Gittings, 1999). In contrast, Deng's government repudiated Zhang's blank exam and reinstated the university exam system in 1977 to highlight the importance of learning and academic achievement (Evans, 1995).

Improved technology and labor productivity have grown China's real gross domestic product (GDP) per capita from \$379 to \$7,700 during 1978-2006 (US dollars, purchasing power parity [PPP], World Bank, 2007). Larger government and family budgets have improved Chinese children's learning and literacy (from 70% to 91% during 1979-2000; Meng, 2002; Wang, 1985).

Increased Government Spending

Increases in both direct and indirect government spending helped Chinese children learn more (see Figure 1). For example China's growing economy funded the 1986 Nine-year Compulsory Education Law.

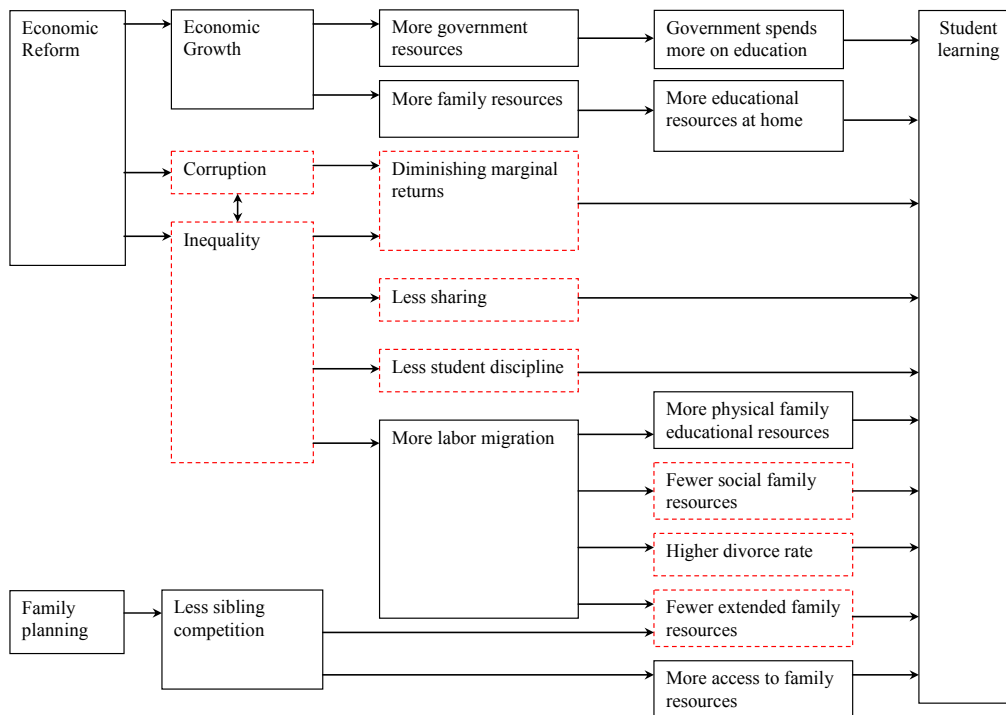


Figure 1. Effects of economic reforms and family planning on economic growth, inequality, family, and student learning. (Black, solid boxes indicate positive, overall effects on student learning. Red, dashed boxes indicate negative, overall effects on student learning).

Whereas 57 million students attended secondary school in China in 1978, 117 million did so in 2003 (CDO, 2007). Similarly, the number of students in higher education rose from 0.3 million to 11 million during 1978-2003 (CDO, 2007). When children have more educational resources and learning opportunities, they often capitalize on them to learn more (e.g., Heyneman and Loxley, 1982).

As countries become richer, their children also benefit indirectly through better health and safety standards. In richer nations, students typically eat more nutritious food, receive better health care, and attend classes in safer school buildings (Black, 1999). Thus, they are often mentally healthier, use their learning opportunities more effectively, and outperform children who are malnourished, receive inadequate medical care, or are exposed to environmental hazards (e.g., Murphy et al., 1998; Neisser, et al., 1996).

Increased Family Resources

Likewise, China's families became wealthier and more educated, so they gave their children more education resources and spent more time with them. China's poverty rate plummeted from 53% to 10% of the population during 1981-2002 (based on poverty lines of 850 or 1,200 yuan a year for rural or urban areas, respectively [about US\$102 and \$145 at 2002 exchange rates]; Chen and Ravallion, 2004). Richer parents often give their children more education resources and higher quality ones (e.g., books, computers, etc.) to help them

learn more (Chiu and McBride-Chang, 2006; Entwisle and Alexander, 1995). Unlike poor parents who work multiple jobs to pay for basic necessities, rich parents have more time to spend with their children and to teach them (Horowitz, 1995). Parents can be role models, ask provoking questions, or give explicit instructions (Pan, Perlmann, & Snow, 2000). These parent-child interactions can help children learn cognitive, social, and cultural skills (Pan, et al., 2000).

Due to China's rising literacy during 1979-2000 (Meng, 2002; Wang, 1985), modern parents are more educated and can help their children learn more (Chiu, Chow, and McBride-Chang, 2007). Compared to less educated parents, highly educated parents tend to spend more time with their children, monitor and supervise them more actively, and have more information and skills to teach them (Lareau, 1989). Furthermore, these highly educated parents have more educated people in their social network (Horvat, Weininger, and Lareau, 2003). Their educated social network likely includes more cognitive, social, and cultural resources to help their children learn more.

In short, China's rapid economic growth increased the budgets of both government and families, so they spent more on educational resources, which likely increased student learning and literacy rates. More educated parents and a more educated social network also added educational resources to improve children's learning.

INEQUALITY

Economic Reforms that Reduced or Raised Inequality

Some of China's reforms grew the economy and increased equality. Privatizing agriculture (1978-1985) and letting food prices approach market rates (1995-1998) spurred the highest average household income growth in China's history and also increased equality (Keng, 2004; Chen & Ravallion, 2004). Rural and agricultural growth also increased trade within China, reduced money transfers from cities to rural areas, and reduced poor people's migration into cities (Ravallion & Chen, 2004). These, in turn, reduced urban poverty, rural poverty and three types of inequality (within rural areas, within cities, and between urban and rural areas; Chen & Ravallion, 2004). Keeping inflation low and maintaining economic stability helped poor people's incomes keep their real value, which would otherwise plummet with sharp price rises (Pillai, 2004; Chen & Ravallion, 2004). Meanwhile, expansion of foreign trade increased growth, with little effect on poverty or equality (Ravallion & Chen, 2004).

In contrast, economic reforms that facilitated corruption, favored coastal areas, opened markets, and favored urban residents reduced equality. Government reforms created many opportunities for corruption (Satō, 2006). Government officials (or their cronies) took money, used inside information to choose the best public assets, created monopolies through government rules that hindered competing firms, and so on (Zhao, 2001). Meanwhile, central and provincial government policies that favored coastal areas raised regional inequality between coastal and inland provinces from 57% to 71% during 1978-2000 (Keng, 2004; Ravallion & Jalan, 1999). For example, China created special economic zones (Park, 1997) and supported specific industries through tax subsidies, loans, and favorable laws (Knight &

Song, 2001). Furthermore, open markets and rapid growth in coastal cities created shortages of workers (especially educated workers) who were then paid much more than their inland or rural peers (Knight, Li, & Zhao, 2001). Economic reforms also favored city residents. For example, subsidized city housing still persists for government employees. These housing subsidies further exacerbated the urban-rural gap (mean urban income exceeded mean rural income by 70% in 2001; Wang, 2001). Together, these factors increased rural inequality from 25 to 37 (as measured by the Gini index) and urban inequality from 18 to 33 during 1981-2001 (Chen & Ravallion, 2004). Overall inequality rose from 25 to 46 during 1980-2006 (World Bank, 2007). As China's economic equality fell, its egalitarianism cultural values also fell (EVSG & WVS, 2006).

Inequality Mechanisms that Hinder Learning

Greater inequality tends to reduce student learning due to several mechanisms: (a) less sharing, (b) less educational investment, (c) corruption, (d) poorer student discipline, and (e) diminishing marginal returns (Chiu, in press). As China becomes less equal, her citizens tend to view one another as less similar, feel less solidarity, and trust one another less (less *homophily*, McPherson, Smith-Lovin, & Cook, 2001; EVSG & WVS, 2006). Thus, students and teachers are less likely to befriend one another, share resources, or help one another academically, so students often learn less (Chiu & Khoo, 2005).

Second, China's greater inequality increases the influence of the elite, who might reduce public educational expenditures. As the rich elite have many more books and other resources at home than others, their children need fewer resources at school (Chiu, in press). As a result, they might advocate fewer public school resources and greater self-financed schooling (Chiu, in press). In school systems with substantial self-financing, poorer families cannot afford adequate educational resources for their children, so overall educational investment is often lower (Benabou, 1996). As noted earlier, students with fewer educational resources often have fewer learning opportunities and learn less (Baker, Goesling, & Letendre, 2002). Indeed, China's public spending on education has dropped from 2.2% to 1.9% of GDP during 1991-2001, though thus far it remains 13% of the government budget (UNDP, 2007).

Third, China's weaker social solidarity and falling trust (EVSG & WVS, 2006) worsens corruption (Uslaner, 2004). As people feel less connected to one another and identify less with one another, the social barriers against self-gain at the expense of others weaken, thereby facilitating corruption (Uslaner, 2004). Greater school corruption siphons off more educational resources from students, which often reduces their learning (Baker et al., 2002). Corruption can also reallocate more educational resources within the school system to the rich elite at the expense of the poor (Uslaner, 2004), further exacerbating inequality within or across schools (Chiu & Khoo, 2005).

Fourth, like other countries, higher crime rates accompanied China's greater inequality (Liu, 2005; Wilkinson, 2004). For each 100,000 people in China during 1978-1999, murders increased from 0.9 to 2.2, and grand larceny skyrocketed from 0.6 to 52.4 (Liu, 2005). Furthermore, teenagers generally commit disproportionately more economic and violent crimes (Freeman, 1995; Mocan & Rees, 2005). Greater crime yields poorer student discipline, distracts student attention away from academic study, and reduces student learning (DeBaryshe, Patterson & Capaldi, 1993).

Lastly, inequality lowers student learning due to diminishing marginal returns (Chiu, in press). Consider a thirsty woman and two glasses of water. She greatly values the first glass of water and drinks it all. Her thirst quenched, she does not finish the second glass of water, showing its lower value (diminishing marginal returns, Mankiw, 2004, p. 273). In general, rich students have more educational resources than poor students do. Hence, poorer students typically benefit more from an extra book than richer students do. With greater inequality, poorer students who use resources more efficiently get fewer resources and learn substantially less. As a result, net learning effectiveness and overall learning is lower in less equal societies (Chiu & Khoo, 2005). As China shifts from a socialist, egalitarian agenda to a liberal, competitive model, local school control and local funding also increase, further exacerbating differences in geographical educational opportunities. Thus, inequalities and inefficiencies will likely rise as disparities between poor, rural, inland schools and wealthy, urban, coastline schools rise.

In sum, some economic reforms improve economic equality, but others reduce it. Overall, economic inequality in China has increased over the last three decades, reducing egalitarianism cultural values and likely yielding negative effects on student learning. Inequality can reduce learning through less sharing among students and teachers, fewer educational resources due to corruption, poorer student discipline, and diminishing marginal returns.

LABOR MIGRATION

Facing economic inequality between inland, rural areas and coastal cities, people moved for higher paying jobs, which hindered migrant children's schooling and weakened family ties that supported children's learning. Government policies that favored coastal provinces, especially cities (e.g., special economic zones, Park, 1997), increased their mean wages far above those in other areas, creating strong economic incentives for people to move for higher paying jobs (Knight, Li, & Zhao, 2001). By 2006, 200 million people left their homes to find work elsewhere; over 24 million left their province (Huang & Pieke, 2003; Xinhua, 2006). These labor migrations yielded large remittances; the average migrant mailed over 4000 RMB back home in 1999, and likely brought home an equal amount during the Lunar New Year or the Autumn Harvest (Huang, 1997).

Worse Schooling for Migrant Children

In China, many migrant children suffered from worse schooling and learned less than their peers. According to articles 8 and 12 of the 1986 *Compulsory Education Law*, local governments receive funding from central authorities and must use their budgets to provide education only for registered residents of their locality. Migrant children can go to a public school if they pay a temporary schooling fee (*Jiedufei*). However, many migrant parents cannot pay these fees, so about 20% of the 20 million migrant children in 2003 did not attend public school (Xin Jing Bao, 2004). Migrant parents who cannot afford the *Jiedufei* might send their children to poorly-equipped private schools for migrant children (*Mingong Zidi*

Xuexiao). Still, some parents cannot afford these school fees either. In 2006, 10% of primary school-age, migrant children, and 80% of middle school-age migrant children did not attend school (Xia, 2006).

China took a step toward improving schooling for migrant children by passing the 2006 *Compulsory Education Law*. Article 12 of the 2006 *Compulsory Education Law* states that local governments provide migrant children "equal conditions for receiving compulsory education." However, the law gives wide leeway to local governments; "the concrete measures shall be formulated by the provinces, autonomous regions and municipalities directly under the Central Government." Due to the modest tone of this legislation, local governments have done little to implement Article 12 (Xia, 2006).

Migration Weakens Family Ties

Migration weakens ties within both the nuclear family (parents, siblings) and the extended family (grandparents, aunts, uncles, cousins). By moving away from their children to get better jobs, parents earn more to give their children more physical educational resources (e.g., books) and more learning opportunities (Chiu & Zeng, in press). However, parents who live away from their children often have fewer interactions with them and give them fewer social learning opportunities, both of which typically reduce children's learning (Chiu, 2007; Putnam, 2000).

Moreover, migration increases divorce rates at both the individual and community levels. Individuals who live away from home for more years have weaker ties to their spouses and home communities, and hence are more likely to divorce (Frank & Wildsmith, 2005). People who live in communities with higher residential mobility know more divorced people and are also more likely to get divorced (Shelton, 1987). As China's migration increased during 1985-2005, its official divorce rate for all marriages rose from 6% to 22% (NBSPRC, 2007). Children of divorced parents have fewer educational resources at home, fewer learning opportunities, and often learn less (Cherlin et al., 1991).

As family members live further apart from one another, their relationships often weaken, as shown through fewer phone calls and fewer meetings (Georgas et al., 2001). In China, migrants living further from their home villages send less money home (Huang & Pieke, 2003). As extended family members live farther away, a child is less likely to benefit from their physical and social resources (Bengston, 2001; DeLeire & Kalil, 2002). Likewise, inamicable divorces cut off a child from the resources of the estranged spouse's extended family members. A child living with single parents who receives fewer resources from extended family members often learns less than other students and is less likely to complete high school (Aquilino, 1996; Chiu, in press).

Hence, economic inequality increases labor migration, which hinders schooling for migrant children, reduces parent-child interactions, raises divorce rates, and weakens immediate and extended family ties. All of these tend to reduce children's family resources, learning opportunities, and academic achievement.

Reduced Births Improve Learning but Weaken Extended Family Ties

China's family planning policies and programs have reduced both births and the number of siblings per child, yielding more learning but weaker family ties. Since its birth in 1949, China has sought to slow its fast-growing population, which grew from 0.6 billion to 1.0 billion during 1953-1982 (Scharping, 2003). Beginning in the mid-1950s, the Chinese government launched many family planning campaigns and programs, culminating in the stringent one-child birth-control policy (publicly announced in 1979; Merli & Smith, 2002). As a result of these policies, the average number of children per woman dropped from 5.4 to 1.7 during 1971-2004 (Scharping, 2003; Hasketh, Li, & Zhu, 2005).

A child with fewer siblings learns more (Steelman, Powell, Werum, & Carter, 2002). Sibling competition for parents' physical and social resources reduces the effective available resources for each child, yielding fewer learning opportunities (Downey, 2001). With fewer siblings to dilute family resources, a child born recently likely learns more than did those born in earlier decades.

However, a child with fewer siblings also has proportionately fewer close relatives and more distant relatives, effectively yielding more distant extended families. As people feel greater emotional distance with more distant relatives, they tend to feel more distant from their extended family overall, and have less collectivist values (Georgas et al., 2001). Thus, China's family planning programs have yielded children with fewer siblings who face less competition for immediate family resources, but these children's children have fewer adult relatives whom they can ask for help. As a result, future children might have fewer educational resources and fewer learning opportunities, yielding less learning.

Changing Cultural Values Increase Importance of Immediate Family

As noted above, China's increasing economic inequality, greater migration, rising divorce rate, and falling birth rate have shifted her cultural values. Her values have become less egalitarian and collectivist, and more hierarchical and individualistic. As cultural values become less egalitarian, government and school practices are less likely to promote close relationships among students (Pong, Dronkers, & Hampden-Thompson, 2003). With less government, school, or schoolmate support, poorer or weaker students learn less, reducing overall learning (Chiu, in press). As China becomes more hierarchical, teachers and students also focus more on status differences, feel less social solidarity, and share fewer physical, social, or informational resources with one another, resulting in less learning (Cohen, 1994).

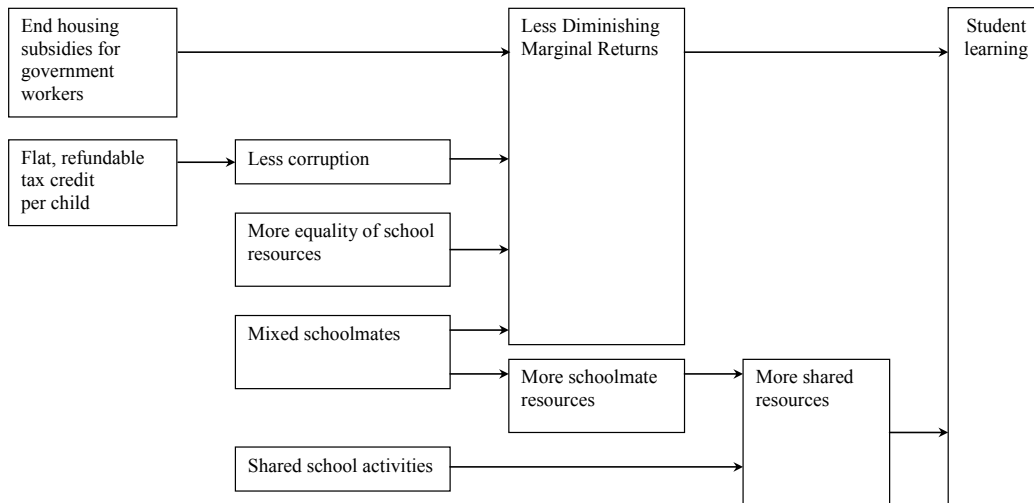


Figure 2. Proposals for reducing inequality and increasing student learning.

As China becomes more individualist, her citizens tend to rely more on themselves or their immediate family, and less on others such as extended family members (who are often physically or emotionally distant; Hofstede, 2003). Thus, a child is less likely to benefit from the resources of extended families in individualistic countries (Georgas et al., 2001). With fewer extended family resources diluting the effects of immediate family resources on children's learning (Chiu, 2007), the impact of the immediate family on learning will likely increase in China.

IMPLICATIONS

While maintaining its economic growth and expanding educational opportunity, China can take several steps toward addressing its inequalities (see Figure 2). These can include (a) equal educational resources for each student, (b) improving relationships among students and teachers, and (c) ending housing subsidies for city dwellers.

Equal Educational Resources

China can devote equal educational resources for each student through direct funding of each student, integration of richer and poor students within the same classes, and equal allocation of resources within a school. China's central government can reduce corruption and inequality by giving a flat, refundable tax credit to each family equal to their child(ren)'s public schooling funding (Hoxby, 2001). As a school must collect students' tuition, its administrative costs would rise. However, a tax credit would sharply reduce the corruption at each layer of government that leeches much of the money away from students (13% of the national budget devoted to education, UNDP, 2007). Negotiations between parent groups and school officials might cause short-term delays in children's schooling, but can yield long-term

benefits such as better schools, principals, teachers, books, and so on. Furthermore, each student would receive the same level of funding from central government revenues, which does not distort tax revenues unlike local mechanisms for funding schools (Hoxby, 2001). Also, migrant children would have the same school funds as other children. In poorer areas, the same tax credit would yield higher purchasing power and reduce regional inequality (Taylor & Taylor, 2004).

Schools can also reduce educational inequality by allocating students, teachers and physical resources more equally and more transparently (Chiu & Walker, 2007). To prevent clustering of richer and smarter students in the same classes, principals can assign students to classes according to sorting of students' given names (rather than by ability). This assignment of students fosters diverse friendships, sharing of resources across economic strata, and flattens the students' status hierarchy (Goldsmith, 2004; Oakes, 1990). Mixing rich and poor students together also hinders targeting of resources toward richer students, which hinders corruption within a school (Chiu & Khoo, 2005).

Improve Relationships among Students and Teachers

Greater social solidarity among students and teachers can counter-act the impact of societal inequality and improve relationships among students and teachers. Each teacher can be assigned to a variety of grade levels and subjects. This allocation of teachers reduces the likelihood that the best teachers only teach the highest ability students in the highest grades (Darling-Hammond & Post, 2000). By teaching multiple grades, teachers instruct the same students in different classes across different years. Thus, teachers have fewer students under their charge over time and can devote more time to each student, yielding closer teacher-student relationships (Darling-Hammond, 1997). For example, a teacher in China teaching four 9th grade classes of 50 students over two years would have 400 students. In contrast, a teacher teaching two 9th and two 10th grade classes of 50 students over two years could teach only 200 different students. Similarly, joint activities among students with suitable teacher guidance (e.g., cooperative learning during class, extra-curricular teams, etc.) increase student contact with one another which can help foster a culture of cooperation (Gutierrez, Baquedano-Lopez, Alvarez, & Chiu, 1999).

Schools in large cities with extensive public transportation systems (e.g., Beijing) can mix rich and poor students together in the same schools with minimal travel time. As rich and poor students attend the same classes, they are more likely to build friendships across economic strata, share different resources and experiences, and learn more overall (Chiu & Khoo, 2005).

End Housing Subsidies

Lastly, ending housing subsidies for city dwellers would promote market growth and reduce inequality. Government reforms have reduced housing subsidies to city residents, but all government employees still receive free housing (28% of all employees in 2006; Cheng, 2007; Gong & Li, 2003). Privatizing government employee housing would likely increase

industrial growth in the real estate sector, as suggested by the results of housing reforms in 13 socialist countries (Buckley & Tsenkova, 2001).

Gradual elimination of this free housing would reduce inequality, especially as higher level administrators receive superior housing (Gong & Li, 2003). As government employees' wages exceed the median wage, studies show that they can afford to pay for their own housing (Duda, Zhang, & Dong, 2005; Gong & Li, 2003).

CONCLUSION

China's economic growth and family planning improved student learning overall, but rising inequality threatens the learning opportunities of her poorer students. Rapid economic growth increased both government and family budgets, allowing them to spend more on educational resources that likely increased student learning. Also, China's reduced birth rate reduced sibling competition for family resources, which also likely increased student learning at the expense of weaker family ties.

However, China's economic reforms also increased economic inequality, which can reduce the learning opportunities of poor students. Family and school inequality can reduce learning through less sharing, less educational investment, more corruption, poorer student discipline, and diminishing marginal returns. Inequality can also reduce learning through increased labor migration and weakened family ties. As these changes have shifted China's cultural values to become more hierarchical and individualistic, they discourage government, school, schoolmate, or extended family support for poorer students. Together, these changes threaten the educational opportunities for poorer children in China, which could reduce overall academic achievement, and undermine China's future economic growth and political stability. In addition to maintaining stable economic growth and expanding educational opportunities, China can address the harmful effects of inequality on learning by (a) giving parents a flat, refundable tax credit for each dependent child's schooling, (b) random allocation of students to classes within a school, (c) mixing rich and poor students together in the same schools and classes, (d) assigning each teacher to multiple grade levels and subjects, and (d) ending housing subsidies in cities.

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THE EFFECTIVENESS OF SCHOOL BASED INTERVENTIONS IN PROMOTING PHYSICAL ACTIVITY AND FITNESS AMONG CHILDREN AND YOUTH: A SYSTEMATIC REVIEW

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ABSTRACT

Objective : The purpose of this systematic review is to summarize the evidence of the effectiveness of school-based interventions in promoting physical activity and fitness in children and adolescents.

Methods : Databases searched included MEDLINE, CINAHL, PsycInfo, Sociological Abstracts, SportDiscus, Dissertation Abstracts, ERIC, and EMBASE from 1985 to July 2007. Search terms included school, physical activity, exercise, physical fitness, physical education, effectiveness, efficacy, evaluation, outcome, impact, and evidence. Search results were further limited to children and adolescents aged 6-18 years. The reference lists of relevant articles were reviewed for additional articles. Standardized tools were used by two independent reviewers to rate each study for relevance, methodological quality, and data extraction. Where discrepancies existed discussion occurred until consensus was reached.

Results : 41,506 titles were identified and screened and 283 articles were retrieved. Multiple publications on the same project were combined and counted as one project, resulting in 170 distinct project accounts (studies). Of the 170 studies 104 were deemed relevant and of those, 4 were assessed as having strong methodological quality, 22 were of moderate quality and 78 were considered weak. In total 26 individual studies were included in the review. There is good evidence that school-based physical activity interventions are effective in increasing duration of physical activity and VO^2 Max, and reducing blood cholesterol and time spent watching television. However the evidence suggests school-based interventions are not effective in increasing the percentage of children and adolescents who are physically active, or in reducing systolic and diastolic blood pressure, BMI, and pulse rate. At a minimum, printed educational materials and changes to the school curriculum that result in increases in physical activity were shown to be effective strategies.

Conclusion : Given that there are no harmful effects and that there was evidence of positive effects on some lifestyle behaviours and physical health status measures, ongoing physical activity promotion in schools is recommended at this time.

Furthermore, it is likely that many health status indicators are inappropriate measures of the effectiveness of school-based interventions. The variability in these findings may be indicative of the limitations and difficulties inherent in doing community-based research where randomization to treatment groups, blind assessment, and co-intervention are difficult to control. Additional research is needed to evaluate the long term impact of these interventions.

BACKGROUND

Introduction

International public health and health promotion organizations have identified the health risks across the lifespan associated with physical inactivity. The World Health Organization (WHO) estimates that 1.9 million deaths throughout the world are attributable to physical inactivity [World Health Organization, 2004a]. Globally, physical inactivity is estimated to cause 10-16% of cases each of breast cancer, colon, and rectal cancers as well as type 2 diabetes, and 22% of coronary heart disease and the burden of these and other chronic diseases has rapidly increased in recent decades [World Health Organization, 2004a]. Recognizing the unique opportunity that exists to formulate and implement an effective strategy to substantially reduce deaths and disease burden worldwide by improving diet and promoting physical activity, WHO adopted, in May 2004, the "Global Strategy on Diet, Physical Activity and Health".

The promotion of physical activity is an essential public health and health promotion strategy to improve health of individuals and populations [World Health Organization, 2004a]. To ensure sustained progress towards major improvements in population health goals, including those related to chronic disease prevention, [World Health Organization, 2004a] called on public health organizations within and between countries to work collaboratively with key partners, including education and health professional bodies, educational institutions, consumer groups, the research community, and the private sector, in providing a comprehensive strategy to promote physical activity among children and youth. The WHO specifically identified schools as a target setting for the promotion of physical activity among children and youth. To this end, activities include the provision of collaboration on the development of health-related curricula; educational policy and guideline development; professional development opportunities for educators and other partners; and research, evaluation, and knowledge exchange to facilitate the development of evidence-informed policies, programs, and practices.

This systematic review will contribute to this evidence-base and provide directions for promoting physical activity and fitness in children and adolescents within the school system. The purpose of this systematic review is to summarize the evidence on the effectiveness of school-based interventions in promoting physical activity and fitness in children and adolescents aged 6 to 18 years. A summary of the magnitude and impact of physical inactivity among children and youth is followed by a systematic evaluation of the impact of multi-faceted school-based interventions on indicators of fitness and physical activity, as well as on various biological measures and lifestyle behaviors. This review includes evaluations of studies published from 1985 to the July 2007.

Magnitude of the Problem

Physical inactivity is one of the leading causes of the major chronic diseases, including cardiovascular disease, type 2 diabetes, osteoporosis, and certain cancers, and largely contributes to the burden of disease, death, and disability in developing and developed countries [World Health Organization, 2004a]. It has been identified as a serious problem and major public health concern for people of all ages [U.S. Surgeon General, 1996]. In fact, physical activity has been called "today's best buy in public health" [Morris, 1994] as it has been estimated that significant savings in health care could result from a mere 10% increase in physical activity population wide [Canadian Fitness and Lifestyle Research Institute, 1997; Katzmarzyk and Janssen, 2004; Katzmarzyk et al., 2000]. Yet, according to the latest international Health Behaviour in School-aged Children (HBSC) study, two-thirds of all young people report participating in sufficient physical activity to meet guidelines [World Health Organization, 2004b]. These guidelines suggest that children should engage in 60 minutes or more of active play at least 5 days per week [World Health Organization, 2004b]. The guidelines also recommend that adolescents should engage in three or more sessions per week of activities that last 20 minutes or more at a time, that require moderate to vigorous levels of exertion.

Examples of moderate to vigorous activities include brisk walking, jogging, stair climbing, basketball, racquet sports, soccer, dance, swimming laps, skating, strength training, lawn mowing, strenuous housework, cross country skiing, and cycling. The available research suggests that the best primary strategy for improving the long-term health of children and adolescents through exercise may be creating a lifestyle pattern of regular physical activity that will carry over to the adult years [Freedson and Rowland, 1992]. This implies that it is of primary importance to identify approaches that will be effective in increasing activity levels of children.

International surveys of youth physical activity [Cale and Almond, 1992; Kannas et al., 1992; Marella et al., 1992; Pyke, 1987; World Health Organization, 2004b], including reports published in Canada [Canadian Fitness and Lifestyle Research Institute, 1997; Canadian Fitness and Lifestyle Research Institute, 2007], highlight the epidemic of physical inactivity among children. Despite many methodological differences, these surveys have consistently reported that fewer than 50% of boys and girls are active enough to produce health benefits, that a considerably smaller proportion of girls than boys are sufficiently active, and that participation in physical activity declines with age during adolescence [Adams et al., 1995; Centers for Disease Control, 1997; Centers for Disease Control, 1999; World Health Organization, 2004b]. It is not clear, however, at what age the decline begins and if the rate of decline is linear [Stone et al., 1998; Sallis et al., 2000] and is greater in girls than boys [World Health Organization, 2004b].

These data are alarming for several reasons: a) changes in risk-related behaviors (e.g., increasing physical inactivity) may modify risk factors for chronic diseases such as hypertension or raised blood lipids among children [Arbeit et al., 1992; Gutin et al., 1997; Hagberg et al., 1983; Hansen et al., 1991; Harrell et al., 1996; Killen et al., 1989; Ball and McCargar, 2003; Walter et al., 1988]; b) physical activity patterns track from childhood into adulthood [Dennison et al., 1988; Kelder et al., 1994; Klepp et al., 1993; Malina, 1996; Raitakari et al., 1994; Sallis et al., 1992; Malina, 2001]; c) physical inactivity among adults is implicated in several chronic and debilitating diseases, including cardiovascular disease,

colon cancer, and diabetes [Powell and Blair, 1993]; d) children are increasingly exhibiting risk factors for cardiovascular disease, such as obesity [Hill and Trowbridge, 1998; Moran, 1999; Schonfeld-Warden and Warden, 1997; Troiano et al., 1995], elevated blood lipids [Lee et al., 1986], and hypertension [Fernandes and McCrindle, 2000], conditions which are known to track into adulthood [Kemper et al., 1990; Lauer et al., 1989; Mahoney et al., 1991; Nicklas et al., 1995; Porkka et al., 1991; Power et al., 1997; Shear et al., 1986; Webber et al., 1983; Webber et al., 1991; Whitaker et al., 1997]; and e) atherosclerotic fatty streaks in the coronary arteries, which are indicative of coronary heart disease, have been found post-mortem in children [Berenson et al., 1992].

Determinants of Physical Activity among Children

Lindquist et al. [Lindquist et al., 1999] basing their work on Kohl and Hobbs [Kohl and Hobbs, 1998], provided a typology for understanding the multitude of factors which may influence children's physical activity patterns. This classification considers determinants at four levels: physiological, psychological, sociocultural, and ecological.

Physiological determinants of physical activity among children and youth include age, gender, and ethnicity [Lindquist et al., 1999; Gottlieb and Chen, 1985; Pate et al., 1994b; Reynolds et al., 1990; Sallis et al., 1993; Sallis et al., 2000]. Specifically, girls have been found to be less active than boys, older children and adolescents less active than younger children, and black girls less active than white girls [Adams et al., 1995; Centers for Disease Control, 1997; Kelder et al., 1995; Robinson and Killen, 1995; Zakarian et al., 1994]. *Psychological determinants* of physical activity include confidence in one's ability to engage in exercise (self-efficacy) [Dishman et al., 2004], perception of physical or sport competence [Sallis et al., 2000], having a positive attitude toward physical activity [Trost et al., 1997], enjoyment of physical activity [Dishman et al., 2005] and, perceiving benefits from engaging in physical activity [Zakarian et al., 1994; Ferguson et al., 1989; Tappe et al., 1990]. Conversely, perceived barriers to physical activity, such as lack of time or feeling tired, are negatively associated with physical activity among youth [Zakarian et al., 1994; Tappe et al., 1990]. *Sociocultural influences* include support for and participation in physical activity of peers and siblings [Sallis et al., 1988], parental level of physical activity [Freedson and Rowland, 1992; Sallis et al., 1992; Gottlieb and Chen, 1985; Reynolds et al., 1990; Zakarian et al., 1994; Sallis et al., 1988; Andersen and Wold, 1992; Biddle and Armstrong, 1992; Butcher, 1985; Garcia et al., 1995; McMurray et al., 1993; Moore et al., 1991; Poest, 1989; Stucky-Ropp and DiLorenzo, 1993] parental support [Sallis et al., 2000], and parental income. *Ecological determinants* of physical activity include access to play spaces, facilities, availability of equipment [Stucky-Ropp and DiLorenzo, 1993], and transportation to activities or programs [Sallis et al., 1992]. In addition, time spent outdoors in the early years is positively correlated with physical activity levels among children [Sallis et al., 1993].

Settings for Promoting Physical Activity in Children and Adolescents

The school setting is an ideal environment for population-based physical activity interventions. It provides benefit to children from all risk groups [Harrell et al., 1996; World

Health Organization, 2004a], particularly those with limited or no access to play areas [McKenzie et al., 1996]; and avoids stigmatization of at-risk children [Harrell et al., 1998]. However, it is not clear what is the most effective strategy to promote life-long healthy lifestyle behaviors. Although most schools require physical education (PE) as part of their curriculum, PE classes may occur infrequently and children are often relatively inactive in them [McKenzie et al., 1995; Simons-Morton et al., 1990; Simons-Morton et al., 1994]. Increasing the frequency and duration of physical education is not always feasible given competing curriculum demands. It is thus essential to promote physical activity throughout the school day during class, lunch times, and recess, and to develop strategies to promote more efficient use of physical education class time.

Review Question and Objectives

The purpose of this systematic review was to assess, analyze, and draw conclusions about the effectiveness of school-based interventions in promoting physical activity and fitness in school-attending children and adolescents aged 6 to 18 years. The specific objectives were:

- To evaluate the effects of school-based interventions on promoting physical activity and fitness in children and adolescents.
- To evaluate the effects of school-based interventions on improving measures of physical health status.
- To determine if certain combinations and/or components of school-based interventions are more effective than others in promoting physical activity and fitness in this target population.

METHODS

Search Strategy

The search strategy, which followed guidelines set out by the Cochrane Collaboration for conducting systematic reviews, was developed to be inclusive and rigorous [Mulrow and Oxman, 1997]. The retrieval of studies included searches of the following databases: MEDLINE, CINAHL, PsychInfo, Sociological Abstracts, SportDiscus, Dissertation Abstracts, ERIC, and EMBASE from 1985 to July 2007. Search terms included school, physical activity, exercise, physical fitness, physical education, effectiveness, efficacy, evaluation, outcome, impact, and evidence. Searches were further limited to children and youth aged 6-18 years. In addition, reference lists of all relevant articles and background papers were reviewed for potentially relevant studies. In addition, the reference lists of several Cochrane reviews evaluating obesity prevention, physical activity promotion, or healthy body weight promotion were reviewed for potentially relevant primary studies. When warranted, the primary author of included studies was contacted for additional information.

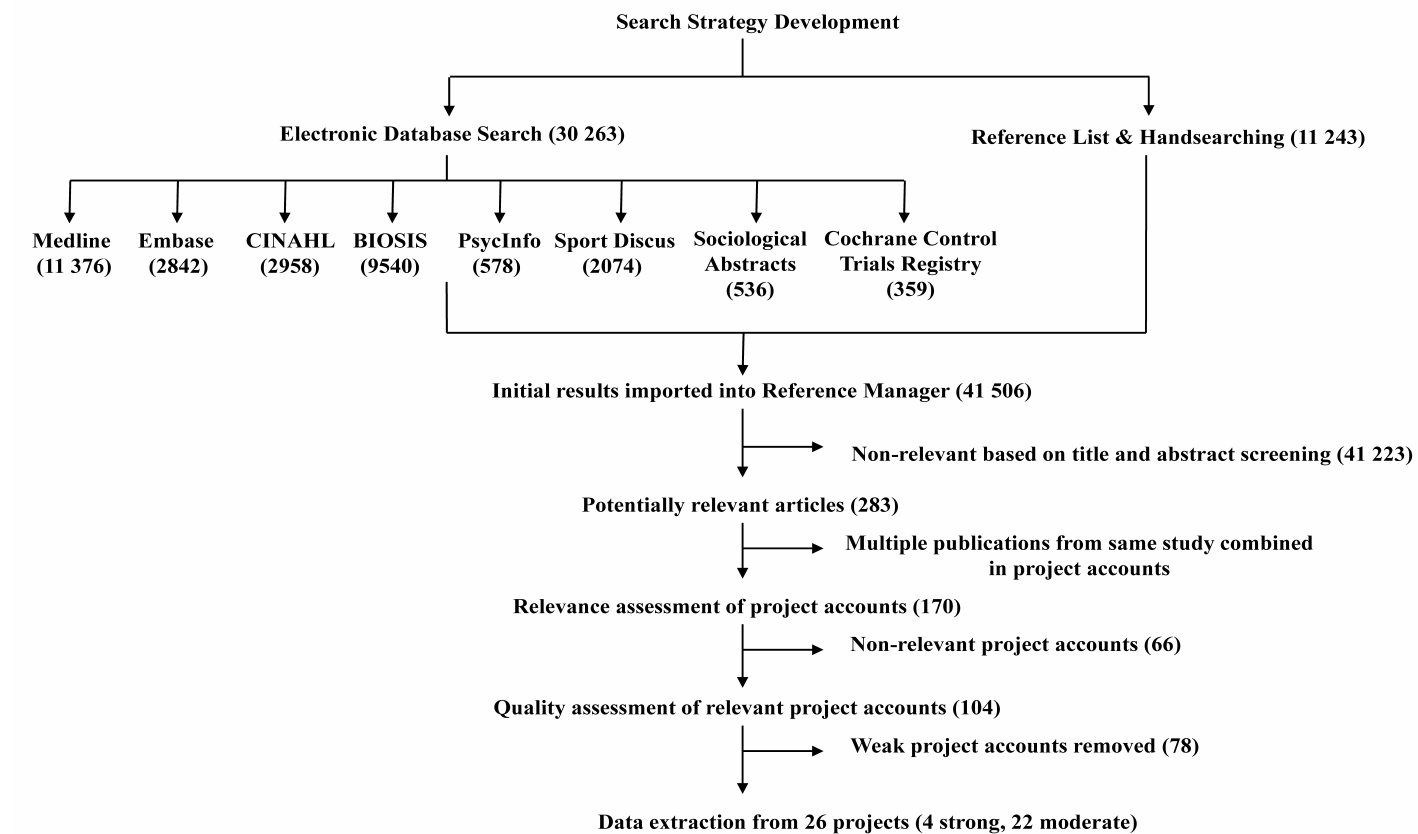


Figure 1. Physical Activity Review – Overview of Process.

Review Process

The review process is depicted in Figure 1. The review team was composed of a health services researcher (MD), a project coordinator (KD), program manager (HH), and research assistants (DT, PR) from an academic research centre. The review team was involved in all aspects of the review process, including screening the results from the database searches, carrying out relevance and quality assessment, data extraction, and reviewing drafts and the final report. Standardized tools were used by two reviewers to independently rate each study for relevance, methodological quality, and to conduct data extraction. Where multiple publications for the same study existed, a project account was created and relevant data extracted from all articles. A list of all projects and project accounts and additional publications for those accounts is included in Appendix 6.

Relevance Assessment

The abstracts from all search strategies were imported into Reference Manager and screened independently by PR and KD. Project accounts (studies) judged as being potentially relevant were retrieved in their entirety and assessed for relevance independently by two reviewers (PR, KD, MD) using a previously developed and tested tool. Where disagreement occurred, discussion ensued until consensus was achieved. Relevance criteria included: a) an intervention relevant to public health practice was described; b) the intervention could be implemented, facilitated, or promoted by staff in local public health units; c) the intervention was implemented in a school setting and was aimed at increasing physical activity and fitness in children and adolescents; d) outcomes were reported for children and adolescents (aged 6-18 years); and e) the study design was prospective and included a control group (See Relevance Tool in Appendix 1). A study had to meet all criteria to be included in the review. Those studies that were deemed relevant were then assessed for methodological quality.

Quality Assessment: Validity Criteria

A standardized quality assessment tool was used to assess the methodological rigor of the relevant studies (Appendix 2). All studies were assessed by two reviewers (PR, MD) independently. Disagreements were resolved through discussion. The six criteria used to assess methodological quality included: a) selection bias (the extent to which study participants were representative of the target population); b) study design; c) control of confounders; d) blinding (whether outcome assessors, intervention providers and participants were aware of the research question); e) data collection methods; and f) withdrawals and drop outs.

Each criterion, worth one point each, was given equal weight in the overall assessment score and then summed to obtain an overall score for each study (Table 1). Studies with at least four criteria rated as “strong” and with no criteria rated as “weak,” were given an overall rating of “strong.” Those studies receiving less than four “strong” ratings and only one “weak” rating were given an overall rating of “moderate”, and those studies with two or more criteria rated as “weak” were given an overall study rating of “weak.” All studies judged as

being of weak methodological quality were removed from further evaluation in this review, as the methodological flaws of those studies drew into question the validity of the results. A list of the excluded weak studies is included in Appendix 5.

Data Extraction

Data extraction was conducted on strong and moderate studies using a previously developed tool (Appendix 3). Two reviewers, MD, PR, independently extracted data from each study. All discrepancies were resolved through discussion. Extracted data included year and country of study, research design, sample, intervention (descriptors, theoretical framework, provider, setting, target group, target group size, consumer involvement), intervention duration and frequency, and length of follow-up. Specific outcomes assessed in this review included: physical activity (% of sample engaged in moderate to vigorous activity [MVPA]); physical activity (time spent engaged in MVPA); television viewing (time spent watching TV); mean systolic blood pressure, mean diastolic blood pressure; mean blood cholesterol; BMI; VO² Max; and pulse rate. Data was extracted only for those outcomes that were measured in a reliable and valid way. Variation in the interventions and populations made it inappropriate to combine the results statistically across studies therefore the results were synthesized narratively.

RESULTS

Description of included studies

Approximately 41,000 titles related to physical activity interventions with children and adolescents were identified by the search strategy. Of these, 283 articles were deemed potentially relevant. Titles were most often deemed not relevant because the intervention was not school-based, or because the article was a description of a physical activity intervention as opposed to an evaluation of the intervention. When multiple publications from the same study were identified and combined, the 283 articles were reduced to 170 unique studies. Of the 170 unique studies 104 met all relevance criteria. A list of the 66 not relevant studies is presented in Appendix 4. The most common reasons studies were judged as not relevant were data on relevant outcomes was not reported and the intervention was not school based.

The results of the quality assessment are presented in Table 1. Of the 104 relevant studies 4 were assessed as being methodologically strong, 22 were moderate, and the remaining 78 were assessed as weak. Methodological weaknesses for the weak studies included: selection bias; not controlling for confounders; outcome assessors not blinded to study allocation; and high percentage of drop outs. Given the many methodological flaws of the weak studies they were excluded from further examination. The most notable methodological weakness for the strong and moderate studies was outcome assessors not being blinded to study allocation. Data extraction was conducted on the remaining 26 studies. A summary is presented in Tables 2 and 3.

Table 1. Results of Quality Assessment

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>Bienstar school-based diabetes mellitus project</i> Trevino et al. 2004	Moderate	Strong	Strong	Strong	Strong	Strong	Strong
<i>Chicago Heart Health Curriculum</i> Petchers et al. 1988	Strong	Strong	Strong	Moderate	Strong	Moderate	Strong
<i>Healthy Heartbeat School Project</i> Plotnikoff et al. 1999	Strong	Moderate	Strong	Strong	Strong	Strong	Strong
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Strong	Strong	Strong	Moderate	Strong	Strong	Strong
<i>Belguim Playground I</i> Verstraete et al. 2006	Moderate	Strong	Weak	Moderate	Strong	Strong	Moderate
<i>CATCH Project</i> Luepker et al. 1996	Moderate	Strong	Strong	Weak	Strong	Strong	Moderate
<i>Children’s TV Viewing</i> Robinson et al. 1999	Strong	Strong	Moderate	Strong	Moderate	Strong	Moderate
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Moderate	Moderate	Strong	Weak	Strong	Strong	Moderate
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Strong	Strong	Moderate	Weak	Strong	Strong	Moderate
<i>Eliakim Training Study</i> Eliakim et al. 1996	Weak	Strong	Moderate	Moderate	Moderate	Strong	Moderate
<i>Exercise and BP Project</i> Ewart et al. 1998	Moderate	Strong	Strong	Moderate	Moderate	Strong	Moderate
<i>Heart Smart</i> Berenson et al. 1993	Moderate	Moderate	Weak	Moderate	Moderate	Strong	Moderate

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>ICAPS</i> Simon et al. 2004	Moderate	Strong	Strong	Weak	Strong	Moderate	Moderate
<i>KYB Project (California)</i> Marcus et al. 1987	Moderate	Moderate	Strong	Moderate	Strong	Weak	Moderate
<i>KYB Project II (Washington)</i> Bush et al. 1989	Moderate	Strong	Strong	Moderate	Strong	Weak	Moderate
<i>Oslo Youth Study</i> Klepp et al. 1994	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
<i>PATH</i> Fardy et al. 1996	Moderate	Strong	Strong	Weak	Strong	Strong	Moderate
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Moderate	Strong	Strong	Weak	Strong	Strong	Moderate
<i>Pathways</i> Stone et al. 2003	Strong	Strong	Weak	Moderate	Strong	Strong	Moderate
<i>SPARK Project</i> Sallis et al. 1997	Weak	Strong	Moderate	Moderate	Strong	Moderate	Moderate
<i>Staying Well</i> Alexandrov et al. 1988	Moderate	Moderate	Strong	Strong	Strong	Weak	Moderate
<i>StEP TWO</i> Graf et al. 2005	Moderate	Strong	Strong	Weak	Moderate	Moderate	Moderate
<i>Supplemental School Fitness</i> Stephens et al. 1998	Moderate	Strong	Strong	Weak	Strong	Strong	Moderate
<i>WASPAN II</i> Burke et al. 1998	Moderate	Strong	Moderate	Weak	Moderate	Strong	Moderate
<i>West Flanders</i> Haerens et al. 2006	Moderate	Strong	Strong	Weak	Strong	Moderate	Moderate
<i>Wisconsin physical education study</i> Carrel et al. 2005	Moderate	Strong	Strong	Weak	Strong	Strong	Moderate
Abbott et al. 1989	Weak	Moderate	Weak	Weak	Weak	Weak	Weak

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>Active Winners</i> Pate et al. 2003	Moderate	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Baquet Aerobic Training & Physical Fitness</i> Baquet et al. 2001	Moderate	Moderate	Weak	Weak	Strong	Weak	Weak
<i>Belguim Schools</i> Verstraete et al. 2007	Moderate	Strong	Weak	Weak	Strong	Weak	Weak
Boyd et al. 1997	Weak	Moderate	Weak	Weak	Strong	Weak	Weak
<i>Cardiac-Kinder</i> Cottrell et al. 2005	Weak	Strong	Weak	Weak	Strong	Weak	Weak
<i>CATCH Project</i> Simons-Morton et al. 1997	Weak	Moderate	Weak	Weak	Strong	Weak	Weak
<i>CATCH Project</i> McKenzie et al. 2004	Weak	Strong	Weak	Weak	Strong	Weak	Weak
<i>CH Project</i> Vandongen et al. 1995	Strong	Strong	Moderate	Weak	Moderate	Weak	Weak
<i>CHIC Project</i> Harrell et al. 1998	Weak	Strong	Strong	Weak	Strong	Strong	Weak
<i>CHIC - II</i> McMurray et al. 2002	Weak	Strong	Strong	Weak	Strong	Weak	Weak
<i>Chilean School Fitness Study</i> Bonhauser et al. 2005	Weak	Strong	Strong	Weak	Strong	Strong	Weak
<i>Dance for Health</i> Flores 1995	Weak	Strong	Weak	Weak	Weak	Weak	Weak
<i>Dutch Obesity Intervention in Teenagers</i> Singh et al. 2007	Weak	Strong	Moderate	Weak	Strong	Strong	Weak
<i>Eat Well and Keep Moving</i> Gortmaker & Cheung et al. 1999	Moderate	Moderate	Strong	Weak	Weak	Moderate	Weak
<i>El Camino Diabetes Prevention</i> Rosenbaum et al. 2007	Weak	Strong	Weak	Weak	Moderate	Strong	Weak

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
Everhart et al. 2002	Moderate	Strong	Weak	Weak	Strong	Strong	Weak
<i>Fifth Grade PA</i> Duncan et al. 1983	Weak	Weak	Weak	Strong	Weak	Moderate	Weak
<i>Future Fit</i> Connor et al. 1986	Weak	Strong	Weak	Weak	Weak	Weak	Weak
<i>Georgia Fit Kid Project</i> Yin et al. 2005	Weak	Strong	Weak	Weak	Weak	Strong	Weak
<i>Go for Health</i> Parcel, et al. 1989	Weak	Moderate	Weak	Moderate	Moderate	Weak	Weak
<i>Goldfine Secondary PE Study</i> Goldfine et al. 1993	Weak	Strong	Weak	Weak	Moderate	Strong	Weak
Grafner et al. 1987	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Greece Urban Schools Study</i> Tsorbatzoudis 2005	Weak	Moderate	Weak	Weak	Moderate	Weak	Weak
<i>Handball and PE</i> Oxizoglou et al. 2005	Weak	Moderate	Strong	Weak	Weak	Weak	Weak
<i>Healthy Hearts for Kids (Web-based health and PA)</i> Palmer et al. 2005	Weak	Moderate	Strong	Weak	Strong	Moderate	Weak
<i>Heart Power</i> Skybo et al. 2002	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Ho-Chunk Youth Fitness Program</i> Carrel et al. 2005	Weak	Weak	Weak	Weak	Weak	Weak	Weak
<i>Hopper Family Participation Study</i> Hopper et al. 1996	Weak	Strong	Strong	Weak	Strong	Strong	Weak
<i>Hopper Family Participation Study 3</i> Hopper et al. 2005	Moderate	Strong	Weak	Weak	Moderate	Weak	Weak
<i>Howard Risk Reduction Program</i> Howard et al. 1996	Weak	Strong	Weak	Weak	Moderate	Weak	Weak
<i>IMPACT Media Study</i> Goran et al. 2005	Weak	Strong	Weak	Weak	Strong	Weak	Weak

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>Indiana PA Study</i> Frauhiger et al. 2002	Weak	Weak	Weak	Weak	Moderate	Weak	Weak
<i>Intensified PA, Heart Rate & Fitness</i> Baquet et al. 2002	Weak	Moderate	Weak	Weak	Strong	Weak	Weak
Jordan et al. 1995	Weak	Weak	Weak	Weak	Weak	Weak	Weak
<i>JUMP-in</i> Jurg et al. 2006	Weak	Moderate	Strong	Weak	Moderate	Strong	Weak
<i>Jump into Action</i> Holcomb et al. 1998	Weak	Moderate	Weak	Moderate	Strong	Moderate	Weak
<i>Kaunas School Study</i> Petkevicius et al. 1985	Moderate	Weak	Moderate	Weak	Weak	Weak	Weak
<i>Kiel Obesity Prevention Study (KOPS)</i> Muller et al. 2001	Weak	Moderate	Strong	Weak	Weak	Moderate	Weak
<i>KYB Project III (New York)</i> Resnicow et al. 1992	Moderate	Moderate	Strong	Weak	Strong	Weak	Weak
<i>Latino youth physical activity study</i> Peña 2004	Weak	Moderate	Weak	Weak	Weak	Weak	Weak
<i>LEAP</i> Dishman et al. 2005	Weak	Strong	Weak	Weak	Moderate	Weak	Weak
<i>Linwood Project</i> Pollatschek et al. 1989	Weak	Moderate	Weak	Weak	Moderate	Weak	Weak
<i>Lungo Cholesterol Study</i> Lungo et al. 1994	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Mahon et al. 1993	Weak	Moderate	Weak	Weak	Weak	Weak	Weak
<i>Metzker Transtheoretical PA Program</i> Metzker et al. 1999	Weak	Moderate	Weak	Weak	Moderate	Weak	Weak
<i>MHH Project</i> Kelder et al. 1995	Weak	Moderate	Strong	Moderate	Strong	Weak	Weak
<i>Moon Schools Study (Wessex Healthy Schools Award)</i> Moon et al. 1999	Moderate	Moderate	Weak	Weak	Moderate	Moderate	Weak

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>Nebraska School Study</i> Donnelly et al. 1996	Weak	Moderate	Strong	Weak	Strong	Weak	Weak
<i>New Moves</i> Neumark-Sztainer et al. 2003	Moderate	Moderate	Moderate	Weak	Weak	Strong	Weak
<i>NS Schools Study (CLASS Study)</i> Veugelers et al. 2005	Weak	Moderate	Strong	Weak	Moderate	Strong	Weak
<i>Odense Schoolchild Study</i> Hansen et al. 1991	Moderate	Strong	Weak	Weak	Strong	Strong	Weak
<i>PA Fitness & Bone Study</i> Schneider et al. 2007	Weak	Moderate	Weak	Weak	Moderate	Moderate	Weak
<i>PA Lifeskills Intervention</i> Young et al. 2006	Weak	Strong	Weak	Weak	Strong	Weak	Weak
<i>PE Makes You Fit & Healthy</i> Fairclough et al. 2005	Weak	Strong	Weak	Weak	Strong	Strong	Weak
<i>Pedometer Intervention in West Virginia Schools</i> Zizzi et al. 2006	Weak	Strong	Weak	Weak	Strong	Moderate	Weak
<i>Pedometer Trial for Low-Active Adolescents</i> Schofield et al. 2005	Moderate	Moderate	Strong	Weak	Weak	Moderate	Weak
Phillip et al. 1989	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Physical Activity & Recess</i> Ernst et al. 2003	Weak	Moderate	Weak	Weak	Moderate	Weak	Weak
<i>Planet Health</i> Gortmaker & Peterson et al. 1999	Weak	Strong	Strong	Weak	Strong	Strong	Weak
<i>PLAY</i> Ernst 1998	Weak	Moderate	Strong	Moderate	Strong	Weak	Weak
<i>Playground Markings</i> Stratton 2000	Weak	Moderate	Moderate	Weak	Strong	Moderate	Weak
<i>Project Fab</i> Jamner et al. 2004	Weak	Weak	Moderate	Weak	Strong	Strong	Weak

Table 1. Results of Quality Assessment (continued)

Physical Activity Projects	Selection Bias	Study Design	Control for Confounders	Blinding	Data Collection	Drop – Outs	Overall Rating
<i>Project SPORT</i> Werch et al. 2005	Weak	Strong	Strong	Weak	Moderate	Strong	Weak
<i>Project Active Teen</i> Dale et al. 2000	Weak	Moderate	Weak	Weak	Strong	Moderate	Weak
<i>Rimmer Cholesterol & Exercise Study</i> Rimmer et al. 1997	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Rural Colorado PA & Nutrition</i> Belansky et al. 2006	Weak	Weak	Weak	Weak	Moderate	Strong	Weak
<i>Sadowsky Exercise Study</i> Sadowsky et al. 1999	Weak	Strong	Strong	Weak	Strong	Strong	Weak
<i>School health report card study</i> Chomitz et al. 2003	Moderate	Strong	Weak	Weak	Moderate	Weak	Weak
<i>Southwestern Cardiovascular Curriculum Project</i> Davis et al. 1995	Weak	Strong	Strong	Weak	Moderate	Weak	Weak
<i>Stanford Health Project</i> Killen et al. 1989	Moderate	Strong	Weak	Weak	Moderate	Moderate	Weak
Tamir et al. 1990	Weak	Moderate	Strong	Moderate	Strong	Weak	Weak
<i>Trois Rivieres</i> Shephard et al. 1996	Weak	Moderate	Weak	Weak	Strong	Moderate	Weak
<i>Tuckman School Study</i> Tuckman et al. 1986	Strong	Strong	Weak	Weak	Strong	Strong	Weak
<i>Underserved Adolescent PA Study</i> Wilson et al. 2005	Weak	Moderate	Strong	Weak	Strong	Strong	Weak
<i>Wellness, Academics & You</i> Spiegel et al. 2006	Moderate	Moderate	Weak	Weak	Strong	Strong	Weak
<i>Zonderland Lipids & PA</i> Zonderland et al. 1994	Weak	Moderate	Weak	Weak	Moderate	Moderate	Weak

Table 2. Methodology of Physical Activity Projects (N=26)

Physical Activity Projects	Study Design	Number of Groups	Number of Participants	Sex & Age of Participants
<i>Bienstar school-based diabetes mellitus project</i> Trevino et al. 2004	Randomized trial	1 intervention group 1 control	Intervention = 969 Control = 1,024	- Mixed (male and female) - 10 yrs
<i>Belguim Playground I</i> Verstraete et al. 2006	Quasi-experimental	1 intervention group 1 control	Intervention = 122 Control = 113	- Mixed (male and female) - 11 yrs
<i>CATCH Project</i> Luepker et al. 1996	Randomized trial	2 intervention groups 1 control	Intervention 1 (school-based) = 28 schools Intervention 2 (school-based plus family-based) Control = 40	- Mixed (male and female) - Grade 3
<i>Children's TV Viewing Project</i> Robinson et al. 1999	Randomized trial	1 intervention group 1 control	Intervention = 106 Control = 121	- Mixed (male and female) - Grade 3 & 4
<i>Chicago Heart Health Curriculum</i> Petchers et al. 1988	Randomized trial	2 intervention groups (curriculum only; curriculum with parent participation) 1 control	647 (break-down between intervention groups & control NA)	- Mixed (male and female) - Grade 6 (11 & 12 yrs)
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Quasi-experimental	1 intervention group 1 control	Intervention = 103 Control = 68	- Mixed (male and female) - 13-14 yrs
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Quasi-experimental	1 intervention group 1 control	4,171 Intervention = 24 schools Control = 16 schools (participant break-down between intervention groups & control NA)	- Mixed (male and female) - Grade 1

Table 2. Methodology of Physical Activity Projects (N=26) (continued)

Physical Activity Projects	Study Design	Number of Groups	Number of Participants	Sex & Age of Participants
<i>Eliakim Training Study</i> Eliakim et al. 1996	Randomized trial	1 intervention group 1 control	Intervention = 22 Control = 22	- Females - 15-17 yrs
<i>Exercise and BP Project</i> Ewart et al. 1998	Randomized trial	1 intervention group 1 control	Intervention = 45 Control = 54	- Females - Grade 9
<i>Healthy Heartbeat School Project</i> Plotnikoff et al. 1999	Quasi-experimental	1 intervention group 1 control	Intervention = 294 Control = 363	- Mixed (male and female) - Grade 6 (11 & 12 yrs)
<i>Heart Smart</i> Berenson et al. 1993	Quasi-experimental	1 intervention group 1 control	266 (break-down between intervention group & control NA)	- Mixed (male and female) - Grade 4 & 5 (9-11 yrs)
<i>ICAPS</i> Simon et al. 2004	Randomized trial	1 intervention group 1 control	Intervention = 475 Control = 479	- Mixed (male and female) - 12 yrs
<i>KYB – California</i> Marcus 1987	Quasi-experimental	3 intervention groups 1 control	Intervention 1 (KYB curriculum and health screening) = 688, 7 schools Intervention 2 (Health screening) = 333, 3 schools Intervention 3 (KYB curriculum) = 253, 5 schools Control = 234, 3 schools	- Mixed (male and female) - Grade 4 & 5 (9-11 yrs)

Table 2. Methodology of Physical Activity Projects (N=26)

Physical Activity Projects	Study Design	Number of Groups	Number of Participants	Sex & Age of Participants
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Randomized trial	2 intervention groups 2 control	Intervention 1 (in lower income inner city area) = 1,590, 14 schools Control 1 = 693, 8 schools Intervention 2 (in middle/upper income suburb) = 485, 8 schools Control 2 = 620, 7 schools	- Mixed (male and female) - Grade 4
<i>KYB Project II (Washington)</i> Bush et al. 1989	Randomized trial	2 intervention groups (KYB curriculum plus parents and students received results of cardiovascular disease risk factor screening; KYB curriculum but only parents received screening results) 1 control	431 (break-down between intervention groups & control NA)	- Mixed (male and female) - Grade 4-6
<i>Oslo Youth Study</i> Klepp et al. 1994	Quasi-experimental	3 intervention groups 3 control	266 (break-down between intervention group & control NA)	- Mixed (male and female) - Grade 5, 6 & 7
<i>PATH (Physical Activity and Teenage Health) Program</i> Fardy 1996 et al.	Randomized trial	1 intervention group 1 control	346 (break-down between intervention & control NA)	- Mixed (male and female) - Grade 9 & 10 (9-11 yrs)
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Quasi-experimental	1 intervention group 1 control	Intervention = 310 Control = 132	- Female - 16 yrs
<i>Pathways</i> Stone et al. 2003	Randomized trial	1 intervention group 1 control	1,441 from 41 schools (break-down between intervention group & control NA) Intervention = 21 schools Control = 20 schools	- Mixed (male and female) - Grade 3

Table 2. Methodology of Physical Activity Projects (N=26)

<i>SPARK Project</i> Sallis et al. 1997	Randomized trial	2 intervention groups (led by 3 certified PE specialists; led by regular PE teachers) 1 control	955 (break-down between intervention groups & control NA)	- Mixed (male and female) - Grade 4 & 5
<i>Staying Well</i> Alexandrov et al. 1988	Quasi-experimental	1 intervention group 1 control	Intervention = 2,250 Control = 1,963	- Mixed (male and female) - 11 yrs
<i>StEP TWO</i> Graf et al. 2005	Quasi-experimental	1 intervention group 1 control	Intervention = 40 Control = 145	- Mixed (male and female) - 8 yrs
<i>Supplemental School Fitness</i> Stephens & Wentz 1998	Randomized trial	1 intervention group 1 control	Intervention = 45 Control = 45	- Mixed (male and female) - Grade 4 & 5 (8-10 yrs)
<i>WASPAN II</i> Burke et al. 1998	Randomized trial	5 intervention groups (physical fitness; physical fitness plus school nutrition; school nutrition; school nutrition plus home nutrition; home nutrition) 1 control	1,147 (break-down between intervention groups & control NA)	- Mixed (male and female) - 10-12 yrs
<i>West Flanders</i> Haerens et al. 2006	Randomized trial	2 intervention groups 1 control	Intervention 1 = 1,226 Intervention 2 = 1,006 Control = 759	- Mixed (male and female) - 13 yrs
<i>Wisconsin Physical Education Study</i> Carrel et al. 2005	Quasi-experimental	1 intervention group 1 control	Can't tell	- Mixed (male and female) - Can't tell age

Table 3. Description of Physical Activity Projects (N=26)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>Bienstar school-based diabetes mellitus project</i> Trevino et al. 2004	United States	<ul style="list-style-type: none"> - Grade school - Adolescents - Parents - Cafeteria staff - Teachers - After school care-takers - Hispanic 	<ul style="list-style-type: none"> - Printed educational materials - Educational sessions - School curriculum - Physical activity sessions - Duration: 7 months 	<ul style="list-style-type: none"> - Social cognitive theory - Social ecological theory 	<ul style="list-style-type: none"> - Teachers 	<ul style="list-style-type: none"> - School - Urban 	At end of intervention
<i>Belgium Playground I</i> Verstraete et al. 2006	Belgium	<ul style="list-style-type: none"> - Grade school - Teachers - White 	<ul style="list-style-type: none"> - Printed educational materials - Game equipment and play cards - Duration: 3 months 	<ul style="list-style-type: none"> - Can't tell 	<ul style="list-style-type: none"> - Research staff 	<ul style="list-style-type: none"> - School - Urban 	3 months after starting intervention
<i>CATCH Project</i> Luepker et al. 1996	United States	<ul style="list-style-type: none"> - Grade school - Parents - Cafeteria staff - White, - African American, - Hispanic 	<ul style="list-style-type: none"> - Printed educational materials - Educational sessions - School curriculum - School based activities - Community-based - Duration: 3 years 	<ul style="list-style-type: none"> - Health Belief Model 	<ul style="list-style-type: none"> - Teachers - Research staff - Cafeteria staff 	<ul style="list-style-type: none"> - School - Home - Urban 	At end of intervention
<i>Children's TV Viewing Project</i> Robinson et al. 1999	United states	<ul style="list-style-type: none"> - Grade school 	<ul style="list-style-type: none"> - Teacher training - School curriculum - Duration: 6 months 	<ul style="list-style-type: none"> - Social cognitive theory 	<ul style="list-style-type: none"> - Teacher 	<ul style="list-style-type: none"> - School 	End of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>Chicago Heart Health Curriculum</i> Petchers et al. 1988	United States	- Grade school	- School curriculum - Duration: 1 school year (40 weeks)	- Health Behavior Model	- Teachers	- School - Mixed (rural, suburban & residential)	
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Greece	- Adolescents - Parents - Greek	- Mass media - Printed educational materials - Educational sessions - School curriculum - Audio-visual materials - Support group - Community-based - Duration: 9 months	- Social Learning Theory	- Teachers - Physician - Nurses - Social workers - Research staff	- School - Home - Community - Rural	At end of intervention
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Greece	- Grade school - Parents - Greek	- Printed education materials - School curriculum - Audio-visual materials - Community-based - Duration: 3 years	- PRECEDE - Health Belief Model - Social Learning Theory	- Teachers	- School - Home - Can't tell if urban or rural	At end of intervention
<i>Eliakim Training Study</i> Eliakim et al. 1996	United States	- Adolescents - Asian, - White, - Hispanic	- School curriculum - Duration: 5 weeks	- Can't tell	- Teachers	- School - Urban	At end of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>Exercise and BP Project</i> Ewart et al. 1998	United States	- Adolescents - White, - African American	- School curriculum - Community-based - Duration: 18 weeks	- Can't tell	- Research staff	- School - Home - Urban	At end of intervention
<i>Healthy Heartbeat School Project</i> Plotnikoff et al. 1999	Australia	- Grade school	- Educational sessions - School curriculum	- Ecological theory	- Teachers	- School - Rural	- Immediately post intervention
<i>Heart Smart</i> Berenson et al. 1993	United States	- Grade school - Mixed ethnicity	- Printed educational materials - School curriculum - Physical activity sessions - Nutritional lunch program - Duration: 10 months (1 school year)	- Social Cognitive model	- Teachers	- School - Can't tell if urban or rural	At end of intervention
<i>ICAPS</i> Simon et al. 2004	France	- Grade school - Adolescents - Parents - Community Organizations - Policy Makers - White	- Printed educational materials - Community-based - Educational sessions - School curriculum - Audio-visual materials - Physical activity sessions - Duration: 4 school years (40 weeks per year x 4 years)	- Can't tell	- Teachers - Physical Activity Instructors - Peers - Community Groups	- Community - School - Urban	6 months after starting intervention; At end of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>KYB – California</i> Marcus 1987	United States	- Grade school - Parents	- School curriculum - Teacher training - Printed educational materials - Parental self assessment - Risk factor screening - Duration: 1 year	- Can't tell	- Classroom teacher (in all but 2 schools) - Public Health Nurses (in 2 schools)	- School - Home	At end of intervention
<i>KYB Project I (Bronx)</i> Walter et al. 1988	United States	- Grade school - Adolescents - Parents - White, - Hispanic, - African American	- Printed educational materials - School curriculum - Community-based - Duration: 6 years	- PRECEDE - Health Belief Model - Social Learning Theory	- Teachers	- School - Community - Urban	At end of intervention
<i>KYB Project II (Washington)</i> Bush et al. 1989	United States	- Grade school - Adolescents - Parents - African American	- Printed educational materials - School curriculum - Counselling - Health screening - School based activities - Community-based - Duration: 4 years	- PRECEDE - Social Learning Theory	- Teachers - Research staff - Volunteers - Advisory board	- School - Home - Community - Physician office - Urban/rural mix	At end of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>Oslo Youth Study</i> Klepp et al. 1994	Norway	- Grade school - Parents - Norwegian	- Printed educational materials - Educational sessions - Health Passport - Community-based - Duration: 9 months	- Social Learning Theory	- Teachers - Nutritionist - Research staff - Peers	- School - Community - Can't tell if urban or rural	Eleven years
<i>PATH (Physical Activity and Teenage Health) Program</i> Fardy 1996 et al.	United States	- Adolescents - Can't tell ethnicity	- Physical activity sessions - Educational sessions - Printed educational material - Duration: 11 weeks	- Can't tell	- Teachers	- School - Urban	- Can't tell
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	United States	- Adolescents - Mixed Ethnicity	- Printed educational materials - School curriculum - Duration: 12 weeks	- Can't tell	Can't tell	- Can't tell - Urban	- Can't tell
<i>Pathways</i> Stone et al. 2003	United States	- Grade school - American Indian	- School curriculum - Physical education session - Nutritional support - Family information and events - Duration: 12 weeks/year over 3 years	- Social learning theory, incorporating cultural heritage of American Indians	- Teacher - Nutritionist (for nutritional support)	- School	End of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>SPARK Project</i> Sallis et al. 1997	United States	- Grade school - European American, - Asian Pacific islander, - Latino, - African American	- Printed educational materials - School curriculum - Duration: 2 years	- Health Belief Model - Social Learning Theory	- Teachers - Certified education specialist - Research staff	- School - Urban	At end of intervention
<i>Staying Well</i> Alexandrov et al. 1988	Russia	- 11 year olds - Parents - Teaching staff	- Printed educational materials - School curriculum - Duration: 3 years	- Can't tell	- Research staff	- Can't tell	- yr1, yr2, yr3
<i>StEP TWO</i> Graf et al. 2005	Germany	- Grade school - Parents - White	- Printed educational materials - School curriculum - Physical activity sessions - Duration: Can't tell	- Can't tell	- Teachers - Nutritionists - Gymnasts - Psychologists - Physicians	- School - Can't tell if urban or rural	At end of intervention
<i>Supplemental School Fitness</i> Stephens & Wentz 1998	United states	- Grade school - African American	- Educational sessions (workshops) - Physical activity sessions - Duration: 15 weeks	- Can't tell	- Medical students	- School - Urban	At end of intervention

Table 3. Description of Physical Activity Projects (N=26) (continued)

	Country	Population	Intervention	Theoretical Framework	Intervention Provider	Intervention Setting	Follow-up
<i>WASPAN II</i> Burke et al. 1998	Australia	- Grade school - Can't tell race / culture	- Printed educational materials - Educational sessions - School curriculum - Counselling - School based activities - Community-based - Duration: 9 months	- Can't tell	- Teachers - Research staff - Parents	- School - Home - Can't tell if urban or rural	6 months post-intervention
<i>West Flanders</i> Haerens et al. 2006	Belgium	- Grade school - Adolescents - White	- Printed educational materials - School curriculum - Computer-based learning - Support group - Duration: 2 years	- Transtheoretical	- Teachers	- School - Urban	At end of intervention
<i>Wisconsin Physical Education Study</i> Carrel et al. 2005	United States	- Grade school - Can't tell ethnicity	- Printed educational materials - Physical activity sessions - Duration: 40 weeks	- Can't tell	- Teachers	- School - Urban	At end of intervention

The majority of studies were conducted in the United States (16), with the remaining originating from European countries (7), Australia (2) and Russia (1). Children and adolescents up to age 13 years were the primary target of the majority of interventions, followed by parents, teachers and cafeteria staff. Adolescents older than 13 years were the focus of only 3 studies. The majority of studies only evaluated outcomes immediately following the intervention, with one study evaluating outcomes six months post and another eleven years post intervention. The populations were comprised of multiple ethnicities including Asian, Australian, African American, European, First Nations/Aboriginal, Greek, Hispanic, Scandinavian, and White. Generally the interventions were implemented in urban centres among all socioeconomic classes.

All studies had intervention components that were delivered in the school setting. Some projects provided additional interventions in the home, community, physician offices, and via the telephone. A number of studies (n=9) were focused primarily on grade school programs that included some parental involvement. One study focused on programs for adolescents and parents only, and five included both grade school children and adolescents. All but two studies reported teachers as the primary intervention provider. Research staff, specialist teachers, nurses, social workers, physicians, volunteers, and peers were occasionally identified as intervention providers.

All projects included a control group that represented either a school or group of schools, or schools from a different community, city or state that did not receive the school-based intervention. However, in some studies the control schools received other physical activity promotion interventions provided through other health organizations or venues. The duration of the interventions varied greatly from a five week program to one lasting six years, with six studies reporting intervention periods of three years or greater.

Several theoretical models were used to develop the physical activity interventions in the included studies. The three most commonly used theories were PRECEDE, Social Learning Theory, and the Health Belief Model. PRECEDE uses cues, prompts, and reinforcements to alter behavior [Skinner, 1953]. Social Learning Theory proposes that behavior change is affected by environmental influences, personal factors, and attributes of the behavior itself [Bandura, 1977]. The Health Belief Model [Rosenstock, 1966] acts on the premise that an individual's behaviors are affected by perceived susceptibility of developing health problems, perceived impact of health problems on one's quality of life, and the belief that changing behavior will be beneficial in avoiding the health problem [Rosenstock, 1966; Hochbaum, 1958].

The studies reported in this review differed in funding levels, the number of project staff, and the resources available to deliver the program or provide training for the delivery of the program. Further, although all of the projects were primarily school-based, none of the projects used the same combination of interventions with the same intensity, making each project unique. However, some similarities with respect to the ways in which the interventions were delivered were observed. For example, all but one project implemented curricula focused on increasing time spent in physical activity and on increasing knowledge about the benefits of an active lifestyle. Eighteen studies distributed printed or audio-visual educational materials to students, often in association with educational sessions. Nine studies involved school-based activities other than school curricula (e.g., school fun nights, walkathons, educational materials and/or sessions for school staff and parents, game equipment). Community-based interventions, such as training sessions and workshops for

parents and parent involvement in the home-based physical activities (homework), were used in conjunction with school-based interventions in several studies. Finally, some studies also reported the use of counselling, health screening, and support groups.

Physical Activity and Fitness Related Outcomes

The physical activity outcomes included in this review represent two broad outcome categories: lifestyle behaviors and physical health status. Specific outcomes related to lifestyle behaviors included physical activity rates (n=7), duration of physical activity (n=8), and time spent watching television (n=4). Specific outcomes of physical health status included: mean systolic blood pressure (n=10), mean diastolic blood pressure (n=9), blood cholesterol level (n=7), BMI (n=14), VO² Max (n=5), and pulse rate (n=5). Given the focus of many of the studies was to promote physical activity, it was surprising that so few studies reported on either physical activity rates, or amount of time spent engaged in physical activity.

Lifestyle Behaviors

Physically Activity Rates

Physical activity rates, calculated as the percentage of participants who were physically active, were reported in seven of the 26 studies. The results are summarized in Table 4. All seven studies reported results for the whole sample, while one study also discussed results by gender. Five studies assessed physical activity rates in grade school children only, one reported for children and adolescents combined, and another reported on adolescents only. All but one study evaluated physical activity rates directly following completion of the intervention, and one study evaluated intervention effects in the long-term, 12 years post intervention on adult rates of physical activity for males and females combined.

Three studies reported statistically significant positive effects for males and females combined, when participants were from grade school only (n=2 studies), or grade school and adolescents combined (n=1). Two of the studies, [Verstraete et al., 2006; Klepp et al., 1994] (both at P<0.01), reported a smaller decrease in physical activity among those exposed to the intervention compared to those in the control group. Interestingly, Klepp et al did not observe a significant effect on participants immediately following the intervention, but rather twelve years later when the sample had become adults. The third study, [Simon et al., 2004], reported a statistically significant increase in those exposed to the intervention compared to those in the control group (P<0.0001). In terms of the magnitude of effect, Simon et al, found that grade school children and adolescents in the intervention group were almost three times more likely to be physically active outside of school compared to controls. The 95% confidence interval ranged from two times more likely to just under four time more likely to be physically active. Data reported for the remaining two studies demonstrated that 53% of grade school children were physically active compared to 43% of controls [Verstraete et al., 2006], and 49% versus 40% [Klepp et al., 1994]. The remaining four studies reported non-significant results.

Of the three studies reporting a positive effect the intervention ranged from three months to nine months to four school years. The interventions varied considerably across these three studies with printed education materials being the only strategy present in all three studies. Educational sessions and community-based strategies were implemented in two of the studies, while the following occurred in only one study: physical activity sessions; game equipment with suggestions for what to do with the equipment; a health passport; and school curricula. Intervention providers also varied widely from research staff, to teachers, to physical activity teachers, nutritionists, and peers. Generally, those studies not reporting a significant effect on physical activity rates implemented similar combinations of interventions, (i.e. printed educational materials, school curricula, physical activity sessions), for similar periods of time, (i.e. 11 weeks, one school year and three years). Studies reporting a significant effect differed slightly from those not reporting an effect on intervention provider, with the former using physical education teachers more often and the latter using general teachers to implement the intervention.

Duration of Physical Activity

Duration of physical activity was reported in nine studies. The results are presented in Table 5. Duration of physical activity was measured primarily as minutes per hour or per week spent engaged in vigorous to moderately vigorous physical activity either at school or outside of school. Five of the eight studies reported results for the whole sample, while two reported the results for males and females separately. The two remaining studies only included adolescent females. Five of the studies assessed duration of physical activity in grade school children only, one reported for children and adolescents combined, and two reported on adolescents only. The length of the interventions varied considerably from 12 weeks, to 18 weeks, to one year, two years and three years. All of the studies evaluated duration of physical activity immediately post intervention.

Among the nine studies measuring duration of physical activity, a statistically significant effect was observed in five studies [Luepker et al., 1996; Manios et al., 1999; Ewart et al., 1998; Marcus AC et al., 1987; Stone et al., 2003], when the whole sample was included for grade school children only (n=4), and for adolescents only (n=1). In one additional study [Haerens et al., 2006], a statistically significant effect was reported for grade school children and adolescents combined in boys but not girls. Three studies reported non-significant effects. Of the four studies reporting a significant effect on grade school children only, two [Luepker et al., 1996; Marcus AC et al., 1987] targeted the intervention at parents, $P < 0.001$ and $P < 0.05$ respectively. Manios et al and Stone et al reported significant effects at $P < 0.0005$ and $P < 0.05$ respectively but did not target parents. Similarly, the one study, Haerens et al, reporting a significant effect ($P < 0.05$) among grade school and adolescent boys, did not target parents. [Ewart et al., 1998], who found a significant effect on adolescents girls ($P < 0.0003$), also did not target parents with the intervention. The increase in the amount of time spent physically active varied across studies from as little as six extra minutes per week to as much as 50 minutes were week.

Of the six studies reporting positive effects the intervention was implemented over 18 weeks to three years. While specific combinations of interventions varied there were some similarities across the six studies. The intervention in all studies included changes to school curricula, and in four studies, printed educational materials were provided. Educational sessions were used in two of the studies, as well as physical activity sessions and community-

based strategies. Interventions used in only one study included a support group, and risk factor assessment. In most instances the intervention provider was a teacher. However, research staff and public health nurses also participated in implementing the intervention in two separate studies. Generally, those studies not reporting a significant effect on duration of physical activity implemented similar combinations of interventions, (i.e. printed educational materials, school curricula), by teachers, but for a shorter period of time, (i.e. 12 weeks to 10 months).

Time Spent Watching Television

The impact of school-based interventions on television viewing, which was measured as minutes per hour or week spent watching television, was reported by four studies, two in grade school children only and two in grade school and adolescents combined. The results are presented in Table 6. Two studies reported results for boys and girls combined, and two for boys and girls separately. Three of the studies evaluated time spent watching television immediately post intervention, and one six months post intervention.

Three studies reported statistically significant positive effects on time spent watching television [Robinson, 1999; Burke et al., 1998; Simon et al., 2004], two for grade school participants only and one for grade school and adolescent participants combined. For the two studies reporting results for boys and girls separately, one study found a significant effect in grade school boys six months post intervention, but not in girls [Burke et al., 1998], and the other study reported no effect [Haerens et al., 2006]. Of the three studies reporting positive results, all demonstrated a significant decrease in the amount of time spent watching television, compared to the control group. [Robinson, 1999] reported a 50 minute decrease in television viewing per day, compared to 10 minutes per day in the control group ($P < 0.001$). Simon, 2004 reported that participants exposed to the intervention were half as likely to spend more than three hours per day watching television compared to those in the control group ($P < 0.0001$). The 95% confidence interval ranged from $\frac{3}{4}$ to just over $\frac{2}{3}$ less likely to watch more than three hours of television per day. Burke reported that six months post intervention boys exposed to the intervention watched five minutes less per day of television compared to those in the control group ($P < 0.01$).

Among the three studies reporting significant effects the length of the interventions varied from six months to four years. School curriculum was a component in all three studies, with printed educational materials, educational sessions, and community-based strategies being implemented in two studies. Interventions occurring in only one study included: physical activity sessions; counselling and audio-visuals materials. Multiple intervention providers implemented the interventions, with teachers being involved in all three studies, research staff in two of the studies, and physical activity teachers, parents, and peers being involved in one study each. The one study not reporting a significant effect implemented a similar combination of interventions, (i.e. printed educational materials, school curricula) for a similar period of time. However, it differed in that only teachers were involved in implementing the intervention as opposed to multiple intervention providers as observed in those studies reporting a positive effect.

Table 4. Lifestyle Behaviors: Physical Activity Rates (% of sample physically active) (N=7)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>Belgium Playground I</i> Verstraete et al. 2006	Baseline End of intervention	Whole Sample	56.58 53.4	55.92 43.47	P<0.01	Data also demonstrates that the intervention resulted in a smaller decrease in MVPA among girls in the intervention
<i>Chicago Heart Health Curriculum</i> Petchers et al. 1988	Baseline Follow-up (yr1)	Whole sample	NA NA	NA NA	NS	
<i>ICAPS Simon et al. 2004</i>	Baseline During intervention (6mths)	Whole Sample	64% 83%	58% 58%	P<0.0001 OR 2.74 (2.01-3.75)	% of participants engaged in leisure supervised PA
<i>KYB – California Marcus 1987</i>	End of intervention	Whole sample			NS	Consumption of dairy products
<i>Oslo Youth Study Klepp et al. 1994</i>	Baseline End of intervention Follow-up (yr12)	Whole sample	53% 60% 49%	63% 64% 40%	NA NA P = 0.01	More of the intervention group were physically active 2-3 times/week than controls at end of follow-up period
<i>PATH Fardy 1996</i>	Post-intervention	Whole sample	NA	NA	NS	
<i>Staying Well Alexandrov et al. 1988</i>	Baseline During intervention End of intervention	Whole sample	NA NA NA	NA NA NA	NS	

Table 5. Lifestyle Behaviors: Physical Activity (minutes engaged in physical activity) (N=8)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline	Vigorous activity	NA	NA	NA P< 0.001	Prolonged treatment effect noted in sample three years post intervention. No gender specific analysis
	End of intervention		59.2 min	45.5 min		
	Follow-up (yr1)		53.2 min	42.2 min		
	Follow-up (yr2)	40.7 min	30.6 min	P< .001		
	Follow-up (yr3)	30.2 min	22.1 min	P< .001		
	Baseline	Total physical activity	NA	NA	NA	
End of intervention	152.0 min		163.2 min	P=0.02		
Follow-up (yr1)	164.5 min		172.1 min	P=0.04		
Follow-up (yr2)	141.6 min		145.4 min	P=0.41		
Follow-up (yr3)	121.1 min	125.4 min	P=0.59			
<i>Children's TV Viewing Project</i> Robinson et al. 1999	Baseline	Whole Sample	396.8	310.2	NS	Physical activity, metabolic equivalent-weighted, min/wk Child measures
	End of intervention		362.3	337.8		
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Baseline	Whole sample	0.9 hours	1.4 hours	NA P<0.0005	
	End of intervention		2.8 hours	2.0 hours		
<i>Exercise and BP Project</i> Ewart et al. 1998	Baseline	Adolescent girls	515.5 min	486.8 min	P<0.0003	
End of intervention	572.7 min		441.8 min			

Table 5 - Continued

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect	Comments
<i>KYB Project (California)</i> Marcus et al. 1987	Baseline End of intervention	Curriculum	NA NA	NA NA	NS	Girls were less likely than boys (p<0.001) and minority students were less likely than Caucasian students (p<0.05) to report aerobic exercise
	Baseline End of intervention	Screening	NA NA	NA NA	NS	
	Baseline End of intervention	Curriculum + screening	NA NA	NA NA	P<0.05	
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline End of intervention	Girls	4.5 5.3	5.5 5.5	NS	Measured as the number of 15 minute sessions engaged in outside of school time
<i>Pathways Stone et al. 2003</i>	End of intervention	Whole sample	Increased		P<0.05	
<i>West Flanders</i> Haerens et al. 2006	Baseline End of intervention (yr2)	Boys	18.3 25.2	22.6 23.8	P<0.05	This outcome represents school-based physical activity <i>Intervention 1 = curricula to promote physical activity with parental involvement</i> <i>Intervention 2 = curricula to promote physical activity with no parental involvement</i>
	Baseline End of intervention (yr2)	Girls	12.7 16.3	16.5 17.7	NS	
	Baseline During intervention (9mths)	Whole Sample	16.2 (Intervention 1) 16.0 (Intervention 2) 22.6 (Intervention 1) 20.5 (Intervention 2)	18.5 18.5	P<0.05	

Table 6. Lifestyle Behaviors: Television Viewing (minutes spent watching TV) (N=4)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>Children's TV Viewing Project</i> Robinson et al. 1999	Baseline	Whole sample	15.35	15.46	P<0.001	Television, child measures
	End of intervention		8.80	14.46		
	Baseline		4.74	5.52	NS	Videotapes, child measures
	End of intervention		3.46	5.21		
	Baseline		2.57	3.85	P=0.01	Videogames, child measures
	End of intervention		1.32	4.24		
	Baseline		4.66	4.47	NS	Other sedentary behaviors, child measures
	End of intervention		3.81	4.05		
	Baseline		12.43	14.90	P<0.001	Television, parental report
	End of intervention		8.86	14.75		
Baseline	4.96	4.41	NS	Videotapes, parental report		
End of intervention	3.87	3.91				
Baseline	1.84	2.71	NS	Videogames, parental report		
End of intervention	1.44	2.57				
Baseline	44.89	39.79	NS	Other sedentary behaviors, parental report		
End of intervention	41.31	43.37				
<i>ICAPS Simon et al. 2004</i>	Baseline During intervention (6mths)	Whole Sample	34% 28%	27% 36%	P<0.0001 0.49 OR (0.35-0.69)	SED equals, high sedentary behavior, >3h/day television viewing and computer/video games
<i>WASPAN II</i> Burke et al. 1998	Baseline	Enrichment	NA	NA	NS	Time spent watching television returned almost to baseline levels after the intervention in all groups

Table 6 - Continued

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
	End of intervention	group boys	NA	NA	NS	
	Follow-up (6mths)		-17.7 min/wk	22.8 min/wk	P=0.014	except in boys in the enrichment group
	Baseline	Enrichment group girls	NA	NA	NS	
	End of intervention		NA	NA	NS	
	Follow-up (6mths)		2.0 min/wk	4.8 min/wk	NS	
<i>West Flanders</i> Haerens et al. 2006	Baseline	Boys	539.6	530.9	NS	Outcome represents time spent in sedentary behavior
	End of intervention (yr2)		525.4	521.5		
	Baseline	Girls	548.1	562.8	NS	
	End of intervention (yr2)		530.6	549.7		

Physical Health Status

Mean Systolic Blood Pressure

Ten of the 26 studies reported results for mean systolic blood pressure. Of these, four studies focused on grade school children, three on adolescents, and two on grade school children and adolescents combined. The results are summarized in Table 7. Six of the studies reported results for the whole sample, two for boys and girls separately, and two studies included only adolescent females. All but one study evaluated impact on mean systolic blood pressure immediately post intervention and one at six months post intervention.

Three studies reported statistically significant positive effects on mean systolic blood pressure [Ewart et al., 1998; Bayne-Smith et al., 2004; Alexandrov et al., 1988]. Two of the studies Ewart et al and Bayne-Smith reported a statistically significant reduction in mean systolic blood pressure in adolescent females, each at $P < 0.05$, while the third study reported a significant result in grade school girls only ($P < 0.01$). Of the three studies reporting positive results, all demonstrated a greater decrease in mean systolic blood pressure from baseline to follow-up for those in the intervention group compared to the control group. On average, the intervention group experienced a 5-6 mmHg reduction in systolic blood pressure compared to a reduction of 3 mmHg in the control group. The remaining seven studies reported nonsignificant results.

Of the three studies reporting positive effects the intervention was implemented for 12 and 18 weeks, and three years. While specific combinations of interventions varied there were some similarities across the three studies. The intervention in all studies included changes to school curricula, and in two studies, printed educational materials were provided. Community-based strategies were implemented in one study. In two studies the intervention providers were research staff and unknown in the third. Generally, the seven studies reporting a non-significant effect on mean systolic blood pressure used similar combinations of interventions implemented by similar combinations of providers for similar lengths of time.

Mean Diastolic Blood Pressure

Nine of the 26 studies reported results for mean diastolic blood pressure. Of these, four studies focused on grade school children, four on adolescents, and one on grade school children and adolescents combined. The results are summarized in Table 8. Six of the studies reported results for the whole sample, one for boys and girls separately, and two studies included adolescent females only. All but one study evaluated impact on mean diastolic blood pressure immediately post intervention and one at six months post intervention.

Four studies reported statistically significant positive effects on mean diastolic blood pressure [Burke et al., 1998; Bayne-Smith et al., 2004; Lionis et al., 1991; Bush et al., 1989]. Two of the studies Lionis et al and Bayne-Smith et al, reported a statistically significant reduction in mean diastolic blood pressure in adolescents, the former for boys and girls combined ($P < 0.05$), and the later for girls only ($P < 0.001$). Burke et al reported a significant result in grade school girls only ($P < 0.05$), and Bush et al reported a significant effect on grade school and adolescent boys and girls combined ($P < 0.001$). Of the four studies reporting positive results, all demonstrated a greater decrease in mean diastolic blood pressure from baseline to follow-up for those in the intervention group compared to those in the control group. On average, the intervention group experienced a 3-4 mmHg reduction in diastolic

blood pressure compared to a slight increase in those in the control group. The remaining five studies reported nonsignificant results.

Of the four studies reporting positive effects the intervention was implemented for 12 weeks in one study, nine months in two studies and four years in another. While specific combinations of interventions varied there were some similarities across the four studies. The intervention in all studies included changes to school curricula and printed education materials. Three of the studies included educational sessions and community-based strategies, and two studies implemented counseling. Interventions used in only one study included a support group, audio-visual materials, and health screening. Multiple providers were involved in implementing the intervention in all four studies reporting a positive effect including teachers and research staff. In addition, parents, volunteers, physicians, nurses and social workers also assisted in implementing the intervention. Generally, the five studies reporting a non-significant effect on mean diastolic blood pressure used similar combinations of interventions implemented by similar combinations of providers for similar lengths of time.

Mean Blood Cholesterol Level

Seven of the 26 studies reported results for mean blood cholesterol level. Of these, three studies focused on grade school children, two on adolescents, and two on grade school children and adolescents combined. The results are summarized in Table 9. Five of the studies reported results for the whole sample, one for adolescent girls only, and one for boys and girls separately. All of the studies evaluated impact on mean blood cholesterol immediately post intervention.

Four studies reported statistically significant positive effects on mean blood cholesterol [Lionis et al., 1991; Walter et al., 1988; Alexandrov et al., 1988; Manios et al., 1999]. Two of the studies Manios et al and Alexandrov et al, reported a statistically significant reduction in mean blood cholesterol in grade school children for the former ($P<0.001$) and grade school boys for the latter ($P<0.0001$), while a third study, Lionis et al reported a significant result in adolescents ($P<0.001$). A fourth study, Walter et al, reported a significant reduction in mean blood cholesterol for grade school and adolescent boys and girls combined ($P<0.05$), but only among schools from a higher socioeconomic status. Of the four studies reporting positive results, two demonstrated a greater decrease in mean blood cholesterol from baseline to follow-up in intervention group compared to controls, whereas in a third study the intervention group experienced a smaller increase in mean blood cholesterol from baseline to follow-up in comparison to controls. Actual impact is unknown in the fourth study. Manios et al, reported a decrease in mean blood cholesterol in the intervention group of 15 mg/dl, while the control group increased by 13 mg/dl. Alternately, Lionis et al reported an increase of mean blood cholesterol of less than 1 mg/dl for the intervention group, while the control group increased by 17 mg/dl. The remaining three studies reported nonsignificant results.

Of the four studies reporting positive effects the intervention was implemented for nine months in one study, three years in two and six years in one study. While specific combinations of interventions varied there were some similarities across the three studies. The intervention in all studies included changes to school curricula, and printed educational materials. Three of the studies also included community-based strategies, and two studies included audio-visual materials.

Table 7. Physical Health Status: Mean Systolic Blood Pressure (mm Hg) (N=10)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline End of intervention Follow-up (yr3)	Whole sample	105.1 110.0 114.1	104.8 109.7 114.0	P=0.33 P=0.48 P=0.71	
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Baseline End of intervention	Whole sample	107.73 109.09	111.52 112.77	P<0.05 NS	Although groups differed significantly at baseline, no changes at the end of intervention. Generalizability of results may be questionable to North American population
<i>Exercise and BP Project</i> Ewart et al. 1998	Baseline End of intervention	Adolescent girls	120.0 114.0	119.9 116.2	P<0.05	Small sample size. Results generalizable to high risk African American adolescent girls
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Baseline End of intervention Baseline End of intervention	Westchester Whole sample Bronx	102.1 102.7 104.6 105.9	105.7 106.5 103.8 105.2	NA NS NA NS	No analysis by gender. Unit of analysis = school
<i>KYB Project II (Washington)</i> Bush et al. 1989	Baseline During intervention (yr1) During intervention (yr2) During intervention (yr3) End of intervention (yr4)	Whole sample	103.5 101.8 103.1 110.7 115.8	103.4 102.2 106.6 114.1 114.0	NS P=0.517 P<0.001 P<0.004 P=0.393	
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline End of intervention	Girls	110.7 105.2	111.2 108.2	P<0.05	

Table 7 - Continued

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>Staying Well</i> Alexandrov et al.	Baseline During intervention (yr1)	Boys	NA NA	NA NA	 P<0.0001	Participants whose DBP or SBP were in the upper 5% of the
1988	During intervention (yr2) During intervention (yr3) End of intervention (yr4)		NA NA	NA NA	 P<0.001 NS	distribution curve on at least one measurement were included in the group designated as having high BP
	Baseline During intervention (yr1) During intervention (yr2) During intervention (yr3) End of intervention (yr4)	Girls	NA NA NA NA	NA NA NA NA	 P<0.0001 P<0.0001 P<0.01	the upper third of the SBP distribution curve – males had statistically significant increases in all three years
<i>StEP TWO</i> Graf et al. 2005	Baseline End of intervention	Whole sample	125.7 114.5	117.0 117.7	 NS	
<i>Supplemental School Fitness</i> Stephens et al. 1998	Baseline End of intervention	Whole sample	98 96	100 97	 NS	
<i>WASPAN II</i> Burke et al. 1998	Baseline End of intervention	<i>Standard PE program</i> Boys	NA NA	NA NA	 NS	No primary data provided in text. Only overall change in SBP displayed in graph form. No significant change noted over intervention period of 18 weeks. Intervention may not be long enough to have an effect on SBP
	Baseline End of intervention	Girls	NA NA	NA NA	 NS	
	Baseline End of intervention	<i>Enriched PE program</i> Boys	NA NA	NA NA	 NS	
	Baseline End of intervention	Girls	NA NA	NA NA	 NS	

Table 8. Physical Health Status: Mean Diastolic Blood Pressure (mm Hg) (N=9)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline	Whole sample	53.5	53.4	P<0.93	
	End of intervention		55.9	55.5	P<0.16	
	Follow-up (yr 3)		56.1	56.0	P<0.66	
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Baseline	Whole sample	65.17	61.68	P<0.01	
	End of intervention		64.29	62.98	P<0.05	
<i>Exercise and BP Project</i> Ewart et al. 1998	Baseline	Adolescent girls	58.2	60.4	NS	
	End of intervention		57.1	58.8	NS	
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Baseline	Westchester	70.0	73.0	NS	
	End of intervention		69.8	72.8	NS	
	Baseline	Bronx	73.5	73.3	NS	
	End of intervention		73.3	72.9	NS	
<i>KYB Project II (Washington)</i> Bush et al. 1989	Baseline	Whole sample	72.6	70.5	P<0.001	Positive treatment effects prolonged throughout intervention period. Post-intervention follow-up needed
	During intervention (yr1)		67.2	70.0	P<0.000	
	During intervention (yr2)		63.9	67.6	P<0.000	
	During intervention (yr3)		56.8	60.7	P<0.000	
	End of intervention		59.3	61.0	P<0.009	
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline End of intervention	Girls	71.0 67.8	70.1 70.3	P<0.001	

Table 8 - Continued

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>STEP TWO</i>	Baseline	Whole	76.4	72.6		
Graf et al. 2005	End of intervention	sample	72.1	73.5	NS	
<i>Supplemental School Fitness</i> Stephens et al. 1998	Baseline End of intervention	Whole sample	58 50	58 50	NS	
<i>WASPAN II</i> Burke et al. 1998	Baseline End of intervention	<i>Standard PE program</i> Boys	NA	NA	NS	All measures of DBP increased over time, and results tended to favor the control group, except for high risk girls attending the standard PE program
			NA	NA		
	Baseline End of intervention	Girls	NA	NA	P<0.05	
			NA	NA		
	Baseline End of intervention	<i>Enriched PE program</i> Boys	NA	NA	NS	
			NA	NA		
	Baseline End of intervention	Girls	NA	NA	NS	
			NA	NA		

F = fitness program, F + SN = Fitness and school nutrition program, Sch = School program, S + HN = School and home nutrition program, HN =Home nutrition.

Table 9. Physical Health Status: Blood Cholesterol Level (mg/dl) (N=7)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline End of intervention Follow-up (yr3)	Whole sample	4.39 4.35 4.15	4.41 4.38 4.14	P=0.64 P=0.39 P=0.21	Measured in (mmol/litre)
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Baseline End of intervention	Whole sample	170.31 171.01	151.01 168.92	P<0.001 P<0.001	Much smaller increase in cholesterol among treatment group members than control group
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Baseline End of intervention	Whole sample	187.4 173.7	177.3 190.6	P<0.001	
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline End of intervention	Girls	159.6 151.2	153.8 149.6	NS	
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Baseline End of intervention Baseline End of intervention	Westchester Bronx	169.4 167.3 173.5 170.9	166.3 165.9 169.5 167.9	 P<0.05 NS	Positive treatment effect only observed in the Westchester group

Table 9 - Continued

<p><i>KYB Project II (Washington)</i> Bush et al. 1989</p>	<p>Baseline During intervention (yr1) During intervention (yr2) During intervention (yr3) End of intervention (yr4)</p>	<p>Whole sample</p>	<p>180.4 186.4 189.3 170.8 177.3</p>	<p>175.2 188.7 188.7 167.4 180.1</p>	<p>P<0.01 P<0.02 P=0.418 P=0.432 P=0.348</p>	<p>Treatment effect favors intervention group but not statistically significant</p>
<p><i>Staying Well</i> Alexandrov et al. 1988</p>	<p>Baseline During intervention (yr1) During intervention (yr2) During intervention (yr3)</p>	<p>Boys</p>	<p>NA NA NA NA</p>	<p>NA NA NA NA</p>	<p>P<0.0001</p>	

Table 10. Physical Health Status: BMI (kg/M²) (N=14)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline End of intervention 3 year follow-up	Whole sample	17.6 19.7 22.0	17.6 19.7 22.1	P=0.72 P=0.59 P=0.88	
<i>Children's TV Viewing Project</i> Robinson et al. 1999		Whole sample	Decreased		Intervention decreased by 0.45kg/m vs. control	
<i>Cretan Effects of Health Education on Adolescents</i> Lionis et al. 1991	Baseline End of intervention	Whole sample	19.99 20.20	19.96 20.86	P<0.05	
<i>Cretan Health and Nutrition Education in Elementary Schools</i> Manios et al. 1999	Baseline End of intervention	Whole sample	16.2 17.0	16.3 18.1	P<0.001	
<i>Exercise and BP Project</i> Ewart et al. 1998	Baseline End of intervention	Whole sample	4.8 25.1	24.1 24.1	NS	
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Baseline End of intervention Baseline End of intervention	Westchester Bronx	11.3 11.3 11.8 11.9	11.9 12.0 11.8 12.0	NS NS	
<i>KYB Project II (Washington)</i> Bush et al. 1989	Baseline During intervention (yr1) During intervention (yr2) During intervention (yr3) End of intervention (yr4)	Whole sample	14.3 14.5 14.8 15.2 15.0	14.0 14.2 14.3 14.8 15.1	NS P<0.011 P<0.070 P<0.424 P<0.954	

Table 10 - Continued

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline	Girls	22.8	23.6	NS	
	End of intervention		22.8	23.7		
<i>Pathways</i> Stone et al. 2003	End of intervention	Whole sample	19.0	19.1	NS	
			22.0	22.2		
<i>SPARK Project</i> Sallis et al. 1997	Baseline	Whole sample (teacher led)	17.5	17.5	NS	
	End of intervention		19.0	18.6		
	Baseline	Whole sample (specialist led)	17.5	NS		
	End of intervention		18.8			
<i>Staying Well</i> Alexandrov et al. 1988	Baseline	Whole sample	NA	NA	NS	
	During intervention		NA	NA		
	End of intervention		NA	NA		
<i>WASPAN II</i> Burke et al. 1998	Baseline	Boys	NA	NA	P=0.016	Positive effect only seen in boys in the treatment program
			End of intervention	NA		
	Baseline	Girls	NA	NA	NA	
			End of intervention	NA		
	Baseline	Boys	NA	NA	NA	
			End of intervention	NA		
	Baseline	Girls	NA	NA	NA	
			End of intervention	NA		

Table 10. (Continued)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>West Flanders</i> Haerens et al. 2006	Baseline	Boys	19.21 (Intervention 1)	18.45	NS	<i>Intervention 1 = curricula to promote physical activity with parental involvement</i>
	End of intervention (yr2)		19.32 (Intervention 2)			
	Baseline	Girls	20.52 (Intervention 1)	19.12		
	End of intervention (yr2)		20.86 (Intervention 2)			
<i>Wisconsin Physical Education Study</i> Carrel et al. 2005	Baseline	Whole sample	32	30.4	P=0.10	
	End of intervention (mth9)		33	30		

Table 11. Physical Health Status: V0₂ Max (mL/kg/minute) (N=5)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>Bienstar school-based diabetes mellitus project</i> Trevino et al. 2004	Baseline End of intervention	Whole sample	63.90 65.71	65.93 65.20	P<0.04 1.87 (-1.44-5.17)	Outcome measured as physical fitness score. Adjusted difference and 95% CI provided in addition to P value.
<i>Eliakim Training Study</i> Eliakim et al. 1996	Baseline End of intervention	Whole sample	(ml/min) 1480 1630	(ml/min) 1570 NA	P<0.05	
<i>PATH</i> Fardy 1996	Post-intervention Pre-intervention Post-intervention	Boys Girls	NA 33 38	NA 33 34	NS P<0.0001	
<i>PATH II (Physical Activity and Teenage Health) Program</i> Bayne-Smith et al. 2004	Baseline End of intervention	Girls	34.5 36.5	34.4 35.9	NS	
<i>Wisconsin Physical Education Study</i> Carrel et al. 2005	Baseline End of 9-month intervention	Whole sample	NA 34.5	NA 32.5	NA	There was a significant difference in the change in VO ₂ max for the treatment group compared to the change in the control group (P<0.001), but the VO ₂ max of the treatment group to the control group was not significant

Table 12. Physical Health Status: Pulse Rate (Beats/minute) (N=5)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>CATCH Project</i> Luepker et al. 1996	Baseline	Whole sample	86.8	86.8	P=0.61	Difficult to determine if positive effect can be attributed to the intervention, given no positive results were observed at the end of the intervention
	End of intervention		83.0	82.9	P=0.60	
	3 year follow-up		79.6	78.5	P=0.03	
<i>Exercise and BP Project</i> Ewart et al. 1998	Baseline	Whole sample	79.7	83.8	NS	
	End of intervention		79.2	83.8		
<i>KYB Project I (Bronx)</i> Walter et al. 1988	Baseline	Westchester	78.6	7.4	NS	
	End of intervention		77.9	76.0		
	Baseline	Bronx	76.6	77.2	NS	
	End of intervention		74.1	74.7		
<i>KYB Project II (Washington)</i> Bush et al. 1989	Baseline	Whole sample	*3.3	3.1	NS	Significant result only observed after second year of intervention, but disappears in third and fourth years of intervention
	1st year of intervention		3.1	3.0	P=0.437	
	2nd year intervention		3.2	3.3	P=0.011	
	3rd year intervention		3.1	3.2	P=0.134	
	End of intervention (yr4)		2.9	2.8	P=0.596	
<i>Supplemental School Fitness</i> Stephens et al. 1998	Baseline	Whole sample	78	76	NS	Pulse rate: resting
	End of intervention		73	81		
	Baseline	Whole sample	140	144	P<0.05	Pulse rate: maximal exercise
	End of intervention		125	146		
	Baseline	Whole sample	108	112	P<0.05	Pulse rate: recovery
	End of intervention		88	123		

* Fitness score determined by taking the mean of pulse rate at 1, 2 and 3 minutes after exercise and assigning score of 1-6 (low to high).

Table 13. Physical Health Status: Other Outcomes (N=2)

Physical Activity Projects	Measurement Period	Study Population	Intervention Group	Control Group	Overall Effect (Intervention group vs control)	Comments
<i>Healthy Heartbeat School Project</i> Plotnikoff 1999	Baseline Immediately post intervention	Girls	NA	NA	P<0.01	Aerobic endurance (20 meter shuttle run, time in seconds)
		Boys	NA	NS	NS	
<i>Heart Smart</i> Berenson et al. 1993	End of intervention	Boys	NA	NA	P<0.01	One mile run time
		Girls	NA	NA	NS	

In two studies the intervention was implemented only by teachers, by research staff in a third study, and in the fourth study multiple providers such as teachers, research staff, physicians, nurses and social workers implemented the intervention.

Generally, the three studies reporting a non-significant effect on mean blood cholesterol used similar combinations of interventions implemented by similar combinations of providers for similar lengths of time.

Body Mass Index (BMI)

Fourteen of the 26 studies reported results for BMI. Of these, eight studies focused on grade school children, three on adolescents, and three on grade school children and adolescents combined. The results are summarized in Table 10. Eleven of the studies reported results for the whole sample, two for boys and girls separately, and one study included only adolescent females. All but one study evaluated impact on BMI immediately post intervention and one at six months post intervention.

Two studies reported statistically significant positive effects on BMI for the whole sample [Lionis et al., 1991; Manios et al., 1999], one for boys only [Burke et al., 1998] and another for girls only [Haerens et al., 2006]. Manios et al reported a significant impact on BMI among grade school children ($P < 0.001$), while Burke et al reported a significant effect on grade school boys only ($P < 0.016$). Lionis et al reported a significant effect on BMI among adolescents ($P < 0.05$), and Haerens reported a significant effect on grade school and adolescent girls only ($P < 0.05$). Of the four studies reporting positive results, all demonstrated a smaller increase in BMI from baseline to follow-up for those in the intervention group compared to the control group. On average, the intervention group experienced an increase of 1 or less in their BMI ratings, versus an increase of almost 2 for those in the control group. The remaining ten studies reported nonsignificant results.

Of the four studies reporting positive effects the intervention was implemented for nine months in two studies, 2 years in one and three years in another. While specific combinations of interventions varied there were some similarities across the three studies. The intervention in all studies included changes to school curricula, and printed educational materials. Three studies included community-based strategies, and two included educational sessions, support groups, and audio-visual materials. One study included a counseling component. In two studies the intervention providers were teachers only, while the two other studies until multiple providers including research staff, and teachers. One study included parents as providers, while another also used physicians, nurses and social workers. Generally, the ten studies reporting a non-significant effect on BMI used similar combinations of interventions implemented by similar combinations of providers for similar lengths of time.

VO² Max

Five of the 26 studies reported results for VO² Max. VO₂ Max, measured as mL/kg/minute, represents physical fitness. Of these, one study focused on grade school children, three on adolescents, and one on grade school children and adolescents combined. The results are summarized in Table 11. Three of the studies reported results for the whole sample, one for boys and girls separately, and one study included adolescent females only. All studies evaluated impact on VO² Max immediately post intervention.

Three studies reported statistically significant positive effects on VO² Max [Trevino et al., 2004; Eliakim et al., 1996; Fardy et al., 1996]. Two of the studies Eliakim et al and Fardy

et al reported a statistically significant improvement in VO^2 Max in adolescent males and females, ($P<0.05$), and adolescent females ($P<0.001$) respectively, while the third study reported a significant result in grade school and adolescent boys and girls ($P<0.04$). Of the three studies reporting positive results, all demonstrated a greater increase in VO^2 Max from baseline to follow-up for those in the intervention group compared to the control group. Trevino et al reported that participants in the intervention group were almost two times more likely to experience improvement in VO^2 Max compared to those in the control group, and that the 95% confidence interval ranged from just under 1 ½ times to over 5 times more likely to experience improved VO^2 Max. The remaining two studies reported nonsignificant results.

Of the three studies reporting positive effects the intervention was implemented for short periods ranging from five weeks to seven months. While specific combinations of interventions varied there were some similarities across the three studies. Interventions implemented by at least two of the three studies included: changes to school curricula, printed educational materials, physical activity sessions, and educational sessions. One of the three studies only included school curricula. The intervention in all three studies were implemented only by teachers. Generally, the two studies reporting a non-significant effect used similar combinations of interventions implemented by similar providers for similar lengths of time.

Pulse Rate

Five of the 26 studies reported results for pulse rate, measured as beats/minute. Of these, two studies focused on grade school children, one on adolescents, and two on grade school children and adolescents combined. The results are summarized in Table 12. All studies reported results for the whole sample and all studies evaluated impact on pulse rate immediately post intervention.

Only one study reported a statistically significant positive effect on pulse rate [Luepker et al., 1996]. One other study [Stephens and Wentz, 1998] reported a significant positive effect, but on pulse rate during maximal exercise and recovery ($P<0.05$), rather than resting pulse rate. Interestingly, Luepker et al did not observe a significant effect immediately following the three year intervention, but rather at three year follow-up ($P<0.03$). All four remaining studies reported nonsignificant effects.

Other Outcomes

Results reported in only one or two studies on additional outcomes are summarized in Table 13. However, given they were reported in such a small number of studies, they are simply listed here, but have not been incorporated into the conclusions and recommendations for practice. [Plotnikoff et al., 1999] reported a statistically significant effect on aerobic fitness (e.g. time to complete a 20 m shuttle run) for girls only and [Berenson, 1993] reported a statistically significant effect on time to complete a 1 mile run for males only, both among grade school children. Both reported significance levels at $P<0.01$. Neither study provided data to determine the magnitude of effect.

DISCUSSION

Overall, the data demonstrated that school-based physical activity interventions are effective in promoting physical activity and fitness in children and adolescents, but only for a small number of relevant outcomes. Specifically the data suggest school-based physical activity interventions had a positive impact on two of the three lifestyle behaviours: increasing the amount of time children and adolescents engaged in physical activity; and reducing the amount of time spent watching television. The evidence is less convincing for increasing the proportion of children and adolescents who are physically active. For physical health status measures, the data suggest school-based physical activity interventions are effective in reducing mean blood cholesterol and improving fitness levels by improving VO_2 Max among children and adolescents, but not for reducing mean systolic and diastolic blood pressure, BMI, and pulse rate.

The long term effects of the intervention are unknown at this time, given all but one study evaluated outcomes in the very short term (e.g. six months or less). It is important, especially for those interventions having positive effects, to be measured in the long term (greater than 1 year), so that these results can help inform long term policy and program decision making at multiple levels. These findings are consistent with the findings of recent reviews conducted by [Summerbell et al., 2005; Thomas et al., 2004] and [Reilly and McDowell, 2003] who reported mixed results regarding the effectiveness of interventions to prevent obesity, promote healthy eating, and promote physical activity in children and adolescents.

Variations in school setting and populations and in the type, intensity, and length of the school-based physical activity interventions of the studies reviewed indicate the need for careful interpretation of the results of this systematic review. Limitations inherent in community-based research such as measurement of appropriate outcomes given the length of the intervention, lack of post-intervention follow-up, failure to conduct analysis on the unit of allocation, and inability to control for co-interventions, warrant further caution especially in regard to the validity of findings of the primary studies included in this review and may limit the generalizability of the conclusions and recommendations. The implication of these limitations will be discussed further as they relate to specific findings.

All of the interventions included in this review were multi-faceted interventions focused on changing multiple risk behaviors associated with adult onset cardiovascular disease (CVD). Some of the multiple components addressed in these studies were physical activity, nutrition, and smoking. Although empirical evidence [Thomas et al., 1999] and theoretical frameworks suggest that CVD risk reduction strategies should target multiple high-risk behaviors simultaneously, it is unclear from the results of this review how these multi-component strategies interact to impact on indicators of physical activity or health status. In particular, it was difficult to assess across studies if one risk factor was perceived as more important than the others, resulting in the bulk of what are typically finite resources and efforts being focused on reducing that particular risk factor. Given that exposure to the physical activity interventions were not assessed in any of these studies, it is conceivable that more emphasis was placed on CVD risk reduction strategies other than physical activity, thereby providing insufficient exposure to physical activity interventions to produce significant changes in measures of interest. An alternative hypothesis might be that children and adolescents (and likely adults) have a limited capacity at any given time to adopt new

behaviors and absorb new knowledge, and interventions simultaneously addressing multiple factors such as nutrition, physical activity, and smoking, may be overwhelming. Results related to the individual outcome measures will now be discussed in greater detail, concluding with recommendations for practice and research.

Lifestyle Behaviors

Previous reports have concluded that the intensity and frequency of physical activity contribute to overall physical health status and suggest that a "threshold" must be maintained in order to produce positive health effects [Alpert and Wilmore, 1994; Armstrong and Simons-Morton, 1994; Shephard, 1997; Tolfrey et al., 2000; Pate et al., 1994a; Centers for Disease Control, 1997; Centers for Disease Control, 1999]. Three indicators of physical activity were assessed in this review: physical activity rates, duration of physical activity and duration of television viewing. Interestingly, there was almost no overlap in the studies assessing these three outcome measures. In addition, given the primary goal of the twenty-six studies was physical activity promotion it is surprising that physical activity rates and/or duration were measured so infrequently.

Physical Activity Rates

The results of this review are mixed with respect to the effectiveness of school-based interventions to increase physical activity rates among children and adolescents. While two studies reported a significant increase in the percentage of children and adolescents who were physically active in the short term, it is unknown if these results were maintained in the long term (e.g. 1-3 years). A third study, which did not report a significant impact in physical activity rates immediately following the intervention, observed a significant difference in the number of participants who were physically active as adults. However, it is plausible that other factors may have occurred during the twelve year follow-up period that may explain these results as opposed to exposure to the school-based intervention. The remaining four studies reported the school-based interventions had no impact on increasing physical activity rates among children and adolescents. Similar findings have been reported by [Flynn et al., 2006] who suggested schools were an important setting in which to implement strategies aimed at increasing physical activity in children and adolescents, but that careful consideration should be given to the development of an intervention targeting multiple components related to physical activity such as strategies aimed at increasing physical activity, behaviour modification, and family involvement.

Of the three studies reporting positive effects the results were reported for males and females combined, so it is not known if gender was an important factor. Two of the studies were directed at grade school children only, and one at grade school and adolescents combined. The similarities across these studies were that they used printed educational materials, and to a lesser extent educational sessions and community-based strategies. The most notable difference between studies reporting a positive effect and those not, was the use of specialist physical education teachers to deliver the intervention in studies reporting a positive effect, versus non specialist teachers in those reporting no effect.

Together these findings indicate that there is very limited evidence to support school based interventions to increase physical activity rates at this time. While a small number of

studies have reported positive effects, this is insufficient to recommend these school-based interventions for improving the percentage of children and adolescents who are physically active. It might be that the interventions were not focused enough on changing school curricula in as significant a way as was required to truly impact on physical activity rates, or that specialist teachers are needed to truly impact on physical activity. At this time the impact of such interventions requires additional study and needs to be evaluated in the long term. The lack of studies reporting on physical activity as an outcome indicates the need for more emphasis to be placed on physical activity itself within more complex chronic disease prevention strategies.

Physical Activity Duration

The duration of physical activity was measured as the number of minutes per hour or week spent engaged in moderate to vigorous physical activity. Similar to the rationale provided above for physical activity rates, duration of activity has also been found to be associated with positive health effects [Pate et al., 1994a; Shephard, 1997]. In fact, a positive linear association between duration of physical activity and positive health effects has been established, with longer duration associated with increased physical health [Pate et al., 1994a; Shephard, 1997]. At this time there is convincing evidence that school-based interventions are effective in increasing the amount of time children and adolescents spend engaged in physical activity, particularly during school hours. Six of nine studies, reported statistically significant effects, and only three reported no effect. There was little difference between projects that reported a significant effect and those reporting no effect on variables such as the combination of intervention strategies and intervention providers. However, those reporting a positive effect tended to implement the interventions for a longer period of time compared to those with shorter intervention periods. Similar results have been reported by Thomas et al and Summerbell et al.

Taken together, these data suggest that school-based physical activity interventions that are of longer duration may be needed to effect change in duration of physical activity among children. There is limited evidence that these interventions are effective in adolescents, even though one study reported a significant increase in time spent engaged in physical activity by teenage girls. The evidence also suggests that effective school-based interventions include a combination of strategies including school curricula, printed educational materials, and likely, though there is less evidence to support this, educational sessions, physical activity specific sessions, and community-based initiatives. For this outcome positive effects were observed when teachers were the primary intervention provider. At this point, school-based interventions are recommended for increasing duration of physical activity, particularly in grade school children, but further evaluation of the long term benefits is needed.

Television Viewing

Television viewing is one way of measuring physical inactivity, and is typically assessed by counting the number of minutes spent watching television per hour or week. There is good evidence from this review that school-based interventions are effective in reducing the duration of television viewing in the short term primarily among grade school children. Of the four studies that reported on this outcome three found statistically significant effects. Similar findings have been reported by Thomas et al. Similar results were observed when the analysis

was conducted for boys and girls combined or separately. One study also demonstrated positive effects six months post intervention.

Analysis of the studies indicated that the length of the intervention was not associated with decreased television viewing in a linear fashion. For example, one project with positive results implemented the intervention over four years while another for six months. Interventions shown to be effective in reducing television viewing include school curricula, printed educational materials, educational sessions, and community-based strategies. However, data on adolescents is lacking and long-term impacts are unclear. As a result, additional long-term data is needed from multiple studies with various target groups, before more concrete recommendations can be made about reducing television viewing in the long-term.

Lifestyle Behavior Summary

There is some convincing evidence school-based interventions are effective in increasing the duration of physical activity and reducing television viewing, particularly in grade school children. The evidence is not convincing that school-based interventions are effective in increasing the percentage of children who are physically active. One major limitation is the lack of evidence with respect to adolescents. At this point there is very limited evidence concerning the impact of school-based interventions on increasing physical activity duration in adolescent girls, and no evidence for adolescent boys. Likewise, there is no evidence of the impact of these strategies on reducing duration of television viewing among adolescents.

The findings of this review indicate that longer interventions may lead to greater success, in particular as measured by duration of physical activity. This isn't necessarily the case for television viewing. Although it remains unclear what combination of strategies is necessary to produce positive results on measures of physical activity and inactivity, at a minimum, printed educational materials and changes to the school curriculum that reflect an environment that is more supportive of active daily living should be used. There is also some evidence that education sessions and community-based initiatives are linked with more positive outcomes.

What is not clear from the evidence presented in this review is the impact of different intensities of school-based physical activity interventions on physical activity promotion, and the extent to which the study population received the full intervention at the specified intensity. It is not known if studies that exposed children and adolescents to more intense interventions had more positive outcomes, or if the percentage of the intervention that the children and adolescents were exposed to had an impact on the outcomes. Although only speculative, it may be that studies of shorter duration but greater intensity were more effective than longer projects with minimal intensity. This hypothesis helps to explain why projects with interventions of similar lengths and types of strategies, with similar participants, had such variability in their findings.

There is no clear evidence at this time if boys and girls respond differently to school-based interventions nor whether they respond differently to different interventions. Given known gender differences in determinants of physical activity [DiLorenzo et al., 1998], future research will need to test various gender-specific strategies within the school setting to answer these questions. Although one study reported significant long-term impacts of school-based physical activity interventions additional studies with longer follow-up are needed to support these findings.

In summary, none of the studies reported any harmful effects associated with the school-based interventions. Given that no harmful effects were observed, and that there is evidence of a positive effect on two of the three lifestyle behaviour outcomes ongoing physical activity promotion in the schools is recommended. At a minimum, the use of printed educational materials and changes to the school curriculum that promote increased physical activity are encouraged. In addition, the inclusion of parents in the intervention may be beneficial. Although interventions may very well need to be ongoing to produce sustainable effects, projects should be implemented for a minimum of 18 weeks. In order to produce sustainable effects, it may be necessary to widen the scope of the strategy to include the community so as to promote multiple environments that support active living as children move from childhood to adolescence to adulthood. Community-based strategies have been shown to be somewhat effective in promoting healthy lifestyles among populations [Dobbins and Beyers, 1999]. Careful consideration of the similarities between the study population and local populations may be helpful in ascertaining the likelihood of local initiatives achieving a positive effect if the same intervention was implemented.

Physical Health Status

Several reviews have been published highlighting the benefits of physical activity among healthy children [Alpert and Wilmore, 1994; Armstrong and Simons-Morton, 1994; Tolfrey et al., 2000; Centers for Disease Control, 1997; Centers for Disease Control, 1999]. However, none have systematically examined the effectiveness of various combinations of school-based interventions in promoting good health. In addition, since one of the goals of public health is to reduce mortality and morbidity associated with an inactive lifestyle [Ontario Ministry of Health, 1997], the measurement of these physical health indicators will provide data with which to monitor success in attaining this goal. Five outcome indicators of physical health status were considered in this systematic review: mean systolic and diastolic blood pressure, mean blood cholesterol, BMI, VO^2 Max, and pulse rate.

Mean Systolic and Diastolic Blood Pressure

There is good evidence from this review suggesting that school-based interventions do not have a significant impact on systolic blood pressure (SBP) or diastolic blood pressure (DBP) in children and adolescents. Of the projects that examined blood pressure, seven reported no significant effects on systolic blood pressure and five reported no significant effects on diastolic blood pressure. One explanation for these results may be that the lack of randomization resulted in the groups being unequal with respect to key confounding variables that accounted for the difference between groups.

The combination of interventions used by the three projects reporting positive effects included at a minimum printed educational materials and changes to the school curriculum. However, these do not differ significantly from the combination of interventions used in the projects reporting no effect. In summary, although some projects reported positive results, the majority of projects did not, meaning it is likely that other factors may have contributed to these positive findings. The evidence at this point would not support the use of school-based physical activity interventions as a way to reduce systolic or diastolic blood pressure. These

findings are supported by those of Summerbell et al who found obesity prevention interventions in children were not effective in changing most anthropometric measures.

One possible explanation for these findings may be related to the unit of measurement. By using the mean systolic blood pressure of a whole sample, certain high-risk groups become indistinguishable from the average. If the mean of the sample is close to, or within what is considered to be “normal” blood pressure levels, then it is unlikely a positive effect will be observed, since the “average” participant will have no reason to reduce his/her blood pressure. This is referred to as a ceiling effect. However, because the mean of the whole population is used, even substantial reductions in blood pressure among those with elevated blood pressure will not result in a significant reduction in the population mean. Therefore, it may also be necessary to measure the impact of these interventions on both SBP and DSP with specific groups or populations that are defined by gender, age, socio-economic status, ethnicity, or risk.

Another explanation may be that increased physical activity may produce some fairly immediate impacts on blood pressure that level off as time engaged in physical activity continues. For example, short-term studies that measured DBP in particular following a short (7 to 20 week) intervention period may be more likely to find a positive effect on DBP because DBP is more readily changed in the short term. However, it may be that in children and adolescents, the introduction of increased physical activity results in immediate decreases in DBP, but that over a prolonged period DBP moves back toward the norm, producing no net effect change on DBP. This would explain why all but one of the projects reporting a positive effect on DBP had intervention periods of less than nine months.

A second hypothesis might be that systolic and diastolic blood pressure are not appropriate outcomes with which to measure the effectiveness of school-based interventions among children and adolescents. In particular, it is likely that increasing systolic and even diastolic blood pressure may be appropriate during years of fast-paced growth, and that increased physical activity would not normally cause any change in these normal patterns of child development. Therefore, the use of these outcome indicators on their own could inappropriately label these interventions as ineffective, when in actual fact they shouldn't be assessed in this study population.

In summary, there is good evidence suggesting that school-based physical activity interventions do not have an impact on systolic and diastolic blood pressure. Where inconsistent findings were reported, these may be attributed to the inclusion of children who were not selected because of their “at risk” status for high blood pressure or CVD. Lack of significant findings may be attributed to the use of aggregate risk data, highlighting the need to examine separately the impact of school-based interventions on at-risk children compared to those at low risk for high blood pressure. Additional data are also needed to identify the appropriateness of using blood pressure as an outcome measure of physical activity interventions among children and adolescents.

Mean Blood Cholesterol

There is good evidence suggesting that school-based interventions are effective in reducing blood cholesterol levels among children and adolescents. Of the seven studies that examined cholesterol among children and adolescents exposed to school-based more than half (4/7) reported a statistically significant decrease in blood cholesterol in the treatment groups as compared to the control group. However, currently there is no evidence on the long-term

impact of these interventions on cholesterol or whether boys and girls experience different results with respect to cholesterol levels.

Only one of the studies reported results by gender of which a significant effect was observed for boys. However, further studies assessing impact on boys and girls separately are needed to confirm this result. Furthermore, only one study measured the long-term impact of the interventions (3 years post) on blood cholesterol. The findings demonstrated that the interventions had no effect on long-term blood cholesterol levels after three years. However, significant effects were also reported in this study immediately post intervention. At this time additional studies evaluating the impact of school-based interventions on blood cholesterol in the long term are needed.

There was little difference with respect to intervention duration for studies reporting positive effects and those reporting no effects. For example, interventions in the studies reporting positive effects ranged from eight weeks to six years, whereas those reporting no effect ranged from three to four years. At a minimum studies reporting a positive effect included printed educational materials and changes to the school curriculum, but generally additional strategies such as educational sessions, audio-visual materials, and parental involvement were also included.

To summarize, the evidence supports the use of school-based interventions to reduce blood cholesterol levels in grade school children and adolescents. However, since all of these studies also included interventions focused on promoting healthy eating it is unclear if this finding is a result of increased physical activity, a change in diet, or both. Also unclear is whether school-based interventions differentially affect girls and boys. Additional data is required to determine if the gender affects the impact of the school-based interventions. Similar findings have been reported by Summerbell et al and Thomas et al.

Body Mass Index

The literature indicates that an elevated BMI places children and adolescents at greater risk for cardiovascular disease, and that diet and physical activity are important factors in maintaining a healthy BMI range [Walter et al., 1987]. Overall, there is good evidence that school-based interventions are not effective in either reducing BMI, or in limiting the extent to which BMI increases with age. Of the fourteen studies reporting results on this outcome, ten reported no effect. There were no obvious differences between the length of the intervention or the combination of strategies used by those studies reporting no effect and those reporting a positive effect. For example, studies finding no effect had an intervention period ranging from eight weeks to six years, while those reporting positive results ranged from seven weeks to three years. One difference in the study sample that may explain some of this variability was that two of the studies reporting positive results were conducted in Greece among a very homogeneous population.

There was little difference between studies reporting no effect and those reporting positive effects with respect to the combination of strategies used in the school-based intervention. All studies whether reporting no effect or positive effects, included printed educational materials and changes to the school curriculum. However, other strategies such as educational sessions, changes to the cafeteria menus, audio-visual materials, and parental involvement were also used producing both positive and no effect. Therefore, the evidence from this review demonstrates that these types of strategies are generally not effective in

altering BMI among children and adolescents. Similar findings have been reported by Summerbell et al, Thomas et al, and Reilly, et al.

There may be several explanations for the findings in these studies. One hypothesis is related to the amount of physical activity the study participants actually engaged in. Although the evidence suggests that school-based physical activity interventions were effective in increasing duration of physical activity and in reducing television viewing, the extent of the increase in physical activity was unclear. Therefore, if the majority of study participants did not significantly increase their frequency and intensity of physical activity, then significant changes in BMI should not be expected nor are they realistic. In summary, there is good evidence that school-based interventions are not effective in altering BMI and are not supported at this time.

VO² Max

Maximal oxygen uptake (VO² Max) is a standard measure associated with fitness levels, with increasing values expected as fitness level improves. There is good evidence that school-based interventions are effective in improving VO² Max among adolescents, and perhaps teenage girls more than boys, but less evidence for grade school children. Three of the five studies evaluating this outcome reported a statistically significant effect. However, the long term impact is unknown and studies are needed to evaluate whether improvements in VO² Max are sustained in the long term.

There was little difference between the studies reporting positive effects versus those reporting no effect with respect to length of the intervention or strategies implemented. Positive effects were observed after short intervention periods (e.g. five weeks to seven months). At a minimum the evidence suggests school-based intervention should include printed educational materials, school curricula, physical activity specific sessions, and educational sessions. In summary, there is good evidence that school-based interventions are effective in improving VO² Max, particularly among adolescents and their use is recommended at this time.

Pulse Rate

The evidence presented in this review suggests that school-based interventions are not effective in reducing pulse rate among children and adolescents. Only two of the five studies reported a significant effect on grade school children only. The projects reporting positive results had interventions ranging from fifteen weeks to three years. Those studies reporting positive results used only changes to school curriculum and printed educational materials, whereas those reporting no effect used educational sessions, parental involvement, and school-based activities along with school curriculum and educational materials.

One explanation for these findings, which has surfaced throughout this discussion, is the appropriateness of using pulse rate for this target population to determine the effectiveness of school-based interventions. It may be that pulse rate in children and adolescents is not directly associated with physical activity levels or fitness levels and therefore reductions in pulse rate are not realistic. In addition, it may be that as children and adolescents grow, a certain pulse rate is required and that this rate is not affected with increased exercise. This would then explain why significant differences in pulse rate between intervention and control groups were not observed.

In summary, the results indicate that school-based interventions are not effective in reducing pulse rate in grade school children or adolescents and are not recommended for this purpose at this time. Clearly, additional research on the impact of school-based interventions is warranted.

Physical Health Status Summary

In summary, the evidence demonstrates that school-based interventions are not effective in altering blood pressure, BMI, and pulse rate. There is good evidence however, that school-based interventions are effective in reducing blood cholesterol and increasing VO^2 Max. It is likely that many of these health status indicators are inappropriate measures of the effectiveness of school-based interventions. Also, it should be determined prior to measuring physical health status indicators that an actual change in physical activity has occurred otherwise, assessment of these outcomes is inappropriate. A more appropriate comparison might be to assess the impact of these interventions on physical health status measures only among those studies reporting a positive effect on physical activity rates or duration of physical activity.

There is no clear evidence at this time if boys and girls respond differently to these school-based interventions. For the majority of studies the unit of analysis was boys and girls combined. When boys and girls were analyzed separately, the results were inconsistent. No effect was reported more often than a positive result. It is likely that many studies were underpowered to observe significant effects when boys and girls were analyzed separately.

Although it remains unclear what combination of strategies is necessary to produce positive results on measures of physical health status, some trends did emerge, which are similar to those listed for lifestyle behaviours. At a minimum, printed educational materials and changes to school curriculum were used in all projects reporting positive effects. At this time however, it is unclear if other strategies such as educational sessions, parental involvement, school-based activities, community-based strategies and audio-visual materials have a beneficial effect on these outcomes. However, it is likely that multiple strategies will be more successful than individual ones. There was some evidence that length of the intervention was inversely associated with positive outcomes, although this was not consistently found across the studies. For example, it did appear that studies of shorter duration demonstrated more positive effects than those studies of longer duration for blood cholesterol and VO^2 Max.

Finally, there is extremely limited evidence concerning the long-term impact of school-based interventions on physical health status indicators. Only two studies assessed impact beyond completion of the intervention. It is important to determine if school-based interventions have sustained impact on physical health status measures in the long term, if significant improvements in chronic disease risk are to be realized.

CONCLUSION

The findings of this review are consistent with those reported in reviews published in recent years. Generally there is good evidence that school-based interventions have a positive effect on increasing duration of physical activity and VO^2 Max, and reducing time spent

watching television and blood cholesterol. A number of studies have reported inconsistent findings with respect to the physiological impact of physical activity on children and adolescents. Some studies have reported significant improvements in body fat, blood lipids, or blood pressure following a program that included physical activity. Others have demonstrated improvements in these same measures, although the findings were not statistically significant. Still, others have reported differences in the impact of physical activity among children as a function of gender or as a function of the type or the intensity of the physical activity intervention.

The variability in these findings may be indicative of the limitations and difficulties inherent in doing community-based research where randomization to treatment groups, blind assessment, and prevention of co-intervention are difficult to control. It also demonstrates the difficulty in measuring outcomes associated with physical activity, both from a physiological as well as a lifestyle behavior perspective.

Inconsistent findings in these studies can further be attributed to: a) variability in strategies used and in the frequency, intensity, and duration of interventions; b) the use of various theoretical models to guide the intervention; c) using a variety of instruments to assess physical activity and/or physical fitness; and d) follow-up periods of different durations. Many of these studies have reported modest change in levels of physical activity and/or physical fitness rates. Lack of change in physical activity or physical fitness, in turn, has been attributed most often to issues of: a) inadequate dose [Tolfrey et al., 2000]; b) poor compliance [Baranowski et al., 1990]; c) inattention to the multiplicity of risk factors for physical inactivity and subsequent overly simplistic, uni-dimensional interventions; d) methodological errors in measuring fitness, (e.g. assessing heart rate only after, as opposed to during, activity); and e) a failure to control for potentially confounding variables [Tolfrey et al., 2000].

None of the studies included in this review discussed in any great detail efforts that were employed to develop intervention strategies that reflected the different perspectives that boys and girls exhibit toward physical activity, or the different barriers and facilitators of physical activity that challenge boys and girls separately. Some suggest that gender differences have an important influence on physical activity. One hypothesis is that enhancing self-efficacy for girls in combination with external validation and support may be essential to promoting continued physical activity, and that group activities that afford a forum for the development of affiliation among peers and/or family members could promote increased female participation. In contrast, the promotion of physical activities that reinforce individuality, foster identity and promote an adequate level of activity at earlier ages may be more effective for boys and may foster a greater likelihood for ongoing physical activity into adolescence and adulthood.

Implications for Public Health Practice

The implications for public health practice, based on the findings of this review, are not as clear as one might wish for. Despite the need for more research some recommendations for practice can be encouraged at this time.

- Since school-based physical activity interventions do not cause harm and are associated with some positive effects, such activities should continue and be encouraged by local public health unit staff to local schools and school boards.
- School-based physical activity interventions should be focused on fostering positive attitudes toward physical activity and should be geared toward the developmental level of the participants.
- Teachers and school staff should be encouraged to act as role models by demonstrating more physical activity during the course of the school day. This may require some dramatic changes within the working environment of teachers and school staff.
- Parental involvement should be an integral part of the school-based intervention.
- More emphasis should be placed on promoting physical activity within school-based interventions (i.e., making physical activity a priority along with other healthy lifestyle behaviors).
- Public health staff should work in collaboration with teachers, schools and school boards to lobby local and provincial policy makers to increase resources for the promotion of physical activity within the school system.

Implications for Future Research

There are many gaps in the literature that require considerable exploration, and subsequently, systematic reviews.

- Research must take care to assess the impact of school-based physical activity interventions more often on physical activity rates and duration and intensity of physical activity.
- More research is needed to assess the validity and appropriateness of outcomes that represent program effectiveness of school-based physical activity interventions for children and adolescents.
- Research is needed to assess the impact of physical activity strategies that take into account the known barriers and facilitators of physical activity among children and adolescents, particularly among those of various socioeconomic status and ethnicity and urban/rural location.
- Additional subgroup analysis including an examination of the differences in physical activity by gender as well as age, and the impact of strategies that take into account the different factors that affect physical activity among males and females and children and adolescents must be examined.
- All outcomes related to the impact of school-based physical activity interventions require follow-up data so that the long-term impact of these interventions can be determined. Length of follow-up could range from six months to several years.
- To increase the depth of knowledge in this field, national granting agencies need to make research related to physical activity promotion a major priority and recognize the need to fund projects that span multiple years of intervention implementation and evaluation.

Clearly, additional data are required to identify appropriate physical activity programs both for children and adolescents, and males and females, as well as addressing issues related to increasing the adoption of and adherence to physical activity among this population. In addition, future studies should not be funded unless long-term follow-up on physical activity and physical health status measures are integrated into the project design.

The problem of physical inactivity is embedded in the social fabric of society. Population wide prevention strategies are required to effectively and comprehensively promote life long active living, since population health approaches can: a) prevent the development of disease, thus limiting the costs of treatment; and b) reach a large number of children in a relatively cost-effective manner. Therefore, a comprehensive strategy will utilize multiple venues for service delivery, including the community at large, the health care system as well as the school system.

A number of hypothesis have been discussed in this review in an attempt to explain the lack of positive results observed on most physical health status measures as well as some of the physical activity indicators. However, one basic explanation has thus far been overlooked. It may be that school-based physical activity interventions need to be marketed in creative ways in order to prolong the interest of children and adolescents. For example, in the school setting physical activity classes may be too closely associated with school work, and for some students this elicits a negative feeling of being made to do more work. Perhaps the key is to promote physical activity by getting children and adolescents to “play” in ways that promote better fitness levels while at the same time represent fun and adventurous activities and challenges that are appropriate for their developmental level. In addition, perhaps this same approach should be used among parents and adults so as to promote an environment and society that is more accepting of “playtime” as a means for achieving physical fitness as opposed to “working” on becoming more fit.

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APPENDIX 1: RELEVANCE TOOL

Effectiveness of Strategies to Promote Physical Activity in Children and Adolescents

Ref. ID: _____

Reviewer: MD BW LF JDW JV

Relevance Criteria:

The study involves an intervention applicable to public health practice, consistent with Ontario's Mandatory Health Programs and Services Guidelines.

Y N

The intervention described could be implemented, facilitated or promoted by staff in local public health units in Canada.

Y N

The study intervention, which is aimed at increasing physical activity in children and adolescents is implemented in a school setting (there may also be family involvement in the program which is promoted by the school).

Y N

Information on outcomes are reported for children and adolescents (6-18 years).

Y N

The study design is prospective and includes a control group (one group pre/post designs are not acceptable).

Y N

Reviewer Decision:

Include in critical appraisal (only if answer 'yes' to all 5 relevance criteria).

Y N

If Discrepancy in Inclusion Decision:

Reason for discrepancy:

Oversight

Y N

Difference in interpretation of criteria

Y N

Differences in interpretation of study

Y N

Additional Comments:

FINAL DECISION: INCLUDE IN STUDY

Y N

APPENDIX 2: QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

Ref ID: _____

Author: _____

Year: _____

Reviewer: _____

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1. Very likely
2. Somewhat likely
3. Not likely
4. Can't tell

(Q2) What percentage of selected individuals agreed to participate?

- 1 80 - 100% agreement
- 2 60 – 79% agreement
- 3 Less than 60% agreement
- 4 Not applicable
- 5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

1. Randomized controlled trial
2. Controlled clinical trial
3. Cohort
4. Other specify _____

RATE THIS SECTION	STRONG	MODERATE	WEAK
<small>See dictionary</small>	1	2	3

C) CONFOUNDERS

The following are examples of confounders:

1. Ethnicity
2. Sex
3. Marital status / family
4. Age
5. SES (income or class)
6. Education
7. Health status
8. Pre-intervention score on outcome measure (BMI, weight, VO2 Max, blood pressure, etc)

(1) Indicate the percentage of relevant confounders that were measured in the experimental and control groups prior to the intervention.

1. 80 – 100%
2. 60 – 79%
3. Less than 60%
4. Can't Tell

(2) If there were important differences between groups prior to the intervention were they controlled for?

1. Yes
2. No
3. Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
<small>See dictionary</small>	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1. Yes
2. No
3. Can't tell

(Q2) Were the study participants aware of the research question?

1. Yes
2. No
3. Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1. Yes
2. No
3. Can't tell

(Q2) Were data collection tools shown to be reliable?

1. Yes
2. No
3. Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and reasons per group?

1. Yes
2. No
3. Can't tell

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest.)

- 1 80 -100 %
- 2 60 - 79 %
- 3 less than 60 %
- 4 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

Global Rating

COMPONENT RATINGS

Please transcribe the information from the gray boxes on pages 2-4 onto this page.

A SELECTION BIAS

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

B STUDY DESIGN

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

C CONFOUNDERS

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

D BLINDING

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

E DATA COLLECTION METHODS

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

F WITHDRAWALS AND DROPOUTS

RATE THIS SECTION	STRONG	MODERATE	WEAK
	1	2	3

GLOBAL RATING FOR THIS PAPER (circle one)

1. STRONG (four STRONG ratings with no WEAK ratings)
2. MODERATE (less than four STRONG ratings and one WEAK rating)
3. WEAK (two or more WEAK ratings)

WITH BOTH REVIEWERS DISCUSSING THE RATINGS:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

- 1 Oversight
- 2 Differences in interpretation of criteria
- 3 Differences in interpretation of study

FINAL DECISION OF BOTH REVIEWERS (circle one):
 1 STRONG
 2 MODERATE
 3 WEAK

APPENDIX 3: CORE DATA EXTRACTION FORM

PHRED Effective Public Health Practice Project

Ref ID # _____

Reviewer: _____

Review Name: _____

Study Identification First Author _____

Year of publication 19____

Language of publication English

French

Other language (specify) _____

Country

Canada

United States

United Kingdom

Other (specify) _____

Can't tell

Design

Years data collected 19____ to 19____ Can't tell

Number of intervention groups _____ Can't tell

Number of control groups _____ Can't tell

Number of subjects screened _____ Not appropriat

Number of eligible subjects _____ Can't tell

Number of eligible subjects _____ Can't tell

Number of allocated subjects (total and by group)

Total	_____	<input type="checkbox"/>	Can't tell		
Intervention #1	_____	<input type="checkbox"/>	Can't tell		
Intervention #2	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate
Intervention #3	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate
Control	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate

Number of drop-outs (total and by group)

Total	_____	<input type="checkbox"/>	Can't tell		
Intervention #1	_____	<input type="checkbox"/>	Can't tell		
Intervention #2	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate
Intervention#3	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate
Control	_____	<input type="checkbox"/>	Can't tell	<input type="checkbox"/>	Not appropriate

Source of funding for the study (check all that apply)

- Governmental organization
- Commercial organization
- Health-care provider organization
- Voluntary body (e.g. Health Promotion Organization)
- Charitable trust
- Research funding body (e.g. Medical Research Council)
- Other (specify) _____
- Can't Tell

Sample

Sex (Check one box only) Male Female Mixed Can't tell

Age (specify mean and range) mean _____ upper _____ lower _____ Can't tell

Ethnicity (specify) _____ Can't tell

Education (Check one box only)

- Completed grade school
- Completed high school
- Completed university
- Mix
- Other _____
- Can't tell

Residential Setting (Check one box only)

Urban Mix Rural Can't Tell

Social-economic status (specify) _____ Can't Tell
(e.g. income, employment)

Intervention – Describe for each intervention as applicable:

Intervention #1	Intervention #2	Intervention #3	Control
Eg. Frail elders personalized program plus community development program			Eg. Visits by project community development program

Intervention descriptors: (check all that apply)

	Intervention #1	Intervention #2	Intervention #3	Control
Community development				
Community-based				
Mass media				
Distribution of printed educational materials (eg. Fact sheets, posters)				
Educational session (workshops)				
School curriculum				
Counseling (one to one)				
Computer-based learning				
Audio-visual materials (eg. Videos)				
Support group				
Other (specify)				

Theoretical framework: (check all that apply for each intervention and control)

	Intervention #1	Intervention #2	Intervention #3	Control
Trans theoretical				
PRECEDE				
Intention and action				
Health belief model				
Social cognitive theory				
Diffusion of innovation				
Social marketing theory				
Can't tell				
Other (specify)				

Intervention provider: (state who (or what) delivered the intervention. check all that apply)

	Intervention #1	Intervention #2	Intervention #3	Control
Professional (state profession)				

Research worker (member of study team)
 Para professional
 Lay person
 Peer
 Volunteer
 Computer system
 Community groups
 Can't tell
 Other (Specify)

Internal training provided:

	Intervention #1	Intervention #2	Intervention #3	Control
Yes (Specify)	_____	_____	_____	_____
No	_____	_____	_____	_____
Can't tell	_____	_____	_____	_____

Intervention setting: (check all that apply)

	Intervention #1	Intervention #2	Intervention #3	Control
Community	_____	_____	_____	_____
Home	_____	_____	_____	_____
Hospital	_____	_____	_____	_____
School	_____	_____	_____	_____
Telephone	_____	_____	_____	_____
Worksite	_____	_____	_____	_____
Clinic	_____	_____	_____	_____
Can't Tell	_____	_____	_____	_____
Other (Specify)	_____	_____	_____	_____

Intervention target group: (check all that apply)

	Intervention #1	Intervention #2	Intervention #3	Control
Infants	_____	_____	_____	_____
Preschool	_____	_____	_____	_____
Grade School	_____	_____	_____	_____
Adolescents	_____	_____	_____	_____
Pregnant women	_____	_____	_____	_____
Parents	_____	_____	_____	_____
Adults	_____	_____	_____	_____
Seniors	_____	_____	_____	_____
Family care givers	_____	_____	_____	_____
Health Professionals	_____	_____	_____	_____
Other (Specify)	_____	_____	_____	_____
Can't tell	_____	_____	_____	_____

Consumer involvement: Were consumers (i.e. members of the public) involved at any point of the design, conduct or interpretation of the study? (e.g., consumers involved in guideline development, or their views collected)

Target group size: (check all that apply)

	Intervention #1	Intervention #2	Intervention #3	Control
Individual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can't Tell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can't Tell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intervention duration: Specify in weeks	Intervention #1	Intervention #2	Intervention #3	Control
Can't tell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intervention frequency: Specify in weeks	Intervention #1	Intervention #2	Intervention #3	Control
Can't tell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Length of post intervention follow-up period (all data collection points): Specify in weeks	Intervention #1	Intervention #2	Intervention #3	Control
Can't tell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:**APPENDIX 4: EXCLUDED STUDIES: NOT RELEVANT**

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**APPENDIX 5. EXCLUDED STUDIES:
METHODOLOGICAL RIGOR ASSESSED AS WEAK**

- Abbott J, Farrell J. A health-related exercise project in primary schools. *Education and Health* 1989; 7(2):33-7.
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APPENDIX 6: INCLUDED STUDIES REFERENCE LIST BY PROJECT ACCOUNT

Belgium Playground Equipment Study

*Verstraete SJ, Cardon GM, De Clercq DL, De B, I. Increasing children's physical activity levels during recess periods in elementary schools: the effects of providing game equipment. *European Journal of Public Health* 2006; 16(4):415-9.

Bienestar School-Based Diabetes Mellitus Prevention Program

*Trevino RP, Yin Z, Hernandez A, Hale DE, Garcia OA, Mobley C. Impact of the Bienestar school-based diabetes mellitus prevention program on fasting capillary glucose levels: a randomized controlled trial. *Archives of Pediatrics and Adolescent Medicine* 2004; 158(9):911-7.

Chicago Heart Health Curriculum

* Petchers MK, Hirsch EZ, Bloch BA. A longitudinal study of the impact of a school heart health curriculum. *Journal of Community Health* 1988; 13(2):85-94.

Child and Adolescent Trial for Cardiovascular Health (CATCH) Project

- (1) Luepker RV, Perry CL, McKinlay SM, Nader PR, Parcel GS, Stone EJ, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH collaborative group. *Journal of the American Medical Association* 1996; 275(10):768-76.
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- (5) Johnson CC, Osganian SK, Budman SB, Lytle LA, Barrera EP, Bonura SR, et al. CATCH: Family process evaluation in a multicenter trial. *Health Education Quarterly* 1994; (Suppl. 2):S91-S106.
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- (9) McKenzie TL, Nader PR, Strikmiller PK, et al. School physical education: effect of the Child and Adolescent Trial for Cardiovascular Health. *Preventive Medicine* 1996; 25(4):423-31.
- (10) McKenzie TLF, Li D, Derby C, Webber LS, Luepker LRV, Cribb P. Sustainability of a health-related physical education intervention in 76 elementary schools: Catch. *Medicine and Science in Sports and Exercise* 2002; 34(5):S 301.
- (11) McKenzie TL, Stone EJ, Feldman HA, Epping JN, Yang M, Strikmiller PK, et al. Effects of the CATCH physical education intervention: teacher type and lesson location. *American Journal of Preventive Medicine* 2001; 21(2):101-9.
- (12) Nader PR, Stone EJ, Lytle LA, Perry CL, Osganian SK, Kelder S, et al. Three-year maintenance of improved diet and physical activity: the CATCH cohort. Child and Adolescent Trial for Cardiovascular Health. *Archives of Pediatrics and Adolescent Medicine* 1999; 153(7):695-704.
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Children's TV Viewing Project

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Cretan Effects of Health Education on Adolescents

- *Lionis C, Kafatos A, Vlachonikolis J, Vakaki M, Tzortzi M, Petraki A. The effects of a health education intervention program among Cretan adolescents. *Preventive Medicine* 1991; 20(6):685-99.

Cretan Health and Nutrition Education Program

- (1) *Manios Y, Moschandreas J, Hatzis C, Kafatos A. Evaluation of a health and nutrition education program in primary school children of Crete over a three-year period. *Preventive Medicine* 1999; 28(2):149-59.
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- (4) Manios Y, Kafatos A. Health and nutrition education in elementary schools: changes in health knowledge, nutrient intakes and physical activity over a six year period. *Public Health Nutrition* 1999; 23(3A):445-8.
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- (6) Manios Y, Kafatos I, Kafatos A. Ten-year follow-up of the Cretan Health and Nutrition Education Program on children's physical activity levels. *Preventive Medicine* 2006; 43(6):442-6.

Eliakim Training Study

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TEACHERS' EVALUATION STYLES WHEN DISTRIBUTING GRADES: DO INDIVIDUAL-STATUS VARIABLES MATTER?

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ABSTRACT

As the major socializing agents, teachers have a central role in evaluating students: they test students and grade their performance; they praise or scold them for learning efforts, homework and class behavior. In the present chapter we focus on grading, the major evaluation tool in schools, and investigate the following questions: What are the distribution rules that guide teachers in their actual daily practice when evaluating students' learning performance in the classroom? Do teachers' distribution preferences vary by their individual-status characteristics (e.g., gender, education level, seniority)?

Theoretically we lean on the contingency approach to distributive justice which identifies three major, mutually exclusive, distribution rules employed separately or jointly when distributing resources of various types: (a) equality, (b) need, (c) equity (or meritocratic principle). Moreover, we contend that people (including teachers) in their decision on just distribution may consider several rules simultaneously and weigh them in various manners. Specifically, we suggest that teachers may vary in 'style of distribution', that is, use varying combinations of weighted rules when grading their student.

We exemplify this approach in an empirical investigation of a national sample of 312 Israeli high school teachers who responded to a question about the relative weight they attribute to five considerations (representing different rules of distribution) when allocating grades to their students. Cluster Analysis that was applied to the data resulted in two main teaching evaluation styles: 'performance (outcome)' style, that stresses students' academic performance and 'effort (input)' style that accord significantly lower weight to academic performance, and give greater weight to student's learning investment. Checking further the effect of personal characteristics on evaluation styles through logistic regression suggested no significant differences of either of the individual variables. We conclude, thus, that teachers' evaluation styles seem to reflect strong societal constituted norms of meritocracy rather than individual preferences.

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Evaluating student performance, by means of grading, is an integral part of teacher's role. Teachers test students and grade their performance; they praise or scold them for learning efforts, homework and class behavior. In this regard, teachers can be seen as agents of distributive justice whereby they distribute valued rewards (grades) to their students, the determination of which rest on some accepted rules (Deutsch, 1979). Although teachers' grading practices affect students' life chances and subjective wellbeing, few studies have focused on the rules (e.g. effort, talent) that guide teachers when distributing grades. For example, Zeidner (1993) found that teachers agree that grades should be distributed according to academic achievement rather than rules related to interpersonal interactions or non-academic traits, such as personal character, behavior and cleanliness. Similarly, Nisan (1985a) found, that teachers in junior high schools believed that three main distribution rules should guide grading: knowledge exhibition, learning effort and class participation. These studies disregarded the possibility that in allocating rewards in school (like in many other rewards' distribution) teachers may consider several rules simultaneously and weigh them in various manners. In the current chapter we follow this line and suggest the possibility of multivalent evaluation styles. In other words, we assume that when evaluating students' performance teachers are likely to consider and weigh a variety of rules (for example, effort, need) rather than apply each rule separately. Moreover, the different weighted combinations of distribution rules reflect different evaluation styles. Accordingly we attempt to address the following questions: What are the major evaluation (grading) styles, namely, preferred combination of distribution rules, which guide teachers in their actual daily practice when evaluating students' performance in the classroom? To what extent these evaluation styles are affected by teachers' individual-status variables (e.g., gender, education level, seniority)? We believe that this approach to educational evaluation can serve as a useful tool for understanding, analyzing and explaining grades distribution beyond the existing univalent explanations. In the following section we present the contingency justice approach that serves as a general framework for our study and then elaborate on specific aspects of teachers as agents of distributive justice.

CONTINGENCY APPROACH TO DISTRIBUTIVE JUSTICE

Unlike approaches that perceive justice in terms of a univalent universal principle (equity) (Adams, 1965; Homans, 1974), contingency approaches, which have been salient since the mid-1970s, assume that people have a range of distinctive and irreducible justice principles and rules which they employ separately or jointly when they distribute resources of various types (Sabbagh, Dar, and Resh, 1994; Törnblom and Foa, 1983; Törnblom, Jonsson, and Foa, 1985). Moreover, justice research has shown that distribution preferences may be affected by individual-status variables such as gender, age, socio-economic status and so on (Kelley and Evans, 1993; Major and Deaux, 1982; Törnblom, 1992). Within this approach, three basic principles are commonly distinguished – equity, equality and need – along with their respective more specific rules, according to which resources, or rewards, are distributed and people evaluate the fairness of any distribution. That is, the principle of equity is but one

of several justice principles, which are substantially and empirically distinct, each of which may be a sufficient condition for granting a reward (Nisan, 1989; Reis, 1984; Sabbagh et al., 1994). The principle of equity refers to non-equal, proportional distributions of social resources, based on the differential investment or performance of each individual. Three main distributive rules are usually derived from this principle: (a) effort, (b) actual contribution and (c) ability. These rules share the assumption that unequal distributions are legitimate and that differential rewards should be based on individualistic and meritocratic values which characterize capitalist societies (Deutsch, 1985; Green, 1988; Sampson, 1975). The principle of equality requires an equal distribution of resources ("to each the same") with no consideration of any special characteristics of the rewardees (Perelman, 1967). Scholars distinguish between different distributive rules that derive from the principle of equality. Among these, the most salient in the empirically-oriented research are simple (arithmetic) equality and equality of opportunities. The principle of need ("to each according to his/her needs"), which is also based on differential resource distribution, strives to reduce individual suffering that is caused by people's incapacity to satisfy their own basic needs (e.g., physical functioning) (Galston, 1980). Schwartz (1975) claims that this principle is related to humanitarian norms and social responsibility.

However, much of the research done within the contingency approach has relied on the questionable idea that any given individual form an overall consistent, univalent body of rule preferences. In contrast, leaning on Sabbagh, Cohen and Levy (2003), we aim, as suggested above, at identifying basic multivalent grading styles that are likely to appear among teachers. This is intended to yield a typology of teachers according to their different styles of weighing multiple distribution rules. We argue that this approach can serve as a useful tool for understanding, analyzing and explaining distribution rule preferences beyond the scope of existing univalent explanations.

TEACHERS' GRADING STYLES

As already mentioned, evaluating student performance, by means of grading, is an integral part of teacher's role. The importance of evaluation by teachers is manifold. First, in allocating grades to their students, teachers act as gatekeepers, providing or withholding access to particular classes, ability groups, tracks, and schools, as well as to higher education (Dauber, Alexander, and Entwisle, 1996; Entwisle and L., 1993; Resh, 1998; Schiller, 1999; Vanfossen, Jones, and Spade, 1987). By doing so, they affect students' socialization experiences, their learning environment and eventually their opportunities to learn, their further educational career and, consequently, their occupational positions and life chances (Hurn, 1985; Oakes, 1985; Wesselingh, 1997). Hence, they are major performers of justice.

Second, teachers are considered major agents of moral socialization. Through overt and latent curricula, they impart not only the valuable knowledge and skills intended to prepare students for their transition to adult (economic) roles, but also basic norms and the sense of justice students will require as citizens of a just society (Dreeben, 1968; Hurn, 1985). In this regard, their grading practices have a latent effect: they inculcate important values and norms of behavior that prevail in the wider society. "Unfair" distribution of grades, not only increases sense of injustice among students, but also contributes to the shaping of their world

views and the "social map" they construct in their mind. Finally, grade distribution may affect students' self-image, learning motivation and future expectations, and indirectly affect their popularity and social acceptance (Brantlinger, 1993; Butler, 1987), Hallinan and Kubicheck 1990 }.

Although there are different means of evaluation educational settings, the most salient one is the standardized grading within classrooms, where students are placed on a hierarchical scale according to their academic success. The distribution of these grades is mainly guided by rules of meritocracy (Bidwell, 1965) (rules that stress personal achievement) rather than by ascription (in-born characteristics, such as gender or race) or particularistic rules that judge students in terms of their particular merits (e.g., personal relations with the teacher or kinship ties) (Hurn, 1985; Parsons, 1959). The strong consensus for using equity as the governing principle in grading notwithstanding, its implementation varies with respect to bases (criteria) employed by teachers in determining grades: talent, knowledge exhibition (in tests or class work), effort, class behavior, or some combination thereof (Dushnik and Sabar Ben-Yehoshua, 2000; Nisan, 1985b). Teachers may also consider to some degree the students' need for encouragement in determining their grades.

Unlike studies that examined teachers' rule preferences separately, we suggest a holistic view whereby preferences of distribution rules are considered simultaneously. Specifically, we hypothesize that teachers' evaluation styles may be mainly differentiated by the relative weight they accord to rules that emphasize "outcome" of learning – namely, actual academic performance of students such as achievement and talent (hereafter, 'performance-outcome' style) vis-à-vis rules that stress student's "input" in the process of learning such as effort, homework preparation, class behavior and so on (hereafter, 'effort-input' style). Leaning on Sabbagh (2003), these two main evaluation styles can be also understood in terms of the degree of differentiation (inequality) that they promote: In comparison to the 'performance-output' grading style, the effort-input grading style is likely to promote less differentiation (inequality) among students because effort is more equally available to all students, namely, the motivation to act is available to most people. In contrast, actual performance and ability are more differentiating because they require innate talents which are unevenly distributed and non dependent upon human will.

This distinction has received some support in the previous research by Nisan (1985a) and Zeidner (1993), who found that teachers tend to prefer different distribution rules when they allocate grades to "strong" and "weak" students. In the case of the former, they tend to stress more strongly the equity rules while for the later they tend to prefer more egalitarian rules based on effort and need.

DISTRIBUTION RULE PREFERENCES AND INDIVIDUAL-STATUS VARIABLES

Social psychological justice research, which has mainly focused on the distribution of economic resources, has shown that distribution preferences may be affected by individual-status variables (Hegtvedt, 1992; Wegener and Liebig, 1995). The main contention in this line of argument is that distribution preferences often express instrumental considerations whereby, in choosing a distribution rule, individuals are rational self-interested agents who

strive to maximize their outcomes. Accordingly, people in lower status positions (e.g. women, lower educational and occupational level, and junior position) tend to assign greater weight to equality rules, or to effort which can be characterized as a weak differentiation rule (see above). These rules explicitly strive to reduce gaps in resource allocation, thus serve best the interests of lower-position individuals. In contrast, people in higher status positions (e.g. men, higher educational and occupational level and senior positions) tend to assign greater weight to equity principle, especially as reflected by the performance rule, which ensure their better chance to maintain or even improve their relative status (Sabbagh et al., 1994).

Since this investigation focuses on teachers' grading, i.e. allocating grades to their students, we realize that their preference of rules of allocation does not directly serve their self interests. We assume, however, that individual-status characteristics might indirectly affect their preferences of rules: Teachers of more advantaged background may be more inclined to adhere to the neo-liberal version of meritocracy (i.e. performance-output) which reproduces societal power relations, that is, high- status groups are likely to endorse this ideology more strongly than low-status groups because it reinforces their initial position (Bowles and Gintis, 1976). In contrast, those with lower status characteristics will tend to follow the effort-need rules that are more equalizing. Moreover, we believe that other than self interests motives may also play a role in teachers' preferences of distribution rules when grading their students. Thus, below we specify our tentative hypothesis in relation to the individual-status variables checked in this study: gender, educational level, and seniority.

Gender: We assume that in the wider society, male individuals hold higher status positions than women (Kidder, Fagan, and Cohn, 1981; Major, 1987; Resh and Dalbert, 2007). In correspondence to this description, we assume that, male teachers are likely to hold higher status positions at schools than female teachers. This is expressed in the relative higher percentage of male teachers holding educational positions such as managers, inspectors and other informal leadership positions (Addi-Raccah, 2006; Ortiz, 1982; Ozga, 1993; Shakeshaft, 1989) Accordingly, we hypothesize that male teachers, who hold a higher status positions within the educational system, will prefer a more differentiating 'performance-output' grading style while female teachers, who hold a lower status position in society, will prefer the less differentiating 'effort-input style'.

This hypothesis may be supported by other theoretical arguments regarding the status differences between males and females. For instance, Mueller and Wallace (1996) claim that males and females hold differential attitudes towards valued resources. Males may be more likely to aspire to highly valued societal resources such as prestige and power (i.e., meritocratic, performance oriented ideology) (Jasso, 1994), but females do not necessarily adopt self-interested behavior (Hegtvedt, 1992; Major, 1987). For example, females have been shown to be guided by an "ethic of care" (Gilligan, 1982) and by low standards of entitlement (Phelan, 1994). Thus their egalitarian preferences may be guided not only by self-interest but also by interpersonal considerations that similarly apply to different resources.

Regarding the variable of *educational level*, several justice studies have suggested that the distribution preferences of individuals in upper and lower educational levels are not alike, but often contradictory (Dar, Erhard, and Resh, 1998; Kelley and Evans, 1993; Robinson and Bell, 1978). For instance, in Robinson and Bell's (1978) study on social equality in England and the United states, authors found that "egalitarian" respondents against "non-egalitarian" ones tend to be blacks, with low-education occupations, and small earnings. Moreover, on the basis of a comprehensive study, Kelly and Evans (1993) indicate that in nine Western and

Eastern countries respondents believe that occupational earnings, as an indicator of social class, should be distributed according to level of education, worker's qualifications, and degree of job's complexity and responsibility. On this basis, we thus hypothesize that in the context of education, teachers with higher education will prefer the 'performance-output' evaluation style more strongly than teachers with lower education. In contrast, teachers with a lower level of education will prefer more strongly the 'effort-input evaluation' style than teachers with a higher level of education. (Diamond, 1986; Holtman and Bayer, 1970).

With respect to *seniority*, which is status variable defined by the number of years in a specific profession, relatively few justice studies have examined the effect of seniority on distribution preferences. Relevant justice research has referred to seniority as a distribution rule that is likely to vary across cultures (Fischer and Smith, 2004; Leung and Morris, 2000; Morris, Leung, Ames, and Lickel, 1999) whereas resource distribution according to seniority is more salient in collectivistic cultures, distribution according to productivity are more salient in individualistic cultures (see also Mueller, Iverson, and Dongi-Gi, 1999): This finding suggests that the cultural meaning of seniority, as a status variable, is likely to be dependant on culture.

In the context of schools we assume that senior teachers, who have accumulated more bureaucratic and professional experience embedded in school's bureaucratic organizational structure (Bidwell, 1965) are more likely than junior teachers to endorse the meritocratic ideology (i.e., 'performance-output' evaluation style) which underlies schools' structure. In contrast, junior teachers, who have less experience with managing school's bureaucracy, will tend to prefer the 'effort-input' evaluation style.

METHODOLOGY

Sample

The study was carried out in a national sample of 165 high schools, representing the four sectors of the Israeli public educational system: Jewish secular (99 schools), Jewish religious (23 schools), Jewish ultra-orthodox (16 schools) and Arab (27 schools). This was the same national school sample drawn for the Israeli PISA assessment of student academic achievement which was conducted in 2001.

In each school, three teachers were randomly drawn from the list of teachers teaching in 10th grade, one in each of the three tested subjects: language (Hebrew or Arabic), mathematics and science. The teachers were asked to answer an anonymous questionnaire that, included questions about their evaluation considerations. Not all the sampled teachers in every school responded and the final sample included 380 teachers (about 73% of the total sample). Using cluster analysis as the main methodology of this research (see below) required listwise deletion (Everitt, Landau, and Lesse, 2001), which reduced the sample to 312 teachers.

Respondents' gender distribution was 71.3% females and 28.7% males. All respondents had an academic degree: 54.8% of them held a B.A. degree and 45.2% an M.A. degree. Respondents' seniority (number of years in teaching) ranged from 1 to 42 years ($M= 18.3$; $SD= 8.9$).

Measures

Independent individual-status variables:

Gender. 0= females 1= males.

Educational level. 0= B.A. 1= M.A.

Seniority. Is defined as the number of years working as a teacher (ranges from 1 to 42 years).

Dependent variable:

Teachers' distribution rule preferences when distributing grades. Teachers were asked to ascribe a weight (in percents) to five different distribution rules that they apply when distributing grades. The rules include talent, academic performance (success in tests), effort that student invests in the learning process, learning behavior in class and student's need of encouragement. These variables are interdependent. Thus, their sum (i.e., five weights or percentages) results in a total of 100%.

In order to preserve the proportions between the five factors' weights that teachers actually take into account simultaneously when they distribute grades (Sabbagh et al., 2003), we used Cluster Analysis- K-means (Everitt et al., 2001). This procedure enables representation of teachers' evaluation (grading) styles according to the weight (percents) attributed to each of the five factors. Specifically, cluster analysis classifies the data in a manner where each respondent belongs to only one cluster, and all clusters contain the entire responding sample. A major benefit of using cluster analysis is that it results in a classification schema that simplify complicated data platform and display it in a meaningful manner. Thus, each cluster provides a concise description of similar patterns of preferences, disregarding small differences in the response pattern as appear in the data.

RESULTS

Identifying Teachers' Evaluation Styles

The best number of K clusters leading to the greatest distinction (distance) is not known a priori and must be computed from the data. Therefore, as the first step cluster analysis was conducted with K=5. This analysis sliced the data to 5 clusters. Since in 4 of the 5 clusters "academic performance" appeared carrying the highest weight, and the number of respondents in each of them was not too big, we reduced the data into 2 optimal clusters according to their content. Thus, in the second step, cluster analysis was conducted with K= 2. Each of the two clusters that appeared in this analysis contained five means of weights (in percent) attributed to each of the rules that guide teachers in grades distribution. In order to assure that these 2 clusters minimize variability within clusters and maximize variability between clusters, we conducted a T test for two independent samples which proved that the two clusters are indeed distinguished (i.e., significantly different in all five factors).

Table 1 displays the general results of the cluster analysis. Accordingly, the first and most predominant style was labeled 'performance (output)'. This style stresses students' academic

performance and accords significantly lower weight to effort, students' behavior in class, students' need of encouragement, and talent. 77.9% of the respondents were affiliated with this evaluation style. The second style was labeled 'effort (input)' style. In this style teachers attribute greater weight to students' learning efforts and significantly lower weight to academic performance. Only 22.1% of the respondents were affiliated with this evaluation style. The outcome variable is thus a categorical variable that was encoded as a binary variable where 'effort (input)' style is assigned "0" and 'performance (outcome)' style – "1".

A closer look of Table 1 reveals that the mean percent of "academic performance" rule is significantly higher in the 'performance' ('outcome') style than in 'effort' ('input') style (71.11% vs. 29.72%). The mean percent of the "talent" rule was higher in 'effort' style as compared to 'performance' style (3.31% vs. 13.09%). A possible interpretation of this finding is that teachers perceive "talent" not as ability to achieve high academic performance, but rather as ability to express creativity, innovation and originality in the learning process. As could be logically expected the "student behavior in class" rule was more strongly emphasized in the 'effort (input)' evaluation style than in the 'performance (output)' style (11.07% vs. 4.73%). This rule together with the rule 'effort invested in the learning process' accounted for 47.08% (on the average) of the grade allocated to a student by the 'effort' style teacher. In the same vein, the rule "need for encouragement" is a factor considered more strongly by teachers of the 'effort' style than by those of the 'performance' style (10.10% vs. 5.94%).

Table 1. Rules' weight (percentage) when distributing grades by evaluation style (cluster)

	Teachers' evaluation styles (clusters)	
	Cluster 1: Performance (output) N=243 (%77.9)	Cluster 2: Effort (input) N=69 (%22.1)
Distribution rules		
Talent	3.31	13.09
Academic performance (tests)	71.11	29.72
Efforts invested in the learning process	14.91	36.01
Student behavior in class	4.73	11.07
Need to encourage students	5.94	10.10
Total	100	100

To conclude, when asked to weight five distribution rules as are used in evaluating their students, two evaluation styles could be distinctly verified. The performance (output) evaluation style, to which most of the teachers adhere, is characterized by a significantly higher weight accorded to "academic performance rule", while the other four rules were more strongly emphasized in the case of the "effort (input)" evaluation style.

Do Individual-Level Status Variables Matter?

To answer this question, we examined a logistic regression model which is suitable for the prediction of categorical or binary outcome variables (Pampel, 2000). Accordingly, teachers' evaluation style (two categories) was defined as the dependent variable, and the three personal individual-status variables - gender, educational level and seniority – as independent variables. Table 2 shows the regression coefficients, wald statistics and odds ratio for each of the three independent variables. These findings suggest that the independent variables, as a set, do not predict respondent's preference for either of the evaluation styles. Moreover, a test of the full model with the three predictors was not statistically significant, $\chi^2(3, N=312) = 4.532$. $p > .05$.

Table 2. Logistic regression of teachers' status characteristics on evaluation styles

Status characteristic	<i>B</i>	S.E.	Odds ratio	Wald Statistic χ^2
Gender	.237	.316	1.267	.564
Educational level	.545	.284	1.724	3.647
Seniority	.003	.015	1.003	.036

CONCLUSIONS AND DISCUSSION

Our starting point in the current investigation is emphasizing the relevance and importance of justice in daily life in formal educational settings (Hochschild, 1981; Sabbagh, Resh, Mor, and Vanhuysse, 2006; Thorkildsen, 1989). Leaning on Walzer's (1983) seminal analysis, which suggests that education is a "sphere of justice," we focus here on one aspect of justice distribution in school, grades' allocation by teachers (the evaluation process). Yet, only few studies have attempted to examine the rules guiding teachers when distributing grades. Such examination, however, is of special importance because these rules function as a mechanism of guaranteeing justice in this crucial arena of school life, which has far reaching implications for students' present and future life chances. It is also a strong latent mechanism of socialization, inculcating norms of achievement orientation and universalism (Dreeben, 1968). Experiencing justice, in turn, has been shown as enhancing people and students' well-being (Dalbert, 2004).

Against this background and based on the contingency approach to justice (Deutsch, 1985; Leventhal, 1976), our study attempted to systematically identify major patterns of grading that teachers apply when evaluating students, namely, patterns of simultaneously weighted combination of different distribution rules that teachers use when allocating grades. Moreover, it examined to what extent teachers' evaluation styles are affected by their personal and professional characteristics.

In order to identify the different teachers' evaluation styles, we applied Cluster Analysis, which is innovative in this context. In doing so, we could capture simultaneously (in a holistic manner), the relative weights that teachers accord to the different distribution rules. Findings

unveiled two main teachers' evaluation styles: The first, labeled 'performance (output)' evaluation style, stresses students' academic performance and accords significantly lower weight to students' effort, behavior in class, need of encouragement, and talent. More than three quarters of the teachers 'belong' to this style. The second, labeled 'effort (input)' evaluation style, attributes greater weight to students' learning efforts and significantly lower weight to academic performance.

Evaluation of students is not an independent practice but rather an extension of class teaching and pedagogical methods. Hence, these two evaluation styles may be interpreted as reflecting two different teaching conceptions. The 'performance' (output) style represents a more traditional approach whereby teachers are perceived as the main authority, holding the basic knowledge which is supposed to be transmitted to students. Accordingly, students are perceived as passive absorbers that are supposed to be filled by teachers' knowledge (e.g. Dickmeyer, 1989; Rosenshine and Stevens, 1986). In contrast, the 'effort (input)' evaluation style may represent a more progressive educational approach in which both teachers and students are responsible for the learning process. Teachers are not seen as the ultimate sources knowledge, but rather guides or mentors, and students are perceived as active learners (e.g. Apple, 1982; Dewey, 1902/1956; Windschitl, 2002). The possible relationship between perceptions about students and teachers roles and about the nature of the teaching learning process, on the one hand, and evaluation styles as revealed here, on the other hand, is a worthwhile line of future research. This is more so in view of the finding that individual-status variables (gender, educational level and seniority) have no influence on teachers' evaluation style.

The prominence of the 'performance (outcome)' evaluation style, where the majority of teachers endorsed this style, corresponds to common view about educational systems as guided by the democratic-western spirit of meritocracy (Hurn, 1985; Young, 1971). In this case, grades serve as a major selecting mechanism and teachers, who allocate them, as the gatekeepers of the meritocratic selection process and as the socializing agents that transmit societal values. As mentioned above, however, it should be noted that this evaluation style does not characterize the whole population of teachers (at least those included in this study). There is a relatively significant group of teachers that prefer the rules of effort and behavior over actual performance when distributing grades.

This variance in teachers' evaluation styles logically raises the assumption that it may be affected by different individual and social/cultural level factors. As already mentioned the findings in the current study suggest that individual level variables, defined in terms of teachers' different status positions, did not affect the preference for a specific grading evaluation style. It is worth noting, that this finding differs from those in other arenas of justice research, where individual variables have been found to explain distribution preferences. What explanation can we bring forward for this irrelevance of individual variables? First, as already noted above, teachers' personal status positions affect evaluation style only indirectly: higher or stronger positions (male, higher education, seniority) may increase teachers' tendency to support the stronger group and to adhere to meritocratic norms by adapting the 'performance-output' evaluation style. Even if this line of argument seems acceptable, it should be examined empirically with a greater number and more specified background variables than we had at hand in this data. Second, and most important, is the fact the teachers' population is relatively homogeneous: a high proportion of them are women, their socio-economic status is probably quite similar, they are all with academic education

differentiated only by degree (B.A. vs. MA) and it is hard to foresee the direction of seniority's influence. Moreover, Israeli high school teachers, act within strong bureaucratic constraints: they must focus on preparation of students towards external matriculation exams (measured as success in exit tests), which affects their grading practice and do not encourage implementation of more flexible rules in their grading practices.

Given that in the actual world of school the practice of grading is very common and, that in doing so, teachers usually combine and differentially weigh a number of considerations, the cluster analysis which enabled the distinction of styles or patterns of grading is an important contribution to the investigation of the process of grading in schools. Learning on this innovative measure future research should attempt to explain the variation in different evaluation styles, beyond our preliminary (and unsuccessful) analysis. First, teachers' evaluation style is likely to be affected by teachers' perceptions of the subject matter they teach. For instance, perceiving a subject matter as flexible and modular (e.g. humanities subjects) may be related to the 'effort' (input) evaluation style, while perceiving a subject matter as linear and hierarchical (e.g. mathematics) may be related to the 'performance' (output) evaluation style (Biberman-Shalev, 2007). Second, related to the perceptions of subject matter, may be worthwhile to introduce other relevant variables that are embedded in teachers' role such as pedagogical teaching methods (e.g. traditional vs. progressive methods), teacher-student relationships (e.g. personal vs. formal relationship) and teachers' self-efficacy (e.g. low vs. high confidence in professional ability). Third, students' characteristics may also affect teachers' preferences for an evaluation style. For example, teachers' evaluation styles may depend on students' academic level (e.g. 'strong' vs. 'weak' students) or on students' educational stages (primary, lower and higher secondary, or higher education). Finally, future studies should examine to what extent teachers' evaluation styles are culturally dependent – in other words, to what extent the two-dimensional structure of evaluation styles as revealed in the current investigation is replicated in other cultures. Assuming that this structure is universal, future studies can determine to what extent the cultural-educational specific condition may explain differences in appearance (frequency) of the different evaluation styles.

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CHINA EFL: A NEW PARADIGM

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PROBLEM IDENTIFICATION

Graduates of the Xinyang Agriculture College English Department suffer from the same pedagogy and methodology that has generally failed China for the past 25 years. The graduates are functionally illiterate in that they have studied English for 12 years but are unable to speak or write coherently, at even a basic level. They are required to learn English through four independent and disconnected courses, i.e. intensive reading, comprehensive listening, extensive writing and oral English.. The teaching methodology is rote memorization of “set phrases” through talk and chalk. There is no English speaking environment, no target language immersion or acquisition.

Xinyang Agricultural College also suffers from the same heavy bank debt service obligations as articulated in the 3/13/07 China Daily article, “Debt warning for universities”[1]. This has resulted in far too high a student/teacher ratio of 150/1. An English class of 40 students in 2002 has ballooned to a class of 160 students in 2006. There is simply not enough money to hire a sufficient number of teachers and even if the funds were available, there is a distinct shortage of qualified and experienced teachers.

Colleges and universities throughout Mainland China must develop a new management strategy that increases economic efficiency while simultaneously improving the quality of the educational product being delivered to the student/consumer.

To maintain the status quo not only cheats the student/consumer by providing them with less than what they are entitled to for their tuition fees; but it also cheats Chinese society as a whole because these college graduates will not be properly prepared to make their maximum contribution to a better-off Chinese society.

THE NEW PARADIGM

Commencing with the spring semester, March 2007, the Xinyang Agricultural College curriculum committee approved two experimental EFL courses; Holistic English I for a class of 360 freshmen and Holistic Business English I for a class of 348 sophomores.

There were many conceptual problems to obtaining approval of the new paradigm.

First, the Workbooks are not yet published because they are still in the formative stages. Usually a university will only authorize the use of published texts.

Second, there was concern that the movies may contain vulgar language, sex or violence and that they had not appeared on the list of approved movies published by Beijing. (Each movie was pre-screened and did contain vulgar language, sex and violence, in amounts less than those found in normal daily life, but realistic in nature.)

Third, there was reluctance to substitute movies for a live foreign expert. (Learning only occurs through direct teacher/student contact?)

Fourth, there was reluctance to substitute one evening class for 9 daytime classes. (Empty classrooms during regular class times seemed inappropriate.)

Fifth, there was fear that students would not "catch the meaning" of the movies (as if they catch the meaning of all text books or lectures).

Sixth, encouraging students to have fun watching movies just did not seem to be a very educational endeavor. (Studying must be a painful and time-consuming endurance event?)

1. Course Description, Holistic Business English I

This one semester course is designed by Niu Qiang, PhD, Martin Wolff, J.D. and Teng Hai, MBA (cn) utilizing a holistic approach to language acquisition through comprehensible input in a friendly environment. (Stephen Krashen's second language acquisition model) The course is designed for Sophomore English majors, non-English majors and Business majors.

The course is a comprehensive, but remedial, "holistic" approach to English acquisition including observation, listening, reading, writing, debate, conversation and Internet research. This course revolves around 9 commercial Hollywood entertainment movies with business content, theme or moral.

The underlying educational philosophy is that the best way to truly improve a student's second language acquisition is through the student's reading, listening, writing and speaking more English, in a holistic manner. There is no shortcut. This course is intended to provide timeless business conversation issues with current application in China.

There are reading and vocabulary activities for the students to complete before watching the movie. The primary purpose of the exercises before watching the movie is to increase the student's comprehension of the movie, i.e. Krashen's "comprehensible input" theory.

There are no academic exercises while watching the movie, thus creating Krashen's "friendly environment" through the absence of academic rigors. Students are encouraged to bring drinks and snacks, relax, and enjoy the movie. The movies are interesting, entertaining, and most importantly, educational. They may be played in any order as one does not build upon another. To enhance the educational value of the movies and hence improve English acquisition and business knowledge, the movies must be presented within a friendly entertainment atmosphere instead of within the institutional strictures of a rigorous academic assignment.

After watching the movie there are writing assignments; Internet research assignments that will draw the student's attention to current issues in China related to the moral of the movie; and suggested topics for conversation or debate. The exercises after watching the movie are intended to involve the student in an in-depth analysis of the moral of the movie and its current relevance in China, and thus prepare the student for the subsequent

conversation or debate regarding the movie. This will facilitate language acquisition and output.

The main objective of this course is to take the students out of the language-learning realm and place them into a language acquisition mode and increase language output.

This course is a departure from the "talk and chalk" teaching methodology where the students are required to "memorize and regurgitate" for a test oriented course. There is simply nothing to memorize. At the same time, the course will expand the students' worldview and business knowledge.

The idea of "Holistic Approach" is borrowed from psychology and has been applied to many fields other than linguistics. Holistic approach in language teaching means to treat what is to be learned as a whole. This course is holistic on three levels: First, along with the movies, the five skills of language are not presented in isolation, but are integrated in one course; Second, due to the nature of movies, English is not broken down into small units, rather the input is presented in all its complexity, which enables the learner to acquire the real meaning and use of the words learned in isolation. Third, the most important innovation of this course is the idea of introducing international business culture by way of movies. The content of the movies provides both a global view of the business world and the underlying culture differences between the east and the west. In addition, moral and personality essentials towards success and failures, gains and loss are an indispensable part of each movie, which will help to build up the university students' character and prepare them for possible challenges in their future life. It achieves what we call "Quality Education" in the real sense. Last but not least, this course is a very example of the famous Chinese saying "combine education with recreation".

The movies will not only strongly motivate the students so as to develop a positive attitude towards classroom learning, but also effectively teach them how to learn on their own outside the classroom, which we believe is the solution of English learning in the end.

The movies replace traditional textbooks that contain old, boring and irrelevant stories or "set phrases" to be memorized through role playing and game playing; resources that evoke constant criticism from students and foreign teachers alike.

This course should not be confused with a "film appreciation" class that studies the film for creation, composition and value. This new paradigm is completely different from the academic pursuit of studying films. Nor is this a CALL (Computer Assisted Language Learning) course. The computer is only one tool in the integrated use of modern technology. This is truly a holistic English course.

2. Course Description, Holistic Freshman English I

This course differs from the sophomore's Holistic Business English I in that the freshmen movies are a little easier to comprehend and the subject matter is more cross-cultural and does not concentrate on business issues.

3. Course Workbooks: Holistic Freshmen English Workbook I and Holistic English Workbook, Business I

The workbooks are not written in textbook format intending to impart the authors' substantive knowledge to the students. Rather, it is designed as a workbook for implementation of the "Seven Factors of Optimal Input" put forth by Dr. Niu Qiang (9/2001) *Re-examine the Role of Input and the Features of Optimal Input Part I*, (12/2001) Part II, *Teaching English In China* Vol. 24, Issue #3 and Vol. 24, Issue #4.

The workbooks [2] are the product of five years research, investigation and testing [3] at 6 Mainland Chinese universities [4]

They are workbooks designed to 1) facilitate the students' self-study; 2) increase the students' business vocabulary and knowledge; 3) assist the students in developing creative thinking; 3) to encourage the students to engage in critical analysis and problem solving; 4) to embolden the students in developing an ethical standard with which they will guide their personal and professional lives and 5) increase confidence in oral communication.

The workbooks allow each student to comprehend, produce and progress according to their own particular pace. Students of various skill levels and knowledge levels will be able to interact with each other since there are no right or wrong answers; just creative answers based upon the individuals' level of comprehension, level of English acquisition, their state of academic accomplishment, and the extent of their classroom participation in conversations and debates.

The depth of discussion and debate will depend upon the nature and mix of the student group, their grade level, the quality of the educational institution, and the ability of the teacher. The movies may be selected in any order and according to the students' interests.

At RMB 30.00 each, the workbooks are also affordable by even the poorest students and they eliminate the need for students to purchase additional notebooks.

3. Course Scheduling

Movies should be shown on Monday and Tuesday evenings. Students should have one week prior to watching the movie to do the required homework. After watching the movie, students should have one week to complete the required homework to prepare for the subsequent conversation class.

During the first week of the semester, all 357 freshmen met on one evening in a large multi-media classroom for a course introduction and all 352 sophomore students met on another evening. The introduction included an explanation of the new pedagogy and methodology; a walk-through of the Workbook for the first movie assignment and first homework; and the students were shown the first 20% of the movie "The Paper Chase." (The entire movie was available on the school website for those interested students who wanted to watch the entire movie).

During the second week the freshman met in 9 discussion groups, in their regular classrooms, during their regular daytime schedules. These classrooms have movable desks and chairs so the students can face each other, as opposed to theatre style seating where the students talk to the back of each other's heads.[5]. During the second week all 348 sophomores met one evening in the multi-media room to watch their first movie. The regular

daytime classes were transferred to the single evening class because the movies require 2 ½ hours to view and will not fit into the 90-minute regular class schedule.

During the third week of the semester the sophomores met in 9 discussion groups, in their regular classrooms, during their regular daytime schedules. The freshmen met one evening in the multi-media room to watch their first movie.

In this way, the foreign expert conducted discussion classes every week, alternating every other week with freshman and sophomores. While the sophomores were assigned to watch an evening movie, the freshman had daily discussion classes and the sophomores had daily discussion classes during the week when the freshmen were assigned to watch a movie. This alternating schedule was maintained throughout the 18-week semester.

The foreign expert had a teaching load of 9 classes every week. A Chinese co-teacher, using English subtitles when available, showed the evening movies. Chinese subtitles were never allowed, as they would be counterproductive to English acquisition.

All of the movies were also available on the Xinyang Agricultural College web site, in the school sound lab and the College computer lab. This eliminated any excuse for a student missing a movie.

Two Chinese co-teachers were assigned to assist the foreign expert. One co-teacher showed the movies in the evening and both co-teachers, on occasion, would participate in the discussion classes for the purpose of learning how to conduct the course in the future, without a foreign expert.

Each class has a student monitor who was assigned to teach all classmates how to access the web site movies, to assign classmates to be responsible for classroom cleanliness and govern movie admission in the multi-media classroom by checking workbooks at the door. (No class workbook, no entry.) This insured that the limited seating was available for the class students only and that those alien to the class, who had no motivation to follow the class decorum, were excluded.

ECONOMIC EFFICIENCY

The wage disparity between foreign experts and Chinese teachers is well documented elsewhere. Xinyang Agricultural College formerly required two foreign experts, one for the freshmen class and one for the sophomore class. Under the new paradigm only one foreign expert is required and the combined time commitment of the two Chinese co-teachers was 5 hours per week.

This immediately reduced the College's expenditure on foreign experts by 40%. When the Chinese co-teachers take full responsibility for the courses, in the near future, the College will realize a 90% budget reduction from the previous foreign expert budget.

There is also another budgetary benefit from the new paradigm. Under the old paradigm students were exposed to the foreign expert assigned to their class. Their experience was limited to the regional English spoken by that foreign expert.

While watching the English movies the students were exposed to an average of ten (10) native English speakers (using many different regional Englishes) per hour and two (2) L2 English speakers per hour. The students/consumers hear (three hundred sixty 360) native English speakers and seventy-two (72) L2 English speakers during the thirty-six (36) hour

semester and hence receive much higher value for their tuition fees than exposure to one (1) foreign expert for thirty-six (36) hours.

STUDENT EVALUATION OF THE NEW PARADIGM

At the end of the semester, 87% of the 352 sophomore students and 93% of the 357 freshmen students, participating in the holistic English program, voluntarily provided answers to an anonymous questionnaire.

The students were asked to rank (from 1 – 10 with 10 being the greatest help) how much the course helped them to improve in ten areas. (vocabulary, reading skills, listening skills, writing skills, conversation skills, (Charts #1, #2) confidence, motivation, discipline, (Charts #3,4) worldview and business knowledge (Charts #5,6). The students' responses are summarized in the attached charts.

The students claim to have comparatively benefited simultaneously in all ten categories, which confirms the value of the holistic approach using movies as the input base for oral English class.

The holistic English course was conducted simultaneously with the traditional reading, listening and writing courses; yet, the students found significant benefit in reading, listening and writing within the holistic course. This suggests that the traditional courses are in need of review.

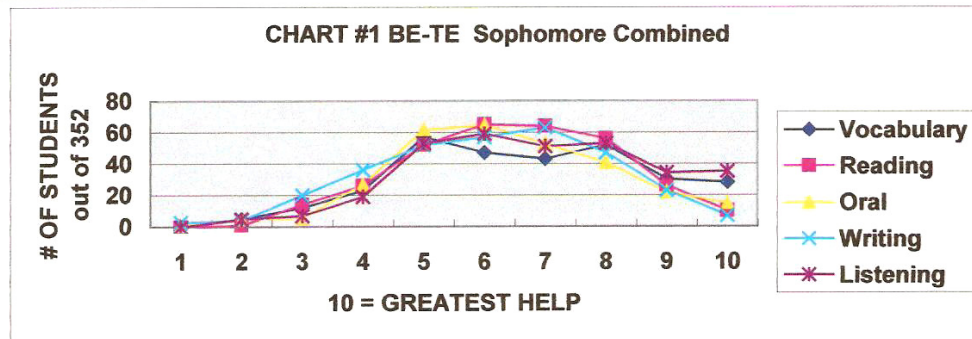
The primary complaint of the students was that with classes containing as many as 51 students, there was insufficient time for each student to converse with the teacher. This correlates directly with the students' evaluation that their conversation skills still lagged behind the development of their other skills, (See Charts #1, #2) even utilizing the holistic paradigm.

The students noted a particular benefit from the teacher assigning each student to conduct the discussion class for five minutes.

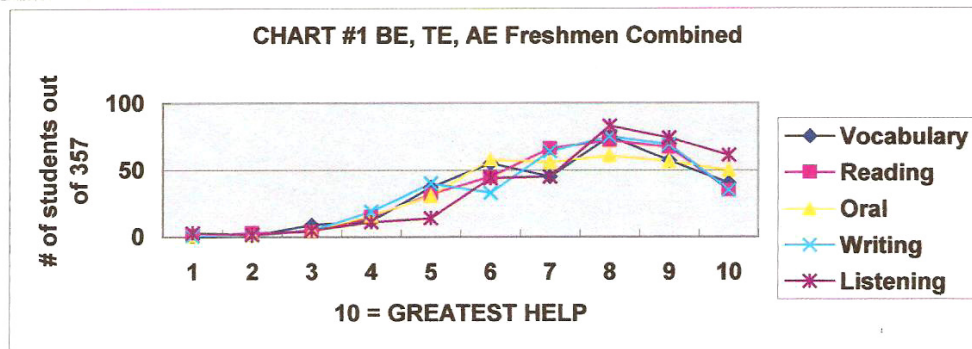
Enhanced confidence, motivation, discipline, (Charts #3,4) worldview and business knowledge (Charts #5,6) also suffered in classes with more than 40 students and as high as 51 students.

There is also a direct correlation between the degree of discipline, motivation and confidence, and the lack of enhancement of learning skills. Classes with 40 or more students experienced more disciplinary problems, less motivation, less confidence and fewer enhancements of skills.

The anonymous questionnaire also asked each student to register the grade they believed they had earned in the course. When comparing the grades requested by the students with the actual grades given, there was a 2% discrepancy. The students had undervalued their accomplishments, which means there is also a probable 2% under evaluation in each of the Charts.

Chart #1

This chart reflects that the sophomore Business English and Tourism English majors in the holistic English program lagged behind in the development of their oral communication skills. Class-by-class analysis establishes the problem being with those classes with more than 40 students and as many as 51 students. Classes with less than 40 students appear to have benefited more in development of their oral communication skills.

Chart #2

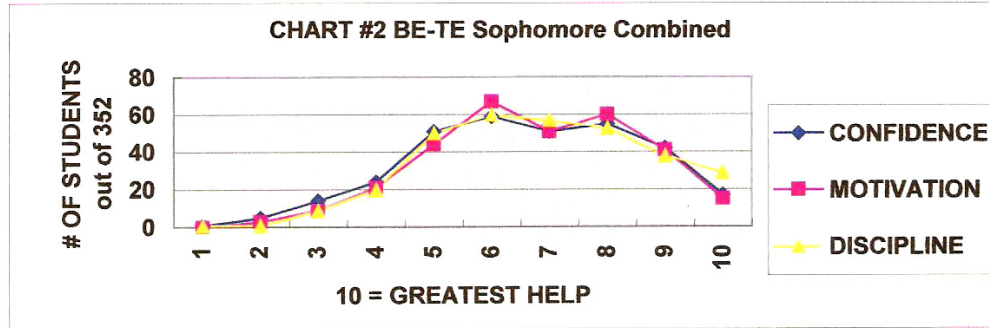
This chart reflects that the freshmen Business English, Tourism English and Applied English majors in the holistic English program lagged behind in the development of their oral communication skills. Class-by-class analysis establishes the problem being with those classes with more than 40 students and as many as 51 students. Classes with less than 40 students appear to have benefited more in development of their oral communication skills. However, this chart also reflects that the freshmen benefited from the holistic English program more than the sophomores.

UNANSWERED QUESTIONS

1. Why did the freshmen class generally benefit more from the holistic program than the sophomores?
2. Why did the freshmen class benefit more in business knowledge than the sophomore class when the freshmen movies were more cross-cultural in content and the sophomore movies were all business content specific?

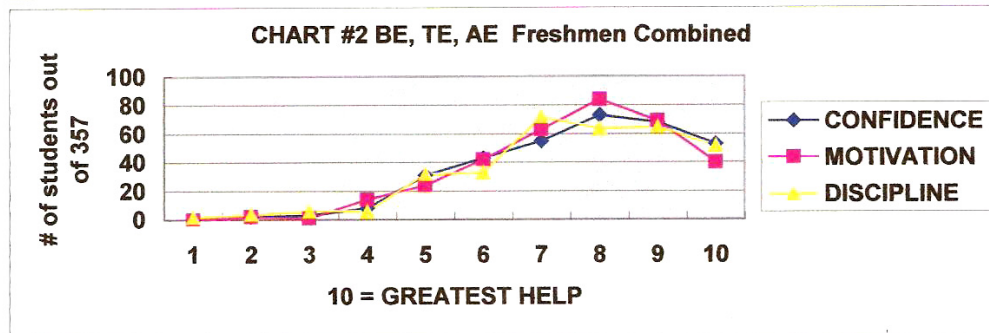
Both the freshmen and sophomore classes were admitted to the college based upon the identical college entrance examination scores and criteria.

Chart #3

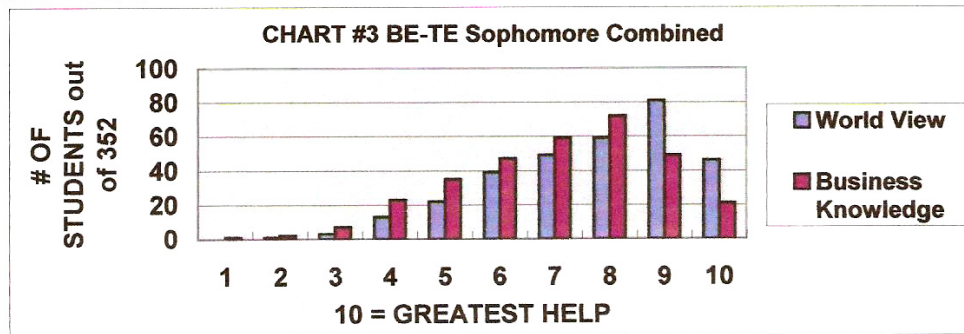


This chart reflects that the sophomore Business English and Tourism English majors in the holistic English program experienced benefit in confidence, motivation and discipline. Class-by-class analysis establishes that those students experiencing the least benefit are from those classes with more than 40 students and as many as 51 students. Classes with less than 40 students appear to have benefited more in development of their confidence, motivation and discipline.

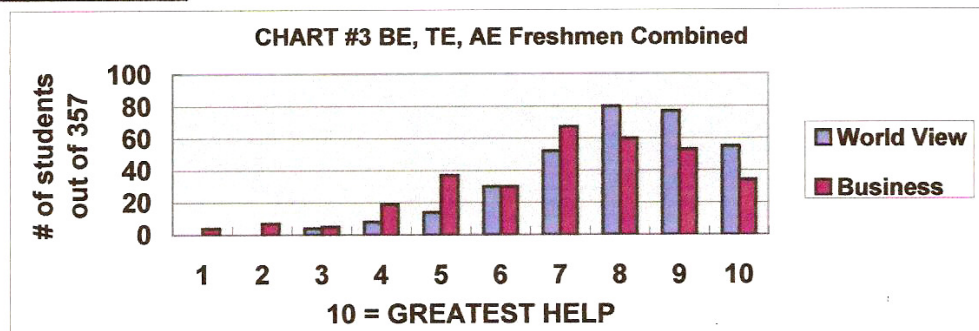
Chart #4



This chart reflects that the freshmen Business English, Tourism English and Applied English majors in the holistic English program experienced benefit in confidence, motivation and discipline. Class-by-class analysis establishes the problem being with those classes with more than 40 students and as many as 51 students. Classes with less than 40 students appear to have benefited more in development of their oral communication skills. However, this chart also reflects that the freshmen benefited from the holistic English program more than the sophomores.

Chart #5

This chart reflects that the sophomore Business English and Tourism English majors in the holistic English program experienced benefit in expanding both their worldview and business knowledge. Class-by-class analysis establishes that the Business English majors benefited more in their enhanced worldview and the Tourism English majors benefited more in their enhanced business knowledge. In classes with 40 to 51 students, benefit was significantly reduced.

CHART #6

This chart reflects that the freshmen Business English, Tourism English and Applied English majors in the holistic English program experienced benefit in expanding both their worldview and business knowledge. Class-by-class analysis establishes the problem being with those classes with more than 40 students and as many as 51 students. Classes with less than 40 students appear to have benefited more in development of their oral communication skills. However, this chart also reflects that the freshmen benefited from the holistic English program more than the sophomores.

CONCLUSION

Our preliminary conclusions are as follows:

1. Students benefited greatly from the new paradigm.
2. Classes with 40 or more students are anti-academic and a detriment to the students' acquisition of English.

3. Oral English classes should be conducted in classrooms specially designed to create a friendly conversation environment.
4. The new paradigm should be expanded into a two semester program for further trial basis and evaluation.
5. The workbooks should be improved following the students' responses to the anonymous questionnaire.
6. For the 2007-8 school year commencing in September 2007, Xinyang Agriculture College should offer Holistic Freshman English I and II [6] and Holistic Business English I and II. [7]

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- [3] CHINA EFL: USE AND ABUSE OF TEACHING WITH MOVIES (2006) Qiang, Teng, Wolff (In Press)
- [4] Changchun University, Jiangxi University of Finance and Economics, Shanghai Normal University, Shanghai University, Tong ji University and Xinyang Agricultural College
- [5] The College does not have any classroom set up specifically for conversation English and one is required.
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THE INFLUENCE OF FAMILIAL NETWORKS ON THE EDUCATIONAL BEHAVIOR OF ELEMENTARY SCHOOL STUDENTS

Marina Hennig and Marcel Helbig

ABSTRACT

In comparison to educational institutions, family networks play a decisive role for educational attainment. Empirical educational science faces the basic problem, that education is primarily defined through institutional characteristics, which are related to systemic educational processes. This neglects the significance of the life world and the realm of experiences, through which adolescents acquire the knowledge and competencies they need in order to be able to cope with every day life. These educational- and learning processes are facilitated by the family. For within the family and its intergenerational relationships an understanding of reciprocity is formed through social relations, solidarity and reliability. The adaptations of life-relevant practical and procedural knowledge are significantly influenced by (social)- milieu-specific experiences and opportunity structure.

In this paper we will show how socio-specific experiences within the family influence children's educational attitude in school. We will mainly focus on the social and cultural resources available to the family of origin, which includes: The parent's educational attainment, their socioeconomic endowment and their social contacts in terms of social networks. The results of the conducted study, which included 60 students and their parents from Berlin, show that in addition to the socioeconomic status, both the size and the composition of social networks are potent for explaining the development of the educational attitude of elementary school children. These factors clearly have a greater influence than factors within the school, such as school- or class climate.

INTRODUCTION

Schooling is one of the most important investments young people can make in their future. Better education can provide young people with more money, more stable careers, and protection from unemployment. Better educated parents live longer and are healthier.

In recent decades, educational sociologists have learned a considerable amount about the factors influencing educational transitions. Whether a young person completes a higher level of schooling depends upon family background, resources, upbringing, and the characteristics

of the family's living situation. Other relevant factors include the young person's experiences in school, including participation, grades, and behavior.

This paper considers the importance of familial resources in view of the gaps in understanding about the mechanisms that play a role in educational transitions. It is intended to supplement previous research that concentrated more heavily upon the inclusion of the parents in children's education and schooling, home values, and, later, relationships in the community. Sociologists have, for example, focused on the interaction between characteristic living environments and family behaviors by researching issues such as the strategies that families living in unsafe neighborhoods use in managing activities that help their children succeed in school (Elder et.al. 1995).

The school itself also represents an important context for child development. However, research has shown repeatedly that there is only a slight connection between the financial resources of schools and school achievement (Hanushek 1989).

It is seldom emphasized, but resources in the form of social relationships both within, and outside of, the family hold great potential for influencing the lives of children. Starting with Coleman and Hoffer, there have been a number of studies that have explored the relative importance of relationships within the family and relationships outside of the family.

Coleman and Hoffer have considered private Catholic schools as extensions of familial values, with the school serving as a functional community for the assertion of parental norms and values. Confirming their assumptions was the finding that the dropout rate among students attending Catholic schools is lower than in other private or public schools. While other studies (Furstenburg and Hughes 1995, Schneider and Coleman 1993, Teachman, Paasch and Carver 1996) have examined the consequences of such parental relationships for middle and high schools, none has studied the consequences of these relationships for the educational transitions of elementary school students.

This is the case, in large part, because the process of educational transition is specific to Germany. In the German school system, pupils are generally selected to attend various types of secondary schools, usually after the fourth grade, except in Berlin and Brandenburg, where this transition occurs after the sixth grade. Teachers decide on the basis of grades which pupils will attend which secondary school: *Hauptschule*, or lower-level secondary school; *Realschule*, or middle-level secondary school; or *Gymnasium*, or upper-level secondary school.

We assume that families embedded in a stronger network of social relationships outside of the household are in a better position to develop their children's human capital than those families that do not have such a network at their disposal.

EXCURSUS: THE SCHOOL SYSTEM IN GERMANY

In Germany, elementary school lasts four years (six years in Berlin and Brandenburg), and is compulsory for all pupils. When elementary school has been completed, teachers decide on the basis of grades which secondary school the pupils will attend (Figure 1).

Hauptschule is intended for students who want to enter into an apprenticeship after finishing school. Because *Hauptschule* is supposed to prepare students for life in the workplace, the acquisition of practical knowledge and skills is strongly emphasized alongside

theoretical learning. Schooling for pupils attending *Hauptschule* lasts a total of nine years. After completing school, students are awarded *Hauptschule* qualifications. After receiving their qualifications, students can embark on a dual course of on-the-job training and attendance at a *Berufsschule* (part-time vocational school), or they can choose to attend a *Berufsfachschule* (full-time vocational school).

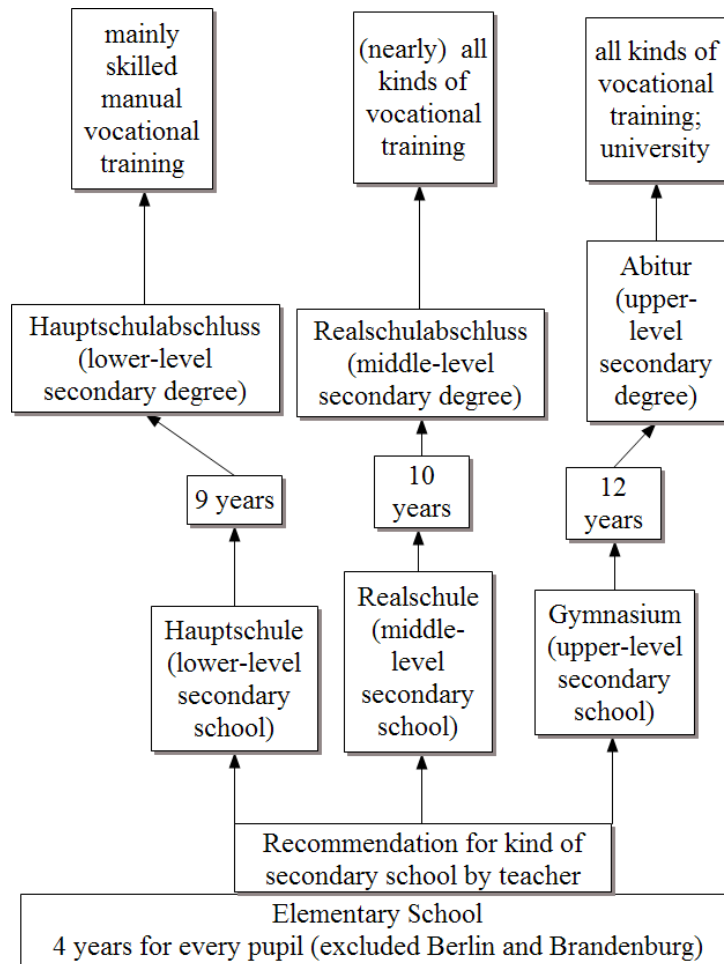


Figure 1: The German School System

Realschule offers students a comprehensive general education. Compared with *Gymnasium*, pupils receive an education that is more vocational in its emphasis. Students are expected to engage in more independent study than in *Hauptschule*. Schooling for children who attend *Realschule* lasts a total of 10 years. *Realschule* graduates can attend a *Berufsfachschule* (full-time vocational school), or they can attend a *Fachoberhauptschule* (vocational extended secondary school) and then enroll in a *Fachhochschule* (vocational college).

Students who attend *Gymnasium* spend eight years in this school before taking their final examinations, or *Abitur*. *Gymnasium* is for students who wish to study at university or a

vocational college (*Fachhochschule*) after completing their schooling. After six years at *Gymnasium*, students can specialize in different subjects. Compared with *Hauptschule* or *Realschule*, more initiative is expected of *Gymnasium* students. After completing *Gymnasium* and passing the *Abitur*, students may attend university, which offers a more theoretical education; or a *Hochschule*, a type of university that offers a more practical education; or a *Fachhochschule*.

Students who do well can transfer from *Realschule* to *Gymnasium*, or from *Hauptschule* to *Realschule*—sometimes even from *Hauptschule* to *Gymnasium*. Conversely, *Gymnasium* students can transfer to *Realschule*. In Germany, the transition is an important indicator of success in school because the school system is extremely impermeable. Just 3.2% of German students manage to move to a higher level secondary school after the initial school selection (Bellenberg et al. 2004). In Germany in 2005, 24.8% of students finished school with *Hauptschule* qualifications, 41.6% with *Realschule* qualifications, and 25.4% with university entrance qualifications. In the same year, 8.2% of all students left school without any qualifications (Federal Statistic Office 2007). Decisions about education affect students for the rest of their lives. Income and unemployment rates are strongly linked to educational attainment. The selection of a secondary school that takes place in the fourth grade, typically at age 10, therefore represents a decision that is difficult to reverse, but which can determine the course of a student's entire life.

SOCIAL CAPITAL

Families have a least three types of resources, or capital, that they can dedicate to their children. Financial capital consists of monetary resources that can be used to purchase goods and services.

Human capital consists of abilities and skills that individuals have acquired as a means of adapting to their environment, and generally take the form of school qualifications or diplomas. For Bourdieu (1983), the concept of human capital, which he called “cultural capital,” does not just encompass institutionalized cultural capital, such as school qualifications. Instead, Bourdieu viewed the possession of objectified cultural goods and abilities as embodied cultural capital.

Social capital, Coleman and others have posited, consists of relationships between 1) parents and children, and 2) parents and other individuals and institutions that influence the children's development, and which are necessary for the development of human capital.

The first type of social capital is in households, and develops through the time parents spend teaching, caring for, observing, and supervising their children. Many studies have dealt with tasks of this type in different ways, but do not usually place them under the heading of social capital. Work performed by mothers that is not directly related to education is often seen as an indicator for the lack of time mothers invest in their children. This is based on the assumption that a direct substitutional relationship exists between time spent on housework and time spent with children. Children in single parent families are disadvantaged because they lack the time and attention that two parents can give. The number of siblings is an important indicator for the reduction in personal time that parents can devote to each of their children (Coleman 1988).

Coleman's concept of social capital also includes the way in which parents interact with their children. Studies that have tried to capture such parent-child interaction by posing questions about communication, and through observation, have found that there is a connection between interaction and school achievement (Astone and McLanahan 1991; Furstenberg and Hughes 1995, Hagan, Macmillan and Wheaton 1996, Teachman et. al. 1996).

In the end, the expectations parents have of their children are key in determining levels of educational attainment and investments by parents in human capital (Schneider and Coleman 1993). Although the first type of social capital is shown to be connected to child development, the second type, social relationships with other households, has seldom been studied empirically.

Coleman argues that these relationships are a source of support and information. They are based upon strong interpersonal relationships that are characterized by mutual obligations, expectations, and reciprocity, and which are preserved through norms and sanctions.

These interpersonal relationships can be strong (as is the case with kin) or weak (as is the case with a professional network).

Coleman and Hoffer (1987) argue, as do others, that the connections between families create a "functional community" with norms and effective sanctions that both encourage and limit children's actions. When parents have such relationships, they can be more effective in communicating common goals and values, and in observing and monitoring the behavior of the children. Parental networks can include information about and relationships with colleagues, and can facilitate communication and monitoring of each family's children, and of those of their friends. This social capital interacts with other parental resources to facilitate the development of human capital.

The participation in school activities or contact with school personnel is an indication of involvement of the parents in their children's school, and of embeddedness in networks. Both are linked to a significant extent to children's school grades (Coleman 1988). The relationships within the household are increasingly measured in terms of how well the parents know the parents of their children's friends. This measure does not, however, reveal anything about the nature or the consequences of the acquaintanceship or relationship. A key question is whether, when looking at the types of connections between families, relationships to kin or to non-relatives are more likely to improve the chances that students will transition to higher levels of schooling. In general, relatives are neither numerous nor diverse, and family members cannot afford to provide both normative control and information about colleagues and work opportunities.

In contrast, weak relationships are often channels through which resources, such as time and financial support, can flow as needed. In addition to being numerous and diverse, weak relationships allow for greater reciprocity in networks than strong relationships because parents who have invested in friendships (but not in family members) can expect more help in an emergency than those who have not done so. (Hofferth, Boisjoly and Duncan 1998). This observation bolsters the idea that the giving of support generates debt—a sort of social capital account (Coleman 1988)—and that friendships are essential in this context.

These types of social relationships are not always characteristic of families. A great number of situations and circumstances, including divorce and drug abuse, can destroy social, human, and financial capital.

What is special about the concept of social capital is the idea that social capital, like financial and human capital, represents a stock or account of potential assistance, and network

linkages that is developed through conscious or unconscious investment processes, and can be drawn upon as needed (Bourdieu 1986, Coleman 1988). A given exchange reflects investments in these networks or reciprocity for the investments already made. Just as financial capital in the form of family income and human capital in the form of parental education are linked to the school performance of the children (Haveman and Wolfe 1994), so we hypothesized that social capital would be associated with achievements in school.

We assume that social capital is correlated with other resources, and therefore leads to increasing or decreasing success in school. Income is the most important of these other resources. The effects of social capital are not the same, however, for all income groups because the lack of other resources can contribute to a decline in social capital.

On the one hand, children whose parents have financial and personal resources that provide support do not need a close network of supportive family members and friends. On the other hand, social capital can increase the effects of income on school success. Teachman et al. (1997) have investigated the effects of the interaction between measured social capital and income on school success. The effects were found to be positive, with social capital strengthening the effects of other resources, such as parental income and education.

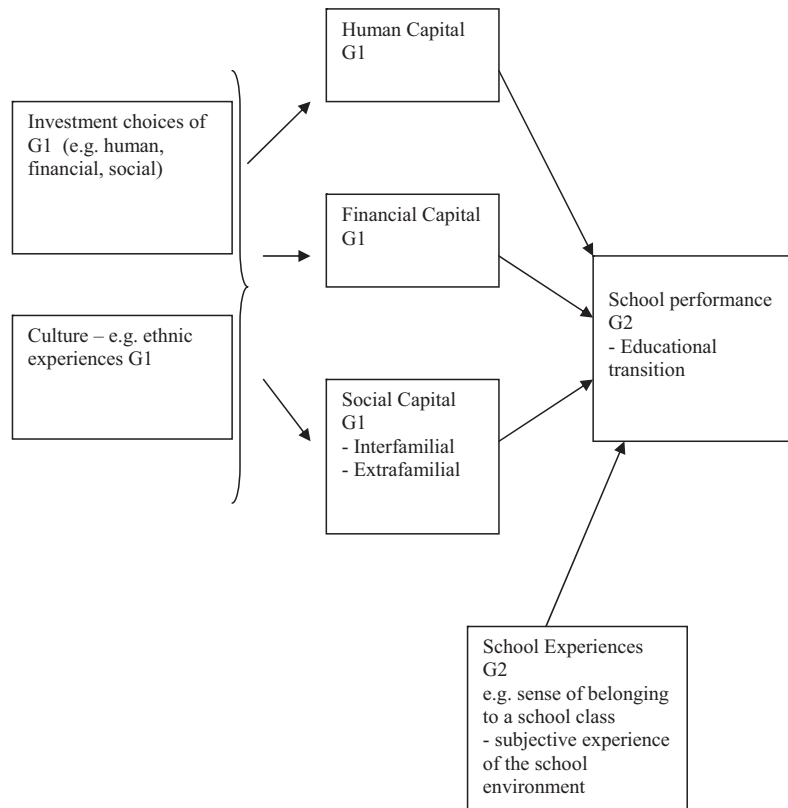


Figure 2: Generational transmission of Human, Financial and Social Capital

In our study, we concentrate on parental human, financial, and social capital, as well as on the school environment of the children. Social capital is considered to have an important intergenerational dimension.

Figure 2 illustrates the hypothetical relationships over generations between human capital, financial capital, and social capital on the one hand, and children's school performance on the other. G1 refers to the parental generation, and G2 to the children's generation.

The model shows both the factors associated with access to financial, human, and social capital, and the ways in which this capital influences the school performance of the child. Added to the model are the influences of school experiences.

Starting at the left, see first the financial, human, and social capital of the parents, which depends upon their investment opportunities, as well upon as their cultural background and moral values. Cultural differences can, in some cases, be the result of different ethnic experiences, and can lead to the development of different values. We also include in the model the average amount of time parents spend with their children. We measure parental human capital by looking at the educational attainment of the mother, while financial capital is based upon family income, and social capital within the family is assessed through the relationships between the parents and the child.

There are many ways to measure social capital outside of the family, but we will restrict ourselves to just a few that cover the structure and number of relationships. Among these measurements are network size, network density, proportion of relatives in the network, multiplexity and reciprocity, as well as the proportion of network members in the immediate neighborhood, frequency of contact, and access to support from adults, children, extended family, friends, neighbors, co-workers, and acquaintances.

We measure access to social capital (to the current inventory), which mirrors embeddedness in a network of social relationships, with the help of responses from the parents about the people who provide support in issues of upbringing, and through the common contacts of the parents with the parents of the other pupils. Because, unfortunately, our study produced few results on the question of financial support, we have too little information on that subject.

In addition to the types of parental capital, the school experiences of the children were added to the study. These experiences include the subjective experience of the school environment and the sense of belonging to a school class.

The right side of the figure concentrates on the school performance of the children as measured by the planned educational transition.

The model represents a reduced form of the influences on the school performance of the children because we have measured no potential variables on the intervening mechanisms (information and observation). Since, however, this abbreviated model shows no connection between social capital and school performance, a further investigation of these mechanisms is, in any case, not worthwhile.

We investigate how parental education, the parent-child relationship, family income, parental perceptions about the support received through the network, and the school experiences of the children influence the educational transitions of the children.

DATA AND METHOD

Sample

1. In 2003, the Berlin Senate's Administration for Education, Youth, and Sport commissioned a study (ELEMENT study of reading and mathematics comprehension, developments in years four through six in Berlin) that examined the initial learning positions of elementary school pupils at the end of the fourth grade, as well as the progress made by students in the fifth and sixth grades. ELEMENT is a longitudinal study which was conducted in Berlin elementary schools at three points in time: in June or September 2003, in May 2004, and in May 2005. The target population of the ELEMENT study were all elementary school children who, in the school year 2002/2003, attended the fourth grade of a public elementary school or a *Gesamtschule* (comprehensive school) with a elementary school branch, and who took part in a general course of instruction. The defined target group was, according to the research project, expanded to include all elementary school children who, at the beginning of the 2003/2004 school year, were accepted into the fifth grade at one of 31 basic *Gymnasien*¹ (upper-level secondary schools).

The randomly selected elementary school sample included 140 school classes from 69 elementary schools and from two *Gesamtschulen* with a elementary school branch.

Participating in the ELEMENT study were:

- 140 fourth grade classes with 3,293 elementary school pupils at the end of the 2002/2003 school year, and
- 59 fifth grade classes at 31 public *Gymnasien* with 1,724 students after the summer break at the start of the 2003/2004 school year.

Parent and student questionnaires were used in an effort to gather as much information as possible about the students' backgrounds outside of school. In addition, information about the students from the available student files were used, particularly in order to establish the framework data about the students' school careers².

Also included in the study was a small additional sample in which the parents of 58 students from the ELEMENT study were asked questions relating to families and networks. This small data set forms the basis of this paper, and is used exemplarily to investigate the validity of the thesis. We are, of course, conscious of the fact that the data set, because of its small numbers, is not necessarily representative, but it should prove functional as a quasi-experimental design.

Measurement

Dependent Variable: Our central dependent variable is the recommendation of the teacher for the transition to secondary school at the end of elementary school. Teachers issue

¹ Basic „Gymnasien“ are all Gymnasia in Berlin with at least 5 grades.

² See Lehmann/Nikolova (2005) p. 7ff.

a recommendation for attendance at one of three types of secondary schools (*Hauptschule*, *Realschule* or *Gymnasium*) based on school performance and the learning and working behaviors of students at the close of their time at elementary school. In some German states this recommendation is binding, while in others it is simply a recommendation that informs the educational decisions parents make about the school careers of their children. Our data show, however, that these are closely correlated with grades in mathematics (0.7) and German (0.73), and can, therefore, be used as an indicator of school performance.

Cultural Capital of the Parents

The cultural capital of the parents was framed using a model from Bourdieu (1983). The two parts of cultural capital, objectified and institutionalized, were brought together in an index. For the objectified part, the number of books in the parental house, as well as the presence of a daily newspaper, a computer, a personal work space, an Internet connection, and a musical instrument were combined into a joint four-step index. This was then combined with data about the highest educational attainment of a parent, which were also rated according to a four-step scale, into a common index. This variable has a minimum value of 0, indicating that the parents have no cultural capital; and a maximum value of 3, indicating that the parents have a high level of cultural capital.

Economic Capital

To measure financial capital, the family net income was used. Net income is money the family has available to pay for living expenses after taxes and other duties are subtracted.

Parent-Child Relationship

Based on an analysis of theoretical and empirical research in Helmke/Weinert 1997, it is possible to identify four functions of parental behavior that can affect the development of the school performance of their children: stimulation/interest, instruction, motivation, and imitation. The parent-child relationship was established based on these functions.

Stimulation/Interest: The amount of cognitive stimulation provided in the family learning environment plays a large role in intelligence (and, indirectly, school performance) during the pre-school and elementary school years. This manifests itself in family activities, such as reading aloud or playing question and answer games, which lead to the creation of a stimulating material environment (ecological aspect)³. This “ecological aspect” is already operationalized elsewhere in this study, including under the heading of the objectified cultural capital of the parents, and therefore will not be included again in this construct.

Instruction: The instructional activities of the parents include actions directly related to school and school performance, as well as direct interventions that lead, either directly or indirectly, to cognitive development through instruction, correction, tuition, and training⁴.

Motivation: Parents can influence the motivational, affective, and emotional characteristics of their children, which can then, in turn, influence the children’s school performance. This tends to occur indirectly⁵. Examples of this would include parental

³ See Helmke/Weinert (1997) p. 122.

⁴ See Helmke/Weinert (1997) p. 122.

⁵ See Helmke/Weinert (1997) p. 122.

expectations, achievement orientation, assessments of children's competencies, and reactions to success and failure; reward, but not punishment.

Imitation: This includes the assumption of parental attitudes about achievement, strategies for overcoming failure, attitudes about work, and strategies for learning.

For the construction of the individual components of the parent-child relationship, a total of 12 variables⁶ were used, from which an index on the basis of >1< was formed for each respective construct. The four indexes for stimulation/interest, instruction, motivation, and imitation were then linked to the parent-child relationship, which ranges between >0<, indicating no beneficial parent-child relationship, and >1<, indicating a beneficial parent-child relationship.

Time Parents Spend with Their Children

Also included within the framework of the inquiry was the time parents spend with their children. This was divided into time during the week (from Monday through Friday) and time on the weekend. Both variables were entered into the analysis.

Variables Related to the Social Relationships of the Parents

For the inquiry into social relationships, a modified network instrument was employed that had been developed for the DFG project, "Family and Social Networks."⁷

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- ⁶
1. I know my child's friends.
 2. I tell my child what I think about his/her friends.
 3. I always know with which friends my child is out doing something.
 4. I talk to my child about things he/she is planning with friends.
 5. My parents pay attention to/ determine how much time I spend on doing homework.
 6. My parents make sure/ determine that I do my homework at a certain time.
 7. My parents make sure / determine that I spend a certain time reading.
 8. My parents compliment me for good grades.
 9. My parents are proud of me.
 10. My parents are content with me if I try my best at school.
 11. My parents think it is important that I don't miss school.
 12. My parents expect me to call them if I come home later.
- ⁷ Following name Generators were used:
1. With whom do you talk about things that are important to you?
- Which of the persons named above is the most important in this situation?
 2. With whom do you share your meals regularly?
 3. With whom do you feel a close emotional tie?
- Which of the persons named above is the most important in this situation?
 4. Who feels a close emotional tie with you?
 5. Who do you support financially every now and then?
 6. With whom do you spend most of your leisure time?
- Which of the persons named above is the most important in this situation?
 7. Your role as mother or father is now relevant. Let us assume you need someone who does babysitting or cares for your children; who would you contact?
 8. Who would contact you if help was needed in the care of their children?
 9. If you or your child is sick, is there someone who helps you at that time? Is there someone you could ask for help?
- Which of the persons named above is the most important in this situation?
 10. Are you in touch with the parents of your child's / children's classmates outside of school? E.g. do you speak with them on the phone rather frequently, do you something do things together or meet at events outside of school or the like.
 11. Is there someone among the parents of your child's classmates whom you can ask for assistance when you need help at organizing your child's/children's leisure activities?
 12. Think about your neighborhood, there is a range of possibilities to meet different people. For example on the playground or while you are shopping, at the doctor, through day care services for children or when

The network size and multiplexity captures the number of alteri and the proportion of alteri, to which several relationships to Ego are maintained. The density of the network provides information about the connectedness between network members. Because the information about contact frequency and the distance of the alteri can only be ascertained through ordinal scaling, the characteristics of the frequency of contact to the alteri and the distance of the alteri were added to the new categories, and the proportionate values that made a metrical analysis possible were calculated. The newly formed category, "proportion of network members in neighborhood," included all distances beyond that of the household, up to the distances that do not go beyond the residential area from the variable of living distance. The variable, "proportion of relatives in the neighborhood in network," is defined by two variables, and is, therefore, not dependent on a single variable. The "proportion of strong relationships in the network" was modeled on research by Mark Granovetter (1973). This includes high contact frequency, a long acquaintanceship of the contact partners, emotional closeness, and a reciprocity of the relationships.

Access to and Receipt of Supportive Services

To establish potential access to supportive services from non-household members, which reflected the inventory of social capital, particularly for parents of elementary school children, at the time of the 2003 inquiry, the following questions were asked:

-
- you walk the dog. Have you met someone with whom you made contact in this way, but whom you have not named yet in the previous questions?
 -Which of the persons named above is the most important in this situation?
13. Have you ever asked one of the persons you named in question 12 for help or support for the following:
 - a. Looking after the children when playing on the playground?
 - b. Asked someone for advice, for example questions about raising children like upbringing or behavioral problems?
 - c. Doing shopping?
 - d. Looking after pets or watering plants during an absence?
 14. Please think of all the persons you have named. Are there any persons not yet mentioned who are important to you or who play an important role in your life? If yes, who?

Respondents received a list with empty, numbered lines to fill in the names of network members. Respondents filled in the names of network members for each name generator. To ensure privacy, they did not name the network members themselves, but gave the numbers assigned to each network member. For example, if their sister's name was written next to #4 on the list, they said "#4" rather than "Gretel". The respondent could name 5 persons per generator for the first 9 generators and 10 persons for the generators pertaining to one's neighborhood (numbers 11 and 12).

We also recorded detailed information about 20 of the network members named, including: age of network member, gender, frequency of contact, residential distance, relation to respondent (partner, friend, etc.), length of relationship with respondent, and existence of family ties to respondent. If the respondents named more than 20 network members, we used numbered cards to select 20 randomly. The cards listed all the network members, and we placed them upside down on a table. Respondents then drew 20 cards from these cards and read out the numbers to the interviewer. Detailed information was only recorded for the network members who were selected from the pile of cards. To calculate network density, we asked: "which of the persons named above is the most important in this situation?". The interviewer listed the named numbers into a matrix and asked whether the network members knew each other well, not so well, or not at all. This meant that respondents had to indicate whether or not there were relationships among the network members.

If respondents were uncertain or did not know, the answer was coded "no". As it would have been impractical to confirm these answers with the named people or to go into the details of the relations, we have relied on the respondents' interpretations and perceptions of these relations.

1. Do you have contact outside the school with the parents of the schoolmates of your children? Do you, for example, call each other on the telephone frequently, or do things together, such meeting at events that take place outside of school?
2. When you think about your immediate living environment, do you see many opportunities to come into contact with other people, such as on the playground, while shopping, at the doctor's office, at the day care center, or while walking the dog? Have you in these ways or in similar ways gotten to know people with whom you still have contact, and have not yet been named? Have you ever asked someone from this particular group of people (refers only to this question) for advice on issues such as caring for children, general childrearing and behavioral questions, and behavioral problems?

We took the answers of the respondents to these questions and created three dummy variables:

1. Contacts to other parents or advice on childrearing from relatives,
2. Contacts to other parents or advice on childrearing from friends and acquaintances, and
3. No contact to other parents of schoolmates or advice on questions of childrearing from friends or relatives, but other forms of help or support were provided.

Variables 1 and 2 represent the integration in familial and non-familial networks. Variable 3 represents people who, while they do not perform supportive services, are nonetheless members of the network and who are prepared to offer help in other situations.

Pupil Experiences

Subjective School Environment

The subjective school environment consists of six variables⁸. A factor analysis of the collected variables designed to demonstrate how children assess school shows that all the variables are loaded onto the same factor. The six items were linked to the four-step index showing how a pupil subjectively rates the environment at his or her school, with 1 representing a bad school environment, and 4 meaning a good school environment.

Social Relationships in a School Class

In the operationalization of social relations, this paper uses an approach similar to that of Jungbauer-Gans (2004). In her study, the students were asked a variety of questions designed to determine whether they feel "grounded" in the class. Jungbauer-Gans describes this as a "sense of belonging."

⁸

1. I like going to school
2. I feel comfortable in school.
3. Our school seems friendly.
4. Learning is fun at our school.
5. In our school one can count on support.
6. Our school has a variety of awesome activities in addition to class instruction.

Similar to the operationalization of Jungbauer-Gans, there are seven variables⁹ in the ELEMENT 4 study in which the students indicate how they see themselves in terms of their interactions with other students in the class. As with the school environment, this factor analysis shows that all the items are loaded on the same factor. Analogously, a four-step additive index was created with a range of between >4<, describing the highest sense of belonging in the school class, and >1<, representing the lowest sense of belonging to the school class.

RESULTS

In Table 1 we see, among other things, the mean values and standard variations of the variables that enter into the analysis.

Table 1. Mean Values and Standard Variations of the Parental Variables

	Mean	Std. Deviation
<i>Dependent Variable</i>		
Recommendation for kind of secondary school (1-3, ordinal)	2.37	.714
<i>Independent Variable</i>		
Migration's Status only in German or with Migrational Background (0-1, nominal)	.3421	.48078
Subjective perceived school climate (1-4, metric)	1.6447	.52443
Cultural Capital of the parents (0-3, metric)	2.4461	.58082
Sense of belonging to a school class (1-4 metric)	2.8306	.61129
Parent-Child-Relation (0-1, metric)	.7353	.11419
Network size (5-40, metric)	13.8421	6.27533
Closeness of Network (0-1, metric)	.7745	.19740
Proportion of strong ties in network (0-1, metric)	.1732	.14230
Proportion of relatives in network (0-1, metric)	.5539	.20736

- ⁹
1. I am well liked in my class.
 2. Others in my class come to me when they have problems.
 3. My class conveys to me a feeling of being important.
 4. I have really good friends in the class.
 5. My classmates think highly of me.
 6. My classmates like me the way I am.
 7. Others in my class like to work in a team with me.

Table 1. (Continued)

	Mean	Std. Deviation
Proportion of network members in neighbourhood (0-1, metric)	.4226	.20576
Proportion of Multistranded ties in network (0-1, metric)	.5798	.13832
Proportion of relatives in neighbourhood in network (0-1, metric)	.2861	.18680
Family income after taxes (grouped) (1-13, ordinal)	6.71	3.144
Contact with parent of a classmate and/or someone who gives advice for parenting and relative (0-1, metric)	.1316	.34257
Contact with parent of a classmate and/or someone who gives advice for parenting and non relative (0-1, metric)	.7632	.43085
No Contact with parent of a classmate and/or someone who gives advice for parenting but contact to someone for other assistance (0-1, metric)	.2368	.43085
Child care per week (grouped) (1-7, ordinal)	2.7895	1.56236
Child care per weekend (grouped) (1-7, ordinal)	2.5000	1.28925

The data show that 76 percent of the parent-reported support in relation to their school children comes from parental contacts to classmates, and advice on childrearing comes from people who do not belong to the family. Only 13 percent of the relatives render these forms of assistance, while 24 percent give no assistance, but were nonetheless mentioned by parents as potentially important for the network. With an average of 13 people, the networks are relatively large, and are in line with the results of the DFG study “Family and Social Networks” (Hennig 2007a). These networks are relatively dense, as demonstrated by the network density (0.77) and the rather high level of multiplexity. At 55 percent, the proportion of relatives in the network is high. Just 28 percent of the relatives live in the parents’ immediate neighborhood, while a total of 42 percent of the network members live in the immediate vicinity. These are friends, co-workers, neighbors, and acquaintances.

The incomes of the families range between 2,500 and 3,000 euros. During the week and on the weekends, the parents spend on average between six and ten hours supervising their children. The cultural capital of the parents was generally found to be at a middle level, and the parent-child relationship can be described as beneficial. The proportion of migrants in sample is quite low.

Table 2. Effects of Social Capital on the School Recommendation Model Summary(e)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.547	.299	.280	.606	.299	15.375	1	36	.000
2	.660	.435	.403	.551	.136	8.420	1	35	.006
3	.710	.504	.461	.524	.069	4.744	1	34	.036
4	.766	.586	.536	.486	.082	6.556	1	33	.015

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.966	.181		16.354	.000
	Proportion of relatives in neighborhood in network	-2.090	.533	-.547	-3.921	.000
2	(Constant)	3.199	.184		17.420	.000
	Proportion of relatives in neighborhood in network	-1.754	.499	-.459	-3.516	.001
	Proportion of strong ties in network	-1.901	.655	-.379	-2.902	.006
3	(Constant)	2.109	.530		3.977	.000
	Proportion of relatives in neighborhood in network	-1.169	.545	-.306	-2.146	.039
	Proportion of strong ties in network	-1.865	.623	-.372	-2.995	.005
	Cultural Capital of the parents	.375	.172	.305	2.178	.036
4	(Constant)	.439	.817		.538	.594
	Proportion of relatives in neighborhood in network	-1.114	.506	-.292	-2.202	.035
	Proportion of strong ties in network	-1.569	.589	-.313	-2.665	.012
	Cultural Capital of the parents	.468	.164	.381	2.858	.007
	Parent-Child-Relation	1.870	.731	.299	2.560	.015

a. Dependent Variable: Recommendation for kind of secondary school.

Table 2 show that the variable that is most likely to account for the elementary school recommendation is the proportion of relatives in the immediate vicinity of the parents. This variable accounts for nearly 30 percent of the variance. The minus sign in front of this value means that the more relatives who live in the immediate vicinity of the parents, the less probable it is that the children will receive a recommendation to attend a higher-level secondary school (*Gymnasium*). The proportion of strong relationships in the network also has a negative effect on the recommendation to attend a higher-level school. This corresponds with Coleman's argument that these relationships do not significantly improve parental resources, or that social capital outside of the family is particularly relevant for the improvement of existing resources. The third variable is the existing cultural capital of the parents. That means that the more objectified and institutionalized cultural capital the parents have, the better the chances that the school performance of the children will result in a recommendation for a higher-level secondary school. The fourth and least important variable in this context describes the parent-child relationship. The more interest the parents show in the friends of their children, and the less they use a directive and dominating style in supervising homework (Helmke and Weinert 1997) and in motivating and stimulating their children in relation to school, the more probable it is that the school will recommend a higher-level school. Collectively these variables account for around 54 percent of the influence on the teacher recommendation.

The other variables entered into the analysis have no significant influence on the school performance of the children as measured by the recommendation of the teacher for a higher-level secondary school.

The operationalization of the strong and weak relationships shows that the weak relationships, as defined by Granovetter (1973), were found in only two cases in the study. In Granovetter's work, weak relationships are characterized by low contact frequency, emotional distance, a lack of reciprocity, and a short period of acquaintanceship between the people involved. These people are almost never found in parental networks. For this reason, we have looked at the composition of parental networks from the perspective of different roles, and have created the IQV index¹⁰. In this measurement, the variation of qualitative features is not recorded as a deviation from the mean, but as the degree of diversity of the characteristics of the qualitative features in the network. Roles were interpreted to be the types of social relationships that are connected to certain social contexts, such as relatives (close family members and distant family members like aunts, uncles, etc.) friends, neighbors, co-workers, acquaintances, and club members. The results showed that children whose parents were found to have a very heterogeneous set of network relationships tended to receive a recommendation to attend a higher-level secondary school, while homogeneous network relationships were found to have a negative effect. The correlation between the two variables (elementary school recommendation and diversity of roles) is statistically significant (.48). If this measure were used in place of strong relationships, it would be the third most important variable after the cultural capital of the parents and the parent-child relationship (Table 3).

This means that the heterogeneity in the composition of the parental networks becomes a resource that has an influence on the school performance of the children. The results of the analysis show that the more heterogeneous the composition, the more potential support the

¹⁰ IQV = Index of Qualitative Variation (Mueller and Schuessler, 1977).

family and, therefore, the children, have available. This coincides with previous studies that looked as the question of when social relationships become a resource.

Table 3. Effects of Social Capital on the School Recommendation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.512(a)	.262	.242	.621	.262	12.805	1	36	.001
2	.636(b)	.405	.371	.566	.143	8.393	1	35	.006
3	.702(c)	.492	.447	.530	.087	5.842	1	34	.021

^a Predictors: (Constant), Cultural Capital of the parents.

^b Predictors: (Constant), Cultural Capital of the parents, Parent-Child-Relation.

^c Predictors: (Constant), Cultural Capital of the parents, Parent-Child-Relation, Diversity of Roles.

^d Dependent Variable: Recommendation for kind of secondary school.

SUMMARY

In this paper, we have investigated how the social capital of the parents, both within and outside of the family, affects their children's success in school, as measured by the recommendation of teachers that their children attend a higher-level secondary school. The starting point of this study was the assumption that social capital intensifies the effects of existing financial and human capital on children's success in school. The results of the analysis show that the relationships outside the family to relatives in the immediate living environment of the families and strong relationships have negative effects on the school success of the children. These do not appear to significantly enlarge the existing resources of the parents. On the other hand, the cultural capital of the parents and a pronounced parent-child relationship appear to positively influence the school success of the children. By contrast, the financial resources of the parents, which have been found to play an especially important role in the school performance of children, was not found in our analysis to play a direct role. There does, however, appear to be a significant connection (.42) between income and the heterogeneity of network composition. It appears that the higher the income of the parents, the more heterogeneous the composition of the networks of the parents, and the more people who belong to the network. Financial resources therefore appear to indirectly enhance the social capital outside of the family.

In addition, the influence of the cultural capital of the parents on the elementary school recommendation is intensified by the social capital outside the family as measured by the diversity of roles (.43). Even if the cultural capital itself is shown to have a direct influence on the school performance of the children, this effect is improved through the diversity and size of the network.

Meanwhile, the direct contacts of parents to the parents of schoolmates or within the neighborhood to friends, acquaintances, co-workers, or club members appear to have little bearing on their children's success in school. Of equally little importance to school success is membership in the school class or the school environment in general.

In conclusion, the analysis indicates that the distinction made by Granovetter between strong and weak ties does not appear to be a useful approach in assessing parental networks because most of the relationships in parental networks do not meet these conditions. Qualitative variation in the composition of a network is, however, a good indicator for the degree to which the network of the parents becomes a social resource and influences children's success in school. The concrete availability of support does not appear to be decisive for school success. Far more important is, obviously, having a diverse set of contacts at one's disposal, i.e., an inventory of social capital outside of the family that one can call upon when help is needed.

The results of our study show that the embeddedness of the parents in an exchange network is an important indicator for the probability that children will receive a recommendation for attendance at a higher-level secondary school. A more precise differentiation of the degree to which information originating from personal contacts, norms and values, or support in the form of time and money are involved could be the subject of future investigations. In any case, studies seeking to establish what influences the school performance of children should not ignore parental networks.

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**THE IMPACT OF IN-SERVICE EDUCATION AND
TRAINING ON CLASSROOM INTERACTION IN
PRIMARY AND SECONDARY SCHOOLS IN KENYA:
A CASE STUDY OF THE SCHOOL-BASED TEACHER
DEVELOPMENT AND STRENGTHENING OF
MATHEMATICS AND SCIENCES IN SECONDARY
EDUCATION**

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ABSTRACT

The aim and purpose of the Classroom Interaction Study was to assess or measure the success or impact of the School-based Teacher Development (SbTD) and Strengthening of Mathematics and Sciences in Secondary Education (SMASSE) In-service Education and Training (IN-SET) programmes against envisaged outcomes (success indicators) in the projects with regard teacher pupil/student interactions within the classroom setting. It also gave teachers the opportunity to give perceptions of what they considered to have what they considered to have been the achievements of the two programmes. The classroom observation approach aimed at describing what teachers and pupils' did in the classroom or the teacher-pupil interaction. The observations focused on three main areas, namely; the frequency with which instructional materials were used, how the teacher utilised class time and the amount and form of interaction observed between the teacher and pupils/students.

From the observations, there seem to be a number of features of classroom behaviour in the teaching of sciences and mathematics. Teachers generally spent much of their class time presenting factual information, followed by asking pupils individually or in chorus to recall the factual information in a question and answer exchange. Students were rarely asked to explain a process or the interrelation between two or more events, and the teacher rarely probed to see what elements of the material or process the pupils did not understand. This interrogatory style was an evaluative exercise, not one that sought to increase pupils understanding.

INTRODUCTION AND BACKGROUND TO THE STUDY

It is now nearly over 40 years ago when Beeby pointed out that in the context of planning education for development, attempts to change the quality of learning in schools had to be linked to improvements in the education of teachers if they were to be effective (Beeby, 1966). Yet this area has received relatively little attention from policy-makers, donors and researchers since then. Though development agencies have supported a range of teacher education projects, few have contained support for research on learning processes and practices. As a result, the evidence base is weak, and much policy on teacher education has not been grounded in the realities that shape teacher education systems and their clients.

Perhaps most surprisingly, the World Declaration on Education for All (EFA), which emerged from the conference at Jomtien in 1990, devoted scant attention to the problems of teachers and teacher education, despite their centrality to the achievement of better learning outcomes. It was not until ten years later, at the Global Forum on EFA in Dakar, Senegal during which it became clear that in many of the countries which had fallen well short of the goals set at Jomtien, teacher supply and teacher quality were amongst the most important constraints. In the Dakar Forum, therefore, teacher education moved up the agenda of the EFA forum to the extent that the Sub-Saharan Regional Action Plan included it as one of its ten targets, namely:

Ensuring that by the year 2015, all teachers have received initial training, and that in-service training programmes are operational. Training should emphasize child-centered approaches and rights and gender-based teaching (UNESCO, 2000).

But the extensive implications that this target had for teacher training systems were not elaborated; nor was the evidence base for the advocacy revealed. This has tended to be reflected in some of the on-going developments. For example, the Association for the Development of Education in Africa (ADEA) has ten thematic international Working Groups, one of which is focused on the teaching profession. However, the objectives of this group are primarily concerned with improvements in the management, employment benefits and professional support for teachers. Initial training and in-service do not feature as primary concerns, neither does research on practice. There are few information and development activities that could guide policy and practice in low-income countries, especially in Sub-Saharan Africa (Stuart and Lewin, 2002).

And yet in many of the less industrialized countries, especially in Africa, teacher education is in a crisis. Inherited systems of teacher education have proved increasingly unable to satisfy the dual demands for higher quality training and substantially increased output called for by commitments to universalize primary schooling (Ncube, 1982; UNESCO, 1997). Many education systems still contain high proportions of untrained teachers; at the primary level most who enter teacher training will only have completed secondary school. The quality of primary schools is such that many are unable to provide a supportive professional environment for trainees of the kind possible where staff are fully trained and often graduates. Donor enthusiasm for new pedagogy, which frequently advocates learner-centered approaches, group work, attention to special needs, and a panoply of methods of training associated with best practice in rich countries, has sometimes sat uneasily with the realities of the training environment, the teacher education infrastructure, and different

cultural and professional expectations of the role of the teacher. Much of the rhetoric of reform has been difficult to translate into real changes in practice (Kunje, 2002).

As a way of improving teaching skills of teachers, especially at the primary and secondary school levels, a number of countries, with donor support have mounted school-focused INSET programmes to meet specific needs of schools, especially as a means of halting the declining quality of education. Such INSETs have focused on two main areas, namely, the problem of reducing significant numbers of unqualified and under qualified teachers and improving the teaching of particular areas of the curriculum (Bude and Greenland, 1983). The implementation and effectiveness of these programmes have, however, not been adequately evaluated, although there are some notable exceptions which suggest their potential usefulness. Rogan and MacDonald (1985), for example, highlight the success of an INSET programme for science teachers in South Africa entitled, *the Science Education Programme (SEP)*. It used a model involving cycles of workshops for teachers and follow-up support in the classroom. This model was successful in improving teacher performance in the classroom. A critical feature of the phased approaches or models is their cyclical nature. Each cycle of the model feeds into the next over a long period of time, usually a number of years.

The conventional course-based model of in-service education and training has been severely criticized in recent years because of its tendency to be over-generalized, over-theoretical and to ignore the problems faced by teachers when they return to their schools and implement the new ideas gained. Moreover the course-based model which tends to operate on the 'cafeteria menu' basis does not usually encourage teachers to consider the needs of their schools when applying for a particular course, especially when this takes place out of school time. Several writers have argued that, if it is to be effective, INSET should be related to particular innovations and to functional groups in the schools, that each school should devise its own staff development policy and the local authorities should provide external support for this process. Staff development should also try to meet the needs of both individuals and the organization as whole, that effective staff development policies are directly related to the overall policy of the institution and that new methods, like job rotation and sabbaticals, should be encouraged in these staff development policies (Bolam, 1983). This thinking has led to the notion of school-focused INSET targeting the needs of particular schools and individual teachers.

The available literature seems to endorse most of the strategies for school-focused INSET programmes, but presents little evidence to support their use. For example, needs assessment is widely supported in the literature. However, there are few examples of programmes in which INSET providers assessed teachers' training needs. Lubben (1994) is alarmed that this is particularly so in developing countries. One of the reasons for this could be attributed to the lack of empirical research and knowledge about the actual process of needs assessment (O'Sullivan, 2002). There is also a dearth of knowledge concerning the determination of content, effective training processes and follow-up strategies. The available literature on content for INSET is mainly concerned with whether the content should be more or less theoretical, rather than pedagogical (Greenland, 1983; Hawes and Stephens, 1990; Heneveld and Craig, 1996).

The literature on training processes tends to be dominated by a concern to promote reflective approaches to training rather than focus on specific practices and technical competence. However questions are beginning to be asked in the literature about the extent to which these approaches are useful in developing countries' contexts (Stuart and Kunje, 1998).

Similarly, very little empirical research has been conducted which supports the critical role of follow-up, throws light on the process used or demonstrates the effectiveness of particular follow-up strategies (Lockheed and Verspoor, 1991). Indeed the lack of follow-up is highlighted as the reason for the limited implementation of INSET in the classrooms in industrialized and developing countries (Lamb, 1995; Yogeve, 1997).

The literature on evaluation has also been found to provide inadequate guidance for practice. Avalos (1985) lamented the failure of many INSET programmes to adequately evaluate their effectiveness. Fuller's (1987) review reports the evaluation of only six studies. Greenland's (1983) notable study of INSET in Africa pointed out that of the 60 separate INSET activities researched, approximately half included a formally conducted evaluation, but in "only six cases was there actual follow-up at the school level to judge effectiveness" (p. 107). Useful evaluation has not improved in recent years. Yogeve (1997) points out that "evaluations do not usually provide systematic information on the effects of SBI (school-based INSET) on classroom behaviour or on actual changes in teaching practices, nor on the impact of SBI on students". This is a cause for concern. It effectively means that no sound judgements can be made between one type of training and another.

The literature explains an apparent gap in the research. Greenland (1983) asks, what counts as evaluation evidence; is it pupil achievement, teacher performance, teacher opinion or all the three? Evaluation of effective INSET presents extremely difficult methodological problems. Consequently, researchers and INSET trainers have shied away from addressing these difficulties. Little (1994) points out that evaluation mainly gathers quantitative data, concentrating on numbers of seminars and workshops conducted, teachers trained, materials delivered, and so on. Such data fails to indicate the effectiveness of a programme, if implementation in the classroom is taken as the indicator of effectiveness. Some key studies, therefore, suggest a useful method or approach of evaluation: the collection of baseline classroom data at the beginning of a programme and its comparison with evaluation data collected upon completion of the programme.

Although many of the INSET programmes are geared towards improving teacher-pupil classroom interactions, literature indicating effectiveness in this area has been quite scanty. While many impressive classroom studies have been conducted in the developed countries, especially the U.S.A., much less is known about life inside Third World classrooms. The International Association for the Evaluation of Educational Achievement classroom environment study (1987), however, did reveal some interesting descriptive findings. Focusing on Nigeria and Thailand, researchers found that in over two-thirds of the observation segments, teachers were simply lecturing at the class. In much of the remaining time, students were sitting alone (on the floor or at desks) working on assigned exercises. When teachers posed a question, these utterances usually were directed at the entire class, not spoken to an individual student. The teachers' questions most often requested a single piece of factual information, rarely requiring complex cognition (Anderson, Ryan and Shapiro, 1987).

An attempt made to present the realities of life in the classrooms for both teachers and pupils in the above selected studies are not different in many of the Third World countries in general, and Africa in particular. The basic assumption is that such presentations are a reflection of the teacher-pupil interactions in the classroom through which schooling actually takes place. In other words, all the aims and objectives of both the formal and informal curriculum are converted into concrete actions carrying messages, some overt and some

hidden, to consumers of the process. This is the predominant classroom interaction that many INSET interventions try to change in Third World teaching situations.

INSET PROJECTS IN PRIMARY AND SECONDARY SCHOOLS IN KENYA

The two recent INSET projects that are intended to improve teachers'-pupils' interaction, among others, have been the Strengthening of Mathematics and Sciences in Secondary Education (SMASSE) and the School-based Teacher Development (SbTD), which is part of Strengthening Primary Education (SPRED 3). The two were first launched on a pilot basis and later transformed into nation-wide projects involving many primary and secondary school teachers.

The SMASSE Project

SMASSE is a joint project between the Ministry of Education, Science and Technology (MoEST) and Japan International Agency (JICA). It was started in July 1998 as a pilot project and expanded to cover the entire country in July 2003. Its overall goal is to upgrade the capability of Kenyan teachers in the teaching of Mathematics and Science (Physics, Biology and Chemistry).

The project was launched following a general demand for INSET among teachers and secondary school heads. Since 1994 the Kenya Secondary School Heads (KSSHA) had been advocating for an INSET and had attempted to organise cluster schools' INSETs in the Coast, Nairobi and Central provinces.

The Kenya Government's goal of making Kenya a newly industrialised country by the year 2020 appears to have been another reason for institutionalising an INSET in mathematics and sciences as a way of improving the quality on instruction and performance. Overall student performance in mathematics and science in the Kenya Certificate of Secondary Education (KCSE) has generally been quite poor over the years.

Before launching the SMASSE project, a baseline survey was carried out in 1998 to establish the status of secondary school mathematics and science. The baseline survey identified some major areas that were said to lead to negative attitudes and poor performance in these subjects. These were as follows:

- Attitudinal factors;
- Teaching methodology;
- Mastery of content;
- Professional interaction for teachers;
- Development of teaching/learning materials; and
- Administrative factors.

On the basis of the baseline survey, the project recognised the need to enhance the quality of teaching in terms of the above issues through an INSET project. Its main purpose is to

strengthen mathematics and science education at the secondary school level through an INSET of serving teachers in the country.

The Kenya Science Teachers' College was identified as the institutional partner for the project. In the mid-1990s, the Kenya government had made a request to the Japanese government to upgrade the college's laboratories, which were now considered ideal for the SMASSE INSET project.

The project adopted a cascade mode of INSET training. There are two levels of training, one at the national level and another at the districts' level. At the national level, national trainers train key district trainers, while at the district level, district trainers train teachers in their respective districts.

To ensure the quality of mathematics and science teaching and their steady improvement, the project promotes an ASEI (Activities, Students, Experiments and Improvisation) movement, which is key in the project for lesson innovation. *Activities* for the students such as practical work, discussion, presentation and others, should be carried/practiced more in the lesson to promote students' active participation. *Students* not the teacher should be placed at the centre of lesson presentation. How the students learn should be given priority over how teachers teach. Students should also be given opportunities to perform *experiments*, which enhance an understanding of concepts and principles in mathematics and science. When conventional apparatus are not available, teachers should make efforts to give experiments by *improvisation* using locally available resources. Improvisation should also be for creating interest in the learners.

The ASEI movement is made possible by *Plan, Do, See* and *Improve* (PDSI) practice. Which means, *Plan*: Careful preparation based on the learners' needs and problems; *Do*: Teach the lesson, using well-chosen and planned activities; *See*: Evaluate the lesson at all the stages of its development. *Improve*: Feedback-the evaluation results to improve lesson instruction and future planning and implementation (SMASSE National INSET Centre, 2003).

Management and Support System of SMASSE

At the time of launching the programme, Government of Kenya provided full time personnel to the National INSET Centre while the Japanese International Cooperation Agency (JICA) provided Japanese experts to assist in the planning and implementation of the INSET activities. The team of experts developed training materials that were used in the national and district INSETs. At the district level training, the key trainers adapted the materials to the local situation and needs.

The INSET programme adopted a cascade system for its activities, with two levels of training, one at the national level and another one at the district level. At the national level, the national trainers train district (key) trainers. At the district level, the district trainers train teachers in their respective districts. To enhance the cascade system, the following were among the key administrative structures:

- *National Coordinator*: at the national level, the Senior Deputy Chief Inspector of Schools coordinated the project. The officer planned, organised and administered funding as well as monitoring and evaluation of SMASSE activities at all levels.

- The Kenya Science Teachers College (KSTC) houses the National INSET Unit, which runs the project on a daily basis and also trains district trainers, awards certificates, monitors and evaluates activities and issues guidelines on the INSET system, quality of teaching and learning.

District INSET Centres: The DEOs, inspectors, head teachers and district trainers shouldered the responsibility of organising, funding and conducting INSETs. More specifically, the centres liaised with the DEOs in the selection of teachers to attend the INSET, sensitised head teachers to support and fund the INSET, monitored the progress of trained teachers, and were the custodians of facilities, equipment and materials supplied.

The SbTD Project

The launching of SPRED was as a result of the perceived decline in the quality of primary education in the country. Kenya's educational provision had grown rapidly since the attainment of independence in 1963. This growth had culminated in the rise of the GER to 95% in 1990. Despite such growth, enrolment had been declining over the years, falling to the figure of 88.8% in 1999. The negative trend was attributed to a number of factors, the main one being economic decline, with parents bearing the cost of school buildings, textbooks and uniforms. Another factor cited was the quality of teaching and learning (MoEST, 1997). The Ministry of Education's National Baseline Survey of 1998 showed that there was a limited range of pedagogic practices in the MoEST public schools, which provided little opportunity for pupil interaction or practical activity.

To arrest the decline in enrolments and improve the quality of primary education, the British Government through the Department of International Development (DFID) supported a joint intervention, the Strengthening of Primary Education (SPRED) Project. The first phase ran from 1993 – 1996 and although it was considered successful in achieving many of its aims, it was found to have limited impact at classroom level. This was ascribed to the lack of involvement of some of the key stakeholders and the utilization of a cascade model of training. Another perceived weakness was the opportunity cost for the pupils as the in-service training took the teachers away from the classroom.

SPRED 3, a three-year Project whose implementation commenced in July 2000, sought to address these weaknesses. The primary purpose of the project was to improve access of poor children to better quality primary education. The project had two components: the text book programme; and the School based Teacher Development programme (SbTD) which advocated a school based model of teacher development, supported by self-study distance education materials. This approach was supported by research findings that showed that distance education was one of the most successful means for upgrading primary teachers (Lockhead, 1991). Distance education had also been found to be more cost effective, than a face-to-face model in the training of large numbers of teachers. Similarly, opportunity cost for the pupils was low, as the teachers continued to study while teaching.

Collectively, the two components were being used as strategies for addressing critical issues in the primary education system, namely:

- Declining enrolment, attendance, and retention rates;
- Rising costs of education to the parents;
- Elusive quality and relevance of education; and
- Need for equitable distribution of basic teaching and learning resources.

With regard to the SbTD in particular, its main aim was to develop teachers who reflected on their teaching and could respond to their children's needs and support their learning. The project's specific objectives were as follows:

- To develop teachers' ability to reflect on all aspects of teaching and learning;
- To develop teachers' understanding and belief in the central role of talk in learning;
- To guide teachers to understand and believe in the importance of children being actively involved in their own learning;
- To encourage teachers to plan for collaborative learning;
- To improve teachers' classroom management and assessment skills;
- To help teachers to identify and give attention to children with special educational needs;
- To raise teachers' awareness of gender issues and to address them in their own teaching;
- To develop teachers' ability to provide guidance and counselling to their pupils; and
- To help teachers to implement change in their schools (GOK/DFID, 2000).

The project assumptions were that a reduction in costs to parents (through supply of textbooks) would increase access, while improvements in the quality of teaching and learning (through the delivery of SbTD) would enhance retention.

The underpinning principle of the SbTD project was more than improving the quality of teaching and learning; it also aimed at playing a key role in developing mainstream the MoEST systems for in-service training to ensure that SbTD is professionally sustainable and indeed institutionalized within the MoEST. This was said to be a shift from the traditional donor-driven projects, which tended to operate through parallel rather than mainstream structures.

The programme was also designed to ensure that training at the teacher level was of consistent quality through distance learning materials (modules) and that teachers could get professional support at all levels, i.e. school, zone, district, division, province and MoEST (INSET). To support this principle the design and implementation of the project was geared towards capacity building, developing and strengthening mainstream systems, involving key stakeholders, gender equality and quality assurance.

At the primary school level, the course was expected to target motivated and committed teachers who were willing to improve their own teaching and the quality of learning in the schools. Three teachers from every school were to be selected by the subject panels and endorsed by the whole staff. Each of the three teachers referred to as Key Resource Teachers (KRTs), would specialise in Mathematics, Science, or English. Their role was to go beyond improving their own teaching skills, as they would be required to work with their school subject panels to improve the teaching in their subject areas. Such teachers were to be selected according to set criteria, which would include gender, motivation, commitment and professionalism, among others. Their key function would be:

- To work through the distance education learning materials; and
- To lead professional development in their schools through their subject panels (GOK/DFID, 2000).

Management and the Support System of the SbTD Project

It was recognized from the onset that for the SbTD to be professionally sustainable it needed to be institutionalized within the MoEST. Moreover the national scale of the programme and the distance education design presented an opportunity to develop and strengthen MoEST in-service system and structures. In February 1999 a MoEST INSET Unit was established within the Inspectorate headed by Deputy Chief Inspector of Schools. This is the Unit that manages the SbTD project. The main focus of this Unit is the development of the SbTD project and establishment of a sustainable mechanism for national in-service delivery. The Unit manages material development, administration, support and information flow.

Being a distance education project, SbTD required ongoing professional support at all levels. The success and quality of the SbTD depended on the quality and effectiveness of support to KRTs. The project had to put in place support mechanisms at all levels. Key stakeholders were sensitized to help them understand their role in supporting the programme.

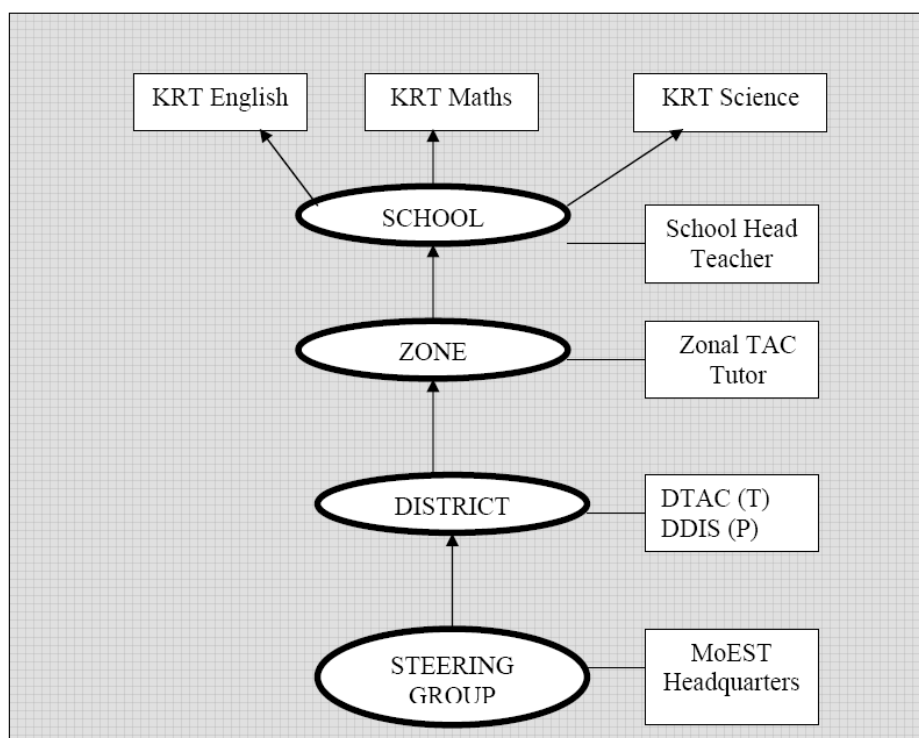


Figure 1. The Management Support Structure of SbTD.

At the national level the INSET team together with the Steering Committee members undertook the development of modules for KRTs and Training Handbooks for other cadres. The focus of the handbooks was to provide knowledge about the course and seek the support of the District Education Office (DEO) office, the Head Teachers, the Inspectors, and the Zonal Teacher Advisory Centre (TAC) Tutors who would in turn support the KRTs.

The Support System ensures that various Support Cadres are adequately trained and resourced to successfully implement the SbTD programme. The training offered to these different cadres was different from the typical cascade model of training which filters down through different layers, hence compromising quality. The training focused on the actual support that the KRTs required, and the need for them to engage in a process of self-reflection and professional development. Some weeks were organized for TAC tutors to deepen their basic skills needed for SbTD and encourage a reflective monitoring and tutoring approach. It also gave the TAC tutor the opportunity to share experiences and facilitate ongoing improvement.

Focusing more on the support system, it should be realised that the programme had to mainstream the support within the existing structures. The TAC Tutors periodically visited teachers in schools, observed them teach, organised face-to-face tutorials as well as marked Tutor Marked Assignments (TMAs). The role of the TAC Tutor was very important in developing teachers professionally.

Purpose and Objectives of the Classroom Interaction Study

The purpose of the study was to assess the effectiveness of the SMASSE and SbTD INSET projects on classroom interaction. More specifically the study was guided by the following objectives:

- To assess teachers' perceptions about the implementation and effectiveness of the SMASSE and SbTD in-service programmes and the challenges experienced by schools in the teaching of mathematics and sciences and sustaining of these projects;
- To assess pupils/students perceptions about their teachers' classroom behaviour with particular focus on their taking greater responsibility of their own learning processes and the general classroom atmosphere; and
- To assess the effects of the two in-service programmes on teachers' teaching approaches, especially embracing changes in teaching skills, classroom management and teacher-pupil/student interactions.

DESIGN AND RESEARCH APPROACH

The research design was participatory. Based on the objectives of SbTD and SMASSE projects, discussions were held between the project coordinators and the researchers in order to build consensus that the Classroom Interaction Study required an action-oriented research approach. This embraced the use of a participatory approach in which all the parties involved in the programmes were part and parcel of conducting the study. Such action research was

fundamentally a problem-solving activity, which was not based on making judgment about the SbTD and SMASSE programmes, but focused on the participatory identification of the two project's impact on the teaching-learning processes by teachers and students, in collaboration with the researchers, with the research tools acting as the media of interaction.

Data Collection

This section focuses on the sampling procedures and research instruments. The study design and approach were discussed and approved in two workshops the held at the JICA Center in Hiroshima in March 2004 and the University of the Philippines in February, 2005.

Study sample: On the basis of resources available for the study, the researchers adopted a case study approach in selected primary and secondary schools located in four districts of Kenya. These were Nairobi, the country's capital city; Kiambu, a peri-urban rural district situated next to Nairobi; Kajiado and Garissa districts, which are predominantly rural-pastoral districts in the Arid and Semi Arid (ASAL) regions of the country. Since the main focus of the study was to assess the effect of the two INSET projects on classroom interaction, this called for a purposive sampling of a relatively small number of schools in each district based on the recommendations of the education 'Quality Assurance and Standards' officers in the districts, but also taking into consideration their geographical and administrative locations. Consequently, 6 public secondary and 4 primary schools were sampled in each of the districts of Nairobi, Kiambu and Kajiado, while 4 secondary and 2 primary schools were sampled in Garissa due to the expansive distances between the schools. In each of the secondary schools, 1 mathematics, 1 physics, 1 chemistry and 1 biology who had participated in the SMASSE programme were targeted, while non-SMASSE teachers in the same subjects were randomly selected. With regard to the SbTD project, 2 mathematics and 2 science teachers (KRTs), who had participated in the project, and 1 non-SbTD teacher in each of the subjects were randomly selected. Therefore, teachers trained in SbTD and SMASSE projects at the primary and secondary school levels, respectively, were involved, as well some control group of teachers who had not been trained in the two programmes. The actual sample was as shown in Table 1.

Table 1. The study sample

Instrument	Project	Kiambu	Kajiado	Nairobi	Garissa	Total
Interviews	SMASSE	28	23	17	11	79
	Non-SMASSE	10	7	9	4	30
	SbTD	17	13	16	10	56
	Non-SbTD	6	6	7	5	24
Lesson observations	SMASSE	12	10	13	10	45
	Non-SMASSE	7	6	5	5	23
	SbTD	8	9	11	5	33
	Non-SbTD	3	4	4	5	16
Focus Group Discussions (FGDs)	Primary Schools	5	4	6	5	20
	Secondary Schools	9	5	10	5	29

Research Instruments: To capture the various aspects of the SbTD and SMASSE projects, a number of data collection instruments were designed for the key participants involved in the research. These included:

- Interview schedule for the SMASSE teachers in Mathematics, Physics, Chemistry and Biology and SbTD teachers in Mathematics and Science. The interviews focused on their perceptions about the implementation and effectiveness of the SMASSE and SbTD in-service projects and the challenges experienced by schools in the teaching of mathematics and sciences and sustaining of these programmes. Non-SMASSE and non-SbTD teachers were interviewed about the general problems they experience in the teaching of these subjects in secondary and primary schools. The interview schedule was validated leading researchers in the Department of Educational Foundations at Kenyatta University.
- Focus group discussion guides for upper primary school pupils and students from the four grades of secondary school were designed and they focused on pupils'/students' perceptions about their teachers' classroom behaviour with particular attention on their taking greater responsibility of their own learning processes and the general classroom atmosphere; and
- Classroom observation guides for SMASSE and Non-SMASSE teachers in Mathematics, Physics, Chemistry and Biology and SbTD and Non-SbTD teachers in Mathematics and Science subjects were constructed. This required the construction of an observation instrument which could be used to reliably to record actions engaged in by teachers over sampled class periods. The behavioural scales were developed to measure discreet behaviours of the individual teacher and dominant pupil/student behaviours in which the entire class was engaged. The observation instrument focused on three main areas, namely; (a) how the teacher utilized class time, (b) the frequency with instructional materials were employed, and (c) the amount of and form of interaction observed between the teacher and pupils/students. The observation instrument contained two parts. The first part included a continuous assessment that required the observer to estimate the proportion of time the teacher behaved in specified ways. For instance, each observer estimated the share of total class time the teacher lectured/presented information, led a recitation and other logistical tasks. These estimates were for the entire 40-minute period. The second part consisted of an estimation of pupil/student behaviours engaged in by the entire class during the same period. Observers, for example, checked if pupils/students were reading a textbook, i.e. if a majority of pupils/students were engaged in this particular activity. The instrument, therefore included basic descriptions of the classroom behaviours, subject taught and instructional materials in use on the basis of both the teacher actions and pupils'/students' behaviour with regard to time use, all which constituted pupils'/students' interaction. The observation instrument was validated by members of the Teaching Practice Unit of Kenyatta University.

The three approaches were considered necessary to generate a wide range of data for the classroom impact study of the two projects. For the SbTD and SMASSE Mathematics and Science teachers, it was appropriate to hold face-to-face, in-depth discussions to obtain more insights in the operations of the projects, since they were key in their implementation. Pupils

and students, on the other hand, were perhaps the most crucial stakeholders in the SbTD and SMASSE projects since they were the end-beneficiaries of an improved teaching and learning process. As such, their views on what went on in the classroom were essential in gauging the success of the implementation and the direction the projects have taken. It was in this regard that their views were sought through FGDs.

In the light of the research design adopted, it was important to undertake largely qualitative and some quantitative analyses of data collected for a more in-depth and systematic evaluation of the projects' implementation and impact on the classroom teaching and learning processes.

An important factor that needs to be taken into consideration with regard to the results of the study is that since both the SMASSE and SbTD are now national programmes, a purposive sample of four districts, although selected on the basis of some geographical settings and particular features regarding programmes' implementation, tends to limit the generalization of the findings.

The School Settings

Before focusing on teachers' and students' perceptions and classroom interaction practices, it is useful to briefly discuss the general classroom settings in both secondary and primary schools in the country.

Secondary Schools: Classrooms in the secondary schools are generally large, bright rectangular rooms with windows running full length of both sides of the classroom. Some have wall displays that are not heavily utilized apart from timetables and class rotas. In some of the older schools many classrooms contain old, and at times damaged desks and chairs, and it is not uncommon to see children sharing chairs throughout a lesson. The classrooms vary in tidiness. Each classroom has a cleaning rota of students, but the care and energy that they put into this very dusty activity depends on the enthusiasm of the class teacher or duty master in maintaining a clean school.

The practical subjects are normally accommodated in specialized units, in the form of workshops for technical subjects and home science, and laboratories for sciences. The latter are furnished with bench-tables and stools. For most established secondary schools, utilities and services such as gas, water and electricity are provided.

Instructional time is normally forty minutes, but frequently, two forty-minute lesson periods are blocked together for the practical subjects especially in the science subjects.

Primary Schools: These vary so enormously that it is not quite easy to generalize about them. In some places classes are taken in the open air and the quality of the physical facilities and the teaching/learning materials are dependent on capacity of the surrounding communities to mobilise the necessary support resources. On the whole, urban primary schools have superior learning facilities. The poor teaching and learning throughout the country has however, been exacerbated the government's decision to provide free primary and secondary education from January 2003 and January 2008 respectively. It is now very common to find classrooms which were constructed to house 40 pupils crowded with 90 pupils or more.

Analysis of Results

In the following sections, we present the results of the study.

Teachers' assessment of the effect of INSET projects on classroom practice: Teachers were asked about what they perceived to be the effect of the INSET projects on their classroom behaviour. Their perceptions are as presented in Table 2.

Table 2. The effect INSET programmes on classroom practice

Item	SMASSE Total No. of Teachers 79				SbTD Total No. of Teachers 56			
			Not specified				Not specified	
	No.	%	No.	%	No.	%	No.	%
Prepares schemes of and lesson plans	73	94.0	6	6.0	50	90.3	6	8.7
Combination of student-centred methods, questioning and lecturing	51	63.2	28	35.8	32	57.9	24	42.1
Improvised materials, labs and equipment and textbooks	59	75.4	20	24.6	30	54.4	26	44.6
Groupwork, experiments, field work, writing notes, asking questions, and lecturing	52	65.8	27	34.2	36	64.7	20	34.3
Home work- regular assessments and assignments	76	96.0	3	4.0	45	81.3	11	9.7

On the overall, teachers were of the view that the projects had considerably improved their classroom performance. With regard to preparations of schemes of work and lesson plans, 94.0% (79) of SMASSE and 91.0% (56) of SbTD were of the view that they very frequently prepare these documents, although there was no reflection of this in the observed lessons. Furthermore, as a result of the projects, 64.0% (79) of SMASSE 57.9% (56) of SbTD respectively, reported to be using a combination of pupil/student-centred teaching approaches alongside questioning and lecturing. An important teaching approach that emerged from the two programmes is the need to improvise in the use of teaching/learning materials and a generous use of materials to “bring reality into the classroom setting”. This was mentioned by 75.4% (79) of SMASSE and 54.4% (56) of SbTD teachers respectively. Among the methods that were predominantly applied in the classroom situation include group work, field work, giving notes asking questions and lecturing, which were cited by 65.8% (79) of SMASSE and 64.7% (56) of SbTD teachers. The training programmes are also said to have placed a strong emphasis on giving pupils/students regular assessments and assignments, which was mentioned by 96.0% (79) of SMASSE and 81.3% (56) of SbTD teachers respectively.

Teachers' Narratives

The following teachers' narratives support what they perceived to have been the impact of the programmes on lesson preparations and classroom performance as discussed in above and were typical of responses by most teachers who had participated in the two programmes.

Box 1. Biology Teacher (SMASSE)

Relevance in Teaching: Preparing practical lessons in physics. Involving students more practically in lessons.

Preparation for Teaching: Schemes of work, lesson plans, lesson notes, teaching aids, three-dimensional teaching aids.

Methods Used in Lesson Presentation: Group activities/discussions, class presentation, practical activities, lecture method.

Teaching/Learning Materials: Textbooks, 3 dimensional models, drawings/manila paper.

Pupils/student involvement in T/L process: Group discussion and presentation, class exercises, solutions on board by different students.

Distribution of Responsibilities by Gender: When classes are combined, the following duties are distributed equally: group secretaries, group chairmen, cleaning b/boards, and facilitation for discussions.

Frequency of Homework: Given, marked and discussed daily; peer marking in objective question tests and those with short, precise answers.

Lesson Evaluations: Daily evaluation-help in preparing for remedial lessons after school/class hours.

Support from School in Teaching: Organisation of tuition and revision programmes for form 4 students. Provision of teaching resources. Extra hours for teaching on Saturdays.

Opportunities for Teaching subject: Currently there is high interest in physics being observed in students due to improved teaching methods.

Obstacles: Large numbers of students/class sizes.

Impact of In-Service Course on Teaching Quality: Preparation of teaching resources. Involving the students more in lessons. More positive to peer and self-evaluation.

Sustaining In-Service Course: Having a school-based programme with external supervisors for everybody

Box 2. (Mathematics Teacher (SbTD))

Assistance in Classroom Teaching: It has simplified teaching; since it has taught me how to involve pupils in their learning, e.g. peer teaching and peer marking.

Teaching Preparations: Schemes of work, lesson plans, collect and store teaching aids. Has set up a resource center.

Teaching Methods: As much as possible uses pupil-centred and practical approaches.

Teaching/Learning Materials: Normally use bottle tops, stones, sticks, old cans, boxes and so on-pupils assist in collecting them.

Student Involvement in Teaching/Learning Process: Group work, peer teaching and marking, demonstrating working out problems on BB, asking and answering questions.

Student's Homework: An assignment after every lesson. Students evaluate themselves, practice and also to make them work ahead of the teacher, revise past lessons. From their answers, one evaluates the effectiveness of teaching and can decide to move ahead or give remedial teaching.

Box 2. (Continued)

Lesson Evaluation: After every topic, students get an evaluation. CATS (major) twice in a term and one exam termly. Practical evaluation through hands on experiments. Peer evaluation using an observation guide-once a term. On daily basis by marking pupils' books. Helps to know their weaknesses and decide on how to adjust teaching.

Support From School: Support is good; buying of equipment, academic trips, time off to attend training.

Distribution of Responsibilities by Gender: Normally mixed equally, in group work the group leaders and secretaries are usually shared between boys and girls.

Lesson evaluation: Support from school: School has helped in establishing a resource center. Unavailable resources are brought on request. Teachers are cooperative-interact on how to improve teaching.

Opportunities: Pupils are usually very interested in learning mathematics. Locally available resources are plenty for improvisation.

Obstacles: Classes are usually too large-marking is a problem and also giving individual attention for weak students is hard.

Impact of In-Service Course on Quality of Teaching: Helped to create a maths panel with colleagues and this has improved the quality of teaching and learning. Learners no longer fear maths and their performance has improved.

Sustaining the In-Service Course: Those who complete the course should be promoted to the next grade as an incentive so as to encourage others to put more effort in studying and practicing what they learn.

Challenges in the Teaching of Mathematics and Science in Schools

Teachers were asked to identify some of the challenges they experience in the teaching of mathematics and science and how INSET projects should be sustained. Their views are summarized in Table 3.

Table 3. Teachers' challenges in teaching mathematics and science

Item	SMASSE				SbTD			
	Total No. of Teachers 79				Total No. of Teachers 56			
			Not specified				Not specified	
	No.	%	No.	%	No.	%	No.	%
Negative attitudes by pupils/students	48	61.3	31	38.7	32	57.2	24	42.8
Large and overcrowded classes	44	56.2	39	43.8	31	54.8	25	45.2
Lack of teaching facilities and equipments/materials	45	58.4	34	41.6	2	74.6	14	25.4
Weak support from schools	43	54.8	36	44.2	35	61.9	21	39.1
Lack of In-service education and training programmes by Ministry of Education	70	88.1	9	21.9	51	91.0	5	9.0
Lack of motivation for teachers	55	68.6	24	31.4	40	75.5	16	31.4

Among the key challenges in the teaching of mathematics and sciences in secondary and primary schools include, the negative attitudes by the students towards these subjects, which were mentioned by 61.3% (79) of SMASSE teachers and 57.2% (56) of SbTD teachers. They also mentioned large and overcrowded classes as well as lack of teaching facilities and equipment, which were mentioned by 56.2% (79) and 58.4% (79) of SMASSE and 54.8% (56) and 74.6% (56) of SbTD respectively. Teachers also mentioned weak support they get from their schools in the teaching of these subjects, which was attributed to lack of adequate funding. This was mentioned by 54.8% (79) of SMASSE and 61.9% (56) of SbTD teachers. The Ministry of Education came under very severe criticism for lacking regular INSET programmes, which was mentioned by 88.1% (79) of SMASSE and 91.0% (56) of SbTD teachers. They also have poor motivation, not only in the teaching of mathematics and sciences, but also towards their entire teaching career due to bad working conditions and remuneration as well as lack of recognition by the Ministry of Education for teachers who had participated in these projects by way of promotion or some form of other professional advancement. This particular aspect was cited by 68.6% (79) of SMASSE and 75.5% (56) of SbTD teachers.

PUPILS'/STUDENTS' PERCEPTIONS ABOUT THEIR CLASSROOM INTERACTION

Pupils'/students' attitudes and views were captured through the FGDs. It should be noted from the outset that a majority of pupils/students were not aware that specific programmes for their teachers had been running, in this case either SbTD or SMASSE. On the whole, therefore, pupil's assessment of the teaching and learning processes, including the performance of their teachers, was quite objective.

As a way of assessing their classroom interactions with teachers students/pupils were asked to first of all discuss what they liked most about mathematics and science subjects. It is apparent from their answers that the things they liked most had more to do with being given more opportunity to participate in the lessons. For example, secondary school students liked mathematics more when they worked in groups, as well as when given individual attention by their teachers to enable them clearly understand 'the concepts'. They also mentioned being given chances to work out examples on the chalkboard before the entire class. Also commonly cited were teachers' friendly attitudes, teachers giving students a chance to ask questions on aspects they did seem to understand, and demonstrating the application of the subject in everyday life, especially when teachers asked more challenging questions. These views were not different from those of primary school pupils. They, for example, specifically mentioned, "the teacher making the lesson quite interesting by putting in humour, which makes us find it easy to learn, in particular the art of playing with numbers". This was said to be done by teachers who seemed to have a strong command of the subject and went beyond what was contained in the class textbook. Pupils also appeared to like teachers who gave explanations using diagrams and practical illustrations.

It was more or less for similar reasons that students/pupils seemed to enjoy the science subjects. Secondary school students, for example, tended to like science subjects when their teachers engaged them in 'experiments and practicals'. In this way, they said, they ended up

discovering their own information and acquiring knowledge. Students also liked the teaching of sciences through the use of illustrations and demonstrations, as well as being given the opportunity to discuss and relate the scientific knowledge to real situations in life. They also seemed to like the subject when teachers make deliberate efforts to interest them in these subjects, especially by asking them questions that required reasoning and encouraging them to learn more on their own through assignments. While primary school pupils shared the same views with secondary school students on things that made them like science subjects, they appeared to take more interest in learning sciences when they were taught through “nature” or “the surrounding environment”.

Conversely, students/pupils tended to have least interest in mathematics and sciences when there was not much involvement in the teaching and learning process. For example, secondary school students tended not to like the teaching of mathematics when their teachers bored them with long explanations and calculations on the chalkboards. They also tended to dislike the subject when it was taught without application to practical situations and the teachers appeared to be ‘rushing in order to complete the syllabus’, and did not give students the opportunity to clearly understand what was being taught. Students also felt that some mathematics teachers handled them in a manner that made them discouraged, especially in response to their (students’) self-initiated questions. Such teachers, it was pointed out, resorted to using abusive language, like referring to students as, *majambazi* (gangsters) and the like. They also seemed not like the idea of some teachers frequently asking students to carry on with the marking of their own work, without sufficient guidance from them. Primary school pupils also shared these perceptions, but also added the demand by teachers for them to memorise formulae that had not been clearly explained, the frequent use of punishments when they failed to get correct answers to certain mathematical problems were given as reasons why they did not like the subject.

Students/ pupils do not like most of the teaching of science subjects for similar reasons. They however, added that the teaching, and hence understanding, of sciences became difficult because many practicals were skipped due to the lack of necessary apparatus and their teachers made little or no effort to improvise for them. Many of the secondary schools not only lacked science laboratories for specific science subjects, but also had no laboratories and science apparatus of any kind, and yet a number of science subjects were compulsory in the Kenya Certificate of Secondary Education (KCSE) examination. In one focus group discussion, students mentioned some cases when their colleagues for the KCSE examination happened to see and were asked to use a microscope for the first time during the practical biology examination paper. In many cases during science lessons, teachers normally carried out the experiments, denying students a “hands-on experience”. Due to the lack of apparatus, many science topics were taught ‘theoretically’. Students also mentioned that their teachers normally dictated long and incomprehensible notes. This was made even more difficult as a result of lack of textbooks. In one particular secondary school in Nairobi, there were 3 textbooks in chemistry, 9 in biology and none at all for physics in a class of 43 students. Some primary school science teachers who were not conversant with their subject content tended to resort to the use of vernacular in trying to explain difficult scientific concepts. In this regard, the lack of interest in learning of sciences would begin right from the primary school, where the subject was not taught practically, and the main source of information, the textbook, was unavailable.

In the context of lack of teaching and learning facilities, when students were asked to mention some ways in which they were involved in the learning of mathematics and sciences, the use of group work and discovery learning methods, which were key approaches advocated by both SbTD and SMASSE, were very rarely mentioned. Although students occasionally mentioned being divided by their teachers into groups for purposes of discussions, this was not necessarily confined to teachers who had participated in these in-service programmes. The main classroom activities which both pupils and students indicated they participated in most included; answering the teachers' questions, working out exercises in their exercise books, copying the teacher's notes, solving problems on the chalkboard, listening to the teacher's explanations, observing demonstrations by the teacher, doing tests, exchanging exercise books to mark assignments, occasionally being allowed to ask questions and to do experiments on their own. These were given as main ways in which most teachers involved the students/pupils in the science and mathematics lessons.

On the basis of our discussions with the pupils/students, it was therefore difficult to attribute such approaches to changes brought by the SMASSE and SbTD programmes. This was more so given that to the pupils/students, there was no difference in approaches to teaching between those teachers who had participated in the SbTD and SMASSE programmes and those who had not. Any difference between them was adjudged by the pupils/students to stem from the personality and character of the individual teacher. In other words, there were good programmes' teachers, just as there were good non-programmes' teachers and vice versa. On the same continuum, one found that both programmes' and non-programmes' teachers had serious flaws in their handling of pupils/students. One of the things that the programmes were meant to do was to improve pupil-pupil and pupil-teacher classroom interaction, which was generally not being demonstrated, as reflected in the FGDs with students and pupils.

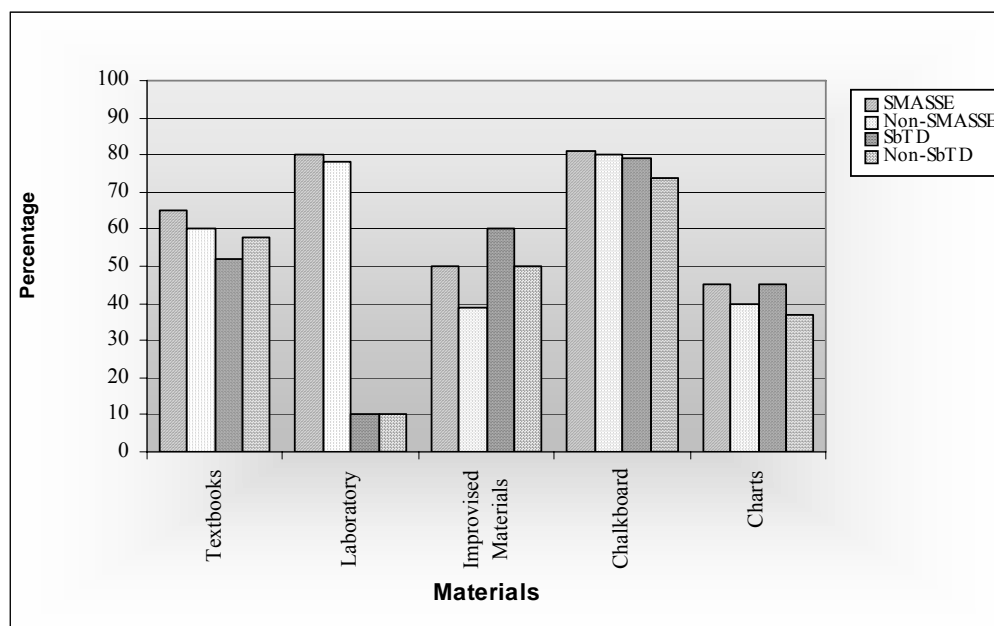
THE DOMINANT CLASSROOM INTERACTION PRACTICES

Classroom observations aimed at describing what teachers and pupils/students did during the lesson, or teacher-pupil, pupil-teacher, and pupil-pupil interaction. The observations focused on three main areas, namely; the frequency with which instructional materials were used, pupils'/students' dominant classroom activities and how the teacher utilized class time.

Teachers' use of instructional materials: Figure 2 illustrates the general findings about the teachers' use of instructional materials within the secondary and primary schools for both SMASSE and SbTD trained teachers and teachers who did not participate in the two projects. These behaviours emanated from the science and mathematics lessons observed by the researchers.

The figure shows that in most of the classrooms observed, the chalkboard was a commonly utilized material in the schools, with about 81% (45) of SMASSE, 80% (23) of non-SMASSE, 79% (33) of SbTD 75% (16) and of non-SbTD teachers. This was followed by the use laboratories in the sciences by 80% (45) and 78% (23) of SMASSE and non-SMASSE teachers respectively in secondary schools as this not a common facility in most primary schools. Another commonly used material was the textbook, which was used by 65%

(45) and 60% (23) of SMASSE and non-SMASSE and 52% (33) of SbTD and 58% (16) non-SbTD teachers respectively.



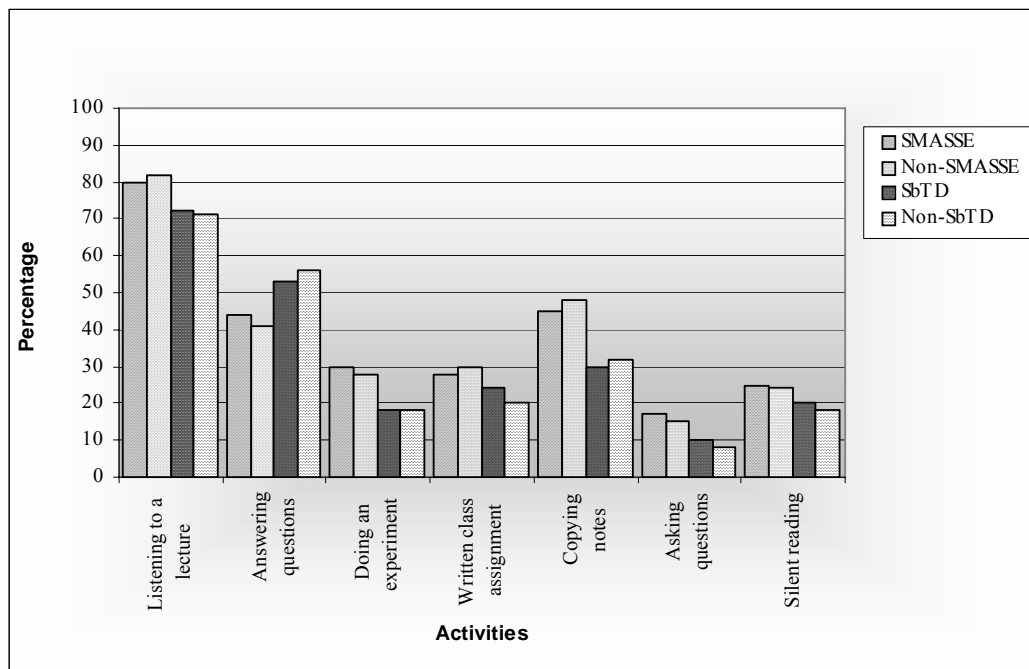
No of teachers:
 SMASSE 45
 Non-SMASSE 23
 SbTD 33
 Non-SbTD 16.

Figure 2. Teachers' Use of Instructional Materials.

In situations where most pupils lacked textbooks, teachers normally read from their textbooks. Textbooks were in use by 65% (45) and 60% (23) of SMASSE and non-SMASSE and 52% (33) and 58% (16) of SbTD and non-SbTD respectively. While both the SbTD and SMASSE projects placed considerable emphasis on the need to improvise the teaching/learning materials from the local environment, this seemed to be a much more common feature with the SbTD trained teachers, who constituted 60% (33) and 50% (16) non-SbTD of the teachers compared to 50% (45) SMASSE and 40% non-SMASSE teachers. Though hampered by lack of manila paper, charts were however, more commonly used in secondary schools with 45% (45) of SMASSE and 40% (33) non-SMASSE, 45% (33) and 38% (16) of non-SbTD as illustrated in figure 2.

Dominant pupil/student activities: Figure 3 shows the dominant classroom behaviour in which a majority of the pupils/students were engaged in. It is seen that very rarely was there a small grouping of pupils engaged in separate activities. In secondary schools, 80% (45) and 82% (23) of the students in SMASSE and non-SMASSE lessons were observed to be passively listening to the teacher lecturing, compared to 72% (33) and 71% (16) in SbTD and non-SbTD classes. Another very dominant behaviour was answering questions, which was observed in 43% (45) and 40% (23) for SMASSE and non-SMASSE classes and 55% (33) and 57% (16) of SbTD and non-SbTD classes respectively. Copying notes represented 45%

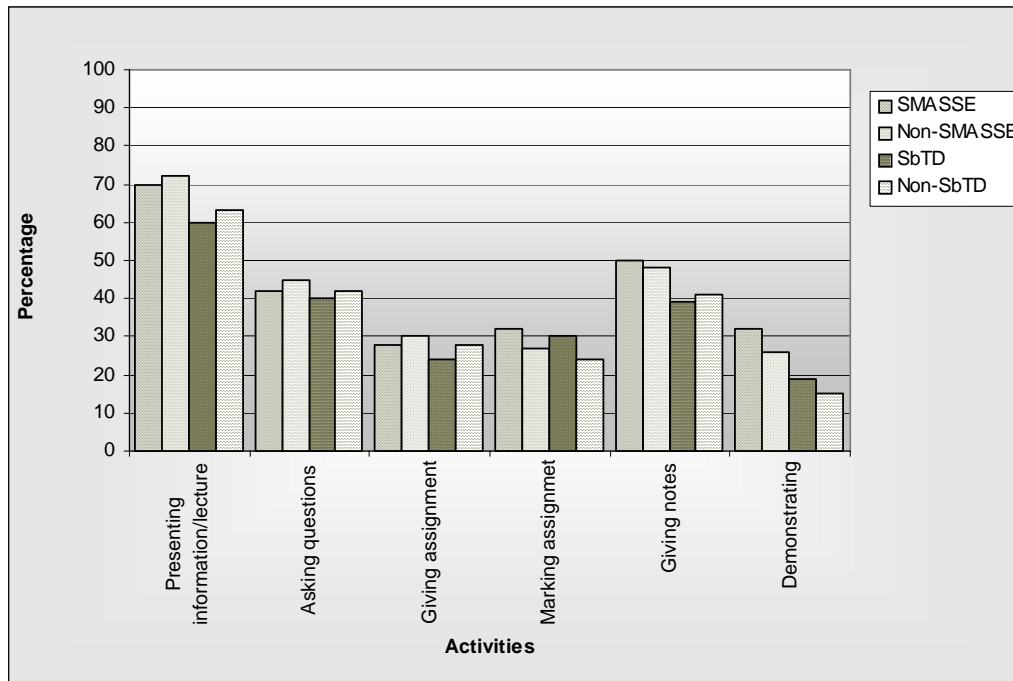
(45) and 48% (23) of SMASSE and non-SMASSE and 30% (33) and 31% (16) of SbTD and non-SbTD of lessons, respectively. Class written assignments accounted for 28% (45) and 30% (23) of SMASSE and non-SMASSE and 25% (33) and 20% (16) of classroom behaviour of SbTD and non-SbTD lessons.



Estimated no. of pupils
 SMASSE 1800
 Non-SMASSE 920
 SbTD 1915
 Non-SbTD 760.

Figure 3. Pupils'/Students Dominant Class Activities.

Teachers' time use and teaching behaviour: Figure 4 presents how teachers used their class time. It is seen that 70% (45) and 72% (23) of SMASSE and non-SMASSE teachers and 60% (33) and 63% (16) SbTD and non-SbTD teachers respectively, used much of their time presenting material or lecturing to the entire class. Giving notes was another dominant activity occupying 50% (45) and 48% (23) of the SMASSE and non-SMASSE teachers, while occupying 39% (33) and 41% (16) of SbTD and non-SbTD time respectively. Asking questions was equally a major feature of the classroom approach, constituting 42% (45) and 45% (23) of SMASSE and non-SMASSE teachers, 40% (33) and 42% (16) of SbTD and non-SbTD teachers. These were followed by giving and marking assignments and demonstrations.



No of teachers:
 SMASSE 45
 Non-SMASSE 23
 SbTD 33
 Non-SbTD 16

Figure 4. Teachers' Time Spent on Classroom Activities.

Nature of the Dominant Teaching/Learning Activities

The following section focuses on the nature of the dominant teaching/learning activities, namely; lecturing, question and answer exchange, written exercises and copying and taking notes.

Presenting information/lecture method: The main teaching strategy that characterized primary and secondary school teaching was the large amount of teachers' talk, which involved mainly the teacher presenting information or lecturing to the pupils/students, interspersed with questions, generally asked to the whole class, with predetermined answers. A minimal amount of time was spent by teachers talking to pupils on an individual basis and throughout most of the lessons observed, the pupils/students played a passive role. A considerable amount of teaching-learning time was also spent with pupils silently working on teacher assigned tasks. These tasks were generally 'whole class' assignments at which the pupils were expected to work independently at the same rate.

Moving from this individual lesson to the wider school day, one was immediately and forcefully struck by the sameness of the lessons. Allowing for the individual teacher differences in style, it seemed that irrespective of the subject under consideration or whether

the pupils were in primary or secondary school level, all lessons were characterized by this same routine, namely the teacher presenting information/lecturing to pupils or asking whole-class directed questions and pupils working silently at the teacher assigned tasks. In both of these routines, the pupils played an almost totally passive role in terms of verbal and hands-on involvement.

Question and answer exchange method: This was the principal form of oral exchange in the classroom. Students/pupils were required to provide very brief answers to the teachers' questions, based on the recall of topics encountered in the previous lesson. The teacher rarely probed for the students' thinking following an incomplete or incorrect response. The approach being more usual to pass on from one pupil to other until the correct response, as designed by the teacher, was provided.

A common technique was for the teacher to ask a question and then to select a volunteer from those pupils who had raised their hands. Another frequently used technique was for the teacher to ask a question and then direct it to a specific pupil by name.

In the question and answer routines during lessons, the rapidity with which the teacher fired the questions and the fractional time allowed for a response were deterrents to pupil participation. Pupils/students needed time to organize their thoughts, and even more so if these were to be presented in a second language. The 'wait time' in the order of several seconds not only provided little thinking 'space' for the pupils, but also raised the chances of the pupils constructing unacceptable responses.

One important feature of the classroom exchanges was usually the questions asked by the teacher about some 'known information'. The teacher knew the answer to the question, and the teacher's reaction to the pupil's response told the pupil how well he/she had met the teacher's expectations. This kind of classroom talk was entirely teacher-directed and gave virtually no recognition to the ideas that pupils brought with them to the lessons. The question and answer exchanges were generally routine at the beginning of lessons, but could also occur at the conclusion of a lesson, when the teacher was led to suspect or thought he/she had completed the topic more rapidly than anticipated and was left with five or ten minutes to fill. Associated with the question and answer exchange was the common practice of students completing the teacher's sentences in a chorus form.

Written exercises: The working of examples by both primary and secondary school learners to provide practice in writing and computing skills were quite common in mathematics and science subjects observed. On the whole, textbooks provided a sequential series of exercises through which each class progressed. It was routine that after a review of the previous lesson and an introduction of the new topic, the lessons proceeded with the teacher working through one or two examples on the board, after which a series of questions were assigned to the pupils/students for working in their exercise books. While the students were working out the assignment, the teacher walked round the classroom, checking and marking individual work. As the students completed the questions, the teacher, if there was still enough time, intervened to work through the same questions on the board. The written exercises were often continued as homework, which could be taken by the teacher for marking and for reviewing during the next lesson. As a variation of the written exercises, the teacher would invite student volunteers to work out examples on the board, while the rest of the class watched.

Taking/ Copying Notes: Copying notes from the board was a common activity in some of the science subjects. Teachers normally explained that that were no suitable textbooks for

particular topics and it was necessary for students to have complete sets of notes in preparation for the future examinations. This was especially so for theory parts of the science lessons. In some schools, a number of teachers had prepared typed sheets of notes for handing out to students. These were quite useful for memorization in preparation for examinations.

In some of the science lessons, sets of worksheets intended to serve as notes had been developed to accompany laboratory activities. It often became feasible to complete the worksheets without reference to other materials. This was largely because the worksheets tended to pick out the main points from the textbook and students seemed not to like making notes from the texts, which was seen to be quite tedious. Of course the completion of worksheets to serve as notes required that students filled in the correct answers to the questions. At points designed to encourage students to record their personal observations, they tended to wait for the teacher-approved observations before writing in the worksheets.

The above general description was based on a limited number of observations of science and mathematics lessons, in which there were a number of key features of classroom behaviour. Teachers generally spent much of their class time presenting factual information, followed by asking pupils individually or in chorus to return the factual information in a question and answer exchange. Students were rarely asked to explain a process or the interrelation between two or more events, and the teacher did not normally probe to see what elements of the material or process the pupil did not understand. This interrogatory style is an evaluative exercise, not one that sought to increase pupils' understanding.

Some Examples of Good Classroom Interaction Practices-Observations: Although most of the observed lessons did not reflect lesson practices advocated in the two training programmes, the following were some few examples of good classroom interaction practices observed in a few of the classes.

Box 3. Mathematics Lesson- Secondary School (SMASSE)

Topic: Sequences and Series

Lesson Introduction: Due to the method adopted to introduce the concepts of 'Sequences' and 'Series' the introduction took 12 minutes during which the teacher gave out match sticks and students worked in groups to form various figures in order to discover for themselves the meaning of the two concepts. This was effectively carried out with the teacher visiting each group to explain.

Lesson Activities: The major activity during this phase was the presentation of results by each group in front of the class. The teacher played the role of a facilitator and guided students to effectively explain the two concepts. All the students were actively involved in the lesson. The teacher was friendly, confident, resourceful and had good class control.

Lesson Conclusion: The lesson was well concluded with students being chosen at random to complete various terms in the sequences and series given on the board. The lesson ended with an assignment being given out.

This was a lesson in which creativity was evident, which went a long way in simplifying the concepts and ensuring effective learning.

Box 4. Science Lesson- Primary School (SbTD)**Topic: Energy. Sub-Topic: Light**

Introduction: The lesson was introduced in a very lively manner with the learners being asked to close their eyes. After this, the learners were actively involved in naming instances that require light in order to perform certain activities, and sources of light. This phase took about 6 minutes and both girls and boys were involved in contributing.

Lesson Activities: The lesson was systematically taught according to the lesson plan. The learners were actively and meaningfully involved in the lesson through group work and hands-on activities using candles, match boxes, rolled exercise books, torches and straight plastic pipes to discover how light travels, with clear guidance from the teacher. There was also an effective use of appropriate motivation and reinforcement techniques. There was a gender balance in the construction of groups, distribution of questions and group responsibilities. The teacher made purposeful movements to each group. Girls seemed more active in answering questions and performing the group activities-the teacher intervened to encourage boys. The teacher was knowledgeable, confident, friendly and creative. She used the lesson plan and notes very well.

Lesson conclusion: The lesson was well concluded in 5 minutes, with the learners answering simple recall questions about the experiments they had done and their observations. The lesson concluded with an assignment on the major points.

DISCUSSION

The key objectives of the SMASSE and SbTD programmes were premised on making the primary and secondary school syllabuses pupil-centred, with large and essential components of practical work in the classrooms, laboratory or science room, and use of the discovery method to transfer useful skills and knowledge to pupils. The starting point for all the activities was that the pupils' own environment, experiences and skills were to be developed in a problem-solving context. The two programmes emphasised the fact that pupils would acquire skills in observing, measuring and estimating; indeed the main concept was to involve pupils practically in learning science and mathematics by using of a wide range of measuring instruments with skill and accuracy.

The analysis of classroom observation data shows that the main areas stressed by these programmes namely; the pupil-centred practical component and the development of concepts relating to the physical environment, were quite problematic to attain. It was observed that the practical component based on 'discovery learning,' which was presumed to be an essential part of the science lessons, had very little to do with the observed classroom processes, probably due to lack of time or lack of equipment. Teacher demonstrations were also not common, and where they occurred, it was with the teacher usually 'doing' and the class 'observing' and answering simple routine questions. There appeared to be very little concern with development of manipulative skills that would be of value in pupils' every day life. The major form of verbal interaction within the classroom, apart from the teacher lecturing and pupils listening silently, was the teacher asking questions and pupils giving answers. The questions mainly involved simple factual recall, and pupils' answers were often of a single word or a sylsed repetition of the question that included the answer. The teachers generally

asked very few 'why' or 'what do you think' questions, although this tended to vary from one teacher to another and from subject to subject. The pupils themselves rarely spoke except when they were spoken to. Throughout the classroom lesson observations, very few pupils' questions were found.

From the lesson observations, as already noted, classroom activities did revolve around the transmission of knowledge, and the teachers' main concern was to 'teach' something they considered important, while the learners main concern was to 'learn' it. In this process, the utility value of the lesson for both the teachers and students seemed to be one of working towards 'passing the terminal examinations'. To carry out their main task of transmitting knowledge and achieve that end, teachers generated the kinds of learning experiences already described. It was generally difficult to discern and describe the pedagogical principles behind their actions, especially after having undergone the intensive SMASSE and SbTD in-service training programmes. What featured most was that they appeared to be strongly based on the rote learning approach, and most probably reflected the way themselves were taught at school. This style was quite widespread and was representative of what normally used to take place and continues to take place in the primary and secondary school classrooms, a fact that seems to have been taken for granted by the two INSET programmes.

With all the emphasis on pupil-centered approaches in the INSET programmes, there was little evidence that this had translated into practice in the actual classroom processes. Pupils normally had greater opportunities to participate in the teaching/learning process through answering the teacher's questions, but their own contributions were often generally ignored. The extended question and answer sessions were a common feature at the start of lessons and also at the end of long sessions of the teachers' talk. In both cases it seemed to be viewed by the teacher as both a revision and an evaluation exercise. Within these sessions, it was a common practice for the teacher to completely ignore many pupil responses and only acknowledge certain 'correct' answers. There might be a variety of reasons why teachers used this kind of technique. First, they could have felt that time was short and they did not wish to be sidetracked by the incorrect answers. Second, they might not have had the knowledge base to deal with the suggested pupils' answers.

Whatever the overt reason, it is suggested that the technique was used by teachers as a control mechanism to reinforce their status and authority in the classroom. In any social interaction between individuals, as has been argued, the person who defines the ground-rules of the situation and decides what is acceptable and unacceptable takes on a position of power and exercises authority. The 'other' party is then placed in a submissive situation. In the classroom situation therefore, the teacher's apparently arbitrary decision to respond to or ignore the pupils' participation in dialogue strongly reinforces his/her position. This not only demonstrates the teacher's authority in social interactions, but also plays a vital role in his/her authority to define the usefulness of pupil knowledge (Prophet and Rowell, 1990).

From a teaching-learning perspective, the arbitrary nature of rejection precluded opportunities for pupils' cognitive development. Incorrect answers were a valuable resource for teachers who could use them to identify slight misunderstandings or complete lack of comprehension in the pupils. Ignoring pupil responses reinforced a behaviouristic approach to teaching, which placed emphasis on the rote learning model through the right and wrong pupils' responses.

As a response to the arbitrary rejection of pupil responses by the teacher, pupils in turn appeared to answer teachers' questions in a random manner. Guesses were the accepted order

of things, and it seemed more important for the pupils to participate by saying something, however wrong, rather than not respond at all. The 'random' selection of pupils' answers was again indicative of a major problem area for them in terms of the mental development of ideas. The emphasis on rote learning and correct response meant that no attention was being paid to the crucial issue of concept development in the subject area, such that any 'learning' that took place remained superficial, since no real cognitive demands were being made on the pupils by the teacher.

One of the most commonly used question and answer technique for the science subjects involved pupils completing, the teacher's sentences, often in chorus. The completed sentences or words were then often repeated by the teacher. This seemed to be as a result of a number of issues. First, in some classes observed, pupils especially at the primary school level had some major difficulty with their ideas in English. Often the teacher was impatient and did not allow for 'wait time' for the pupils to organize and express their thoughts. In situations where teachers were aware of the problem, and allowed pupils time to organize their thoughts, as well as gave them encouragement for the expression of ideas in their own words, the amount of content covered was normally reduced, and therefore appeared as if less work was being done. Furthermore, faced with large classes and a variety of language incompetence, one of the "coping strategies" utilized by teachers was 'sentence completion'. By simplifying and actually phrasing the idea for the pupils, while still leaving them some input in the form of a missing word, teachers seemed to feel that they were resolving the problem. The simple repetition of the word or the complete sentence was then perceived as the reinforcement of the idea, although based on a fundamentally flawed concept of learning, which postulates that the repetition of words leads to an understanding of the meaning of the words. In reality, the widespread use of the strategy seemed to have the opposite effect, namely that pupils would nominally complete the syllabus, but only at the expense of any conceptual development at a personal level (Prophet and Rowell, 1990).

As clearly demonstrated in the narratives, the SMASSE and SbTD programme teachers did appreciate the need to adopt student-centred approaches to teaching as advocated by the two INSET programmes, and indeed claimed to be putting them into practice, although this was not reflected in the classroom interaction processes observed. Apart from some of the factors already discussed, there seemed to be general apathy towards the application of the new methods of teaching due to what the teachers perceived as "poor management of the training programmes and the failure of government recognition" of their participation in the two programmes, although the study did not focus much on this particular area as it was not its main thrust. For example, during the SbTD training, teachers were asked to contribute Kenya Shillings 1,200 towards their training and the purchase of training materials, with a tacit understanding that the course would count in their professional and academic growth by being issued with certificates on conclusion of the course, which would lead to promotions and entrance into institutions of higher learning. For some unclear reasons, the Ministry of Education seemed to have reneged on this issue, leading to teacher dissatisfaction and increased lack of interest in the programme. As for the SMASSE, teachers also voiced their dissatisfaction about its poor management which has also been supported by many complaints in the dailies, especially making attendance of the programme mandatory and the perceived lack of incentives, particularly non-payment of per diems, at times occasioning teacher walk-outs from the training centers. They also complained about the government's failure to

recognise their participation in the programme, which would have contributed to their academic and professional mobility growth.

CONCLUSION

In conclusion, the SMASSE and SbTD projects set out a child-centred learning experience which students/pupils were expected to be exposed to during the teaching situation, an approach that would draw on their everyday experiences in order to give them the opportunity to express and develop their own ideas. This was to be achieved by offering a programme of studies with a greater emphasis on 'practical' rather than the usual rote learning exposure. The classroom interactions documented in this study showed that such an approach remained a long time ideal. The teaching portrayed in these observations placed emphasis on the acquisition of limited skills associated with the specific responses required in achieving success in the terminal/national examinations. The dominant mode of interaction was that of transmission of information from teachers to students, accompanied by repetition and drill. Knowledge seemed to be a commodity to be poured into empty vessels. What appeared lacking from these interactions was any recognition of the beliefs and values which students brought with them to the classroom or even an acknowledgement that students had already-constructed structures for interpreting their world. The imposition of the teacher's way of seeing things not only limited the expansion of the students' expressive capacities, but also served to inhibit the development of connections between students' existing ideas and those presented in class. Learning involves linking that which is to be learned with what is already known, requires some modification of the existing conceptual framework. The current classroom practices, with their outstanding lack of student expression of ideas, are likely to extend the separation of school knowledge from everyday knowledge.

The fact that students were communicating in a second language raised the question of the extent to which this impeded the articulation of thoughts their through oral or written expression. Words serve as a focus for the elaboration of ideas, and talking or writing enhances the generation of clear understanding. The lack of confidence in the usage of the English language was frequently reinforced overtly by the teacher's impatience and covertly by the teacher's avoidance of student contributions. Many teachers attempted to compensate for the students' language difficulties by reducing the content of the lesson to a simplistic account of ideas, which, instead of stimulating students' thinking with previously encountered ideas, faded into the oblivion of repeating the familiar. Trying to break out of the vicious circle by involving students in higher order thinking could bring about some inevitable frustration and was avoided by most teachers. Teachers were faced with the dilemma of choosing between an emphasis on the development of personal understanding through talking and writing and an emphasis on the completion of the syllabus in preparation for the examinations. It would have been suicidal not to cover all the necessary topics in preparation for these examinations.

The study also observed general apathy and lack of interest in applying student-centred teaching approaches by teachers who had participated in the two programmes as a result of what was perceived to be "poor management of the INSETs and government's failure to

recognize participation in them, and to lead towards their professional and academic development”.

It is therefore clear from the schools where these classroom observations were carried out that claims for a ‘student-centred or ‘practical’ teaching as advocated by the SMASSE and SbTD INSET programmes remain a pipe dream. The teaching remains firmly an authoritarian and teacher-centred mode where the pupils are generally passive recipients of content-based verbal information. The development of concepts, attitudes, and manipulation skills, emphasized in these INSET programmes appeared not to be taking place. It was emphasized from these observations that the stipulated processes were actually being inhibited, rather than being developed and enhanced in the classrooms. It is however, appreciated that while it might be easy to lay the blame on the teachers for the apparent failure to implement the laudable set of objectives of the two INSET programmes, there was a complexity of situations which were obviously beyond their control. Faced with large classes, syllabuses overloaded with content, high expectations from pupils, parents, head teachers and the local communities who perceived examination success (even though unattainable by the majority of pupils) as the priority of the schools, and examinations which still emphasized and rewarded simple rote learning and recall skills, it was no surprise that teachers utilized a set of strategies that ensured their survival in the classroom, but failed to take cognizance of individual pupils and their development.

The findings of this study in no way negate the need for in-service training programmes. The Ministry of Education Science and Technology needs to recognize the fact that there are many key players in the education system and that indeed in-servicing of teachers cannot be the responsibility of any one player, be they donor agencies or NGOs. There are many providers with different focuses. All these efforts need to be appreciated and properly harmonised and guided. Therefore there is need to put mechanisms in place for continuous processes of in-servicing primary and secondary school teachers. In order to improve the coordination of in-service providers and programmes especially at primary and secondary school levels, the INSET Unit in the Ministry of Education should coordinate and ensure that in-service initiatives are decentralized, institutionalized and sustained. INSET structures should be enhanced at Provincial and District levels. One key area is to address is accreditation and certification of in-service courses. This was viewed as a means of ensuring that quality training is provided and the professional and academic growth of teachers is rewarded and sustained.

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NEW MODALITY OF SCHOOL HEALTH PROGRAM: AN EMERGING NEED FOR DEVELOPING COUNTRIES

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ABSTRACT

School Health Program (SHP) is defined with respect to environment, services, and education. It should be a plan with a good vision so that it will be fruitful. School Health Program is to be conducted to ensure a healthy environment in schools and to promote the health of the school children. It helps to prevent the different diseases and make the children conscious about their health. SHP makes easy for early diagnosis, treatment, follow-up, and check regularly to the diseased and non-diseased students. A new concept of SHP, which is an emerging need for developing countries, is more focussed in this study. It is one of the cost effective program if implemented at a national and international level and make aware all the nongovernmental organizations/international non-governmental organizations/donors to spend their money in this type of program.

Keywords: School Health Program (SHP), problems, curriculum, new modality and students.

INTRODUCTION

The school health program (SHP) is an important branch of community health [1], [2] and is responsible for looking after the health of school children. It is an economical and powerful means of raising the health of the community. Though it is carried out in many countries since eighty years, it has not been able to find its place in the majority of schools in developing countries like Nepal. It is a universal truth that a healthy child turns into a healthy adult in future and hence proper cares on the health of school children turns the foundation of a nation that consists of healthy people who can lead a healthy life and contribute to the development of a nation.

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Early detection and treatment of asymptomatic disease have emerged as a major strategy for secondary prevention of the chronic diseases. Screening is aimed at the presumptive identification of unrecognized disease or defect by the use of procedures that can be applied rapidly and economically to a population. Its purpose is to distinguish among apparently well persons those who probably have a disease from those who probably do not [3]. This article is related to the school health problems and mainly focuses on a new concept of school health program.

HEALTH PROBLEMS

The centers for disease control and prevention has identified six categories of risk behavior in today's students [4].

1. Behaviors That Result in Unintentional and Intentional Injuries

A person's behaviour may be the main cause of health problem, but it can also be the main solution. By changing their behaviour these individuals can solve and prevent many of their own problems [5]. Relatively little is known about risk behaviours of elementary school children [6]. The prevalence of risk behaviours was higher in absent than present students [7]. Through health education, we help people understand their behaviour and how it affects their health. We encourage people to make their own choices for a healthy life. We do not force people to change.

Behaviours can result in intentional and unintentional injuries. Unintentional injuries are accidental. These include motor vehicle related accidents, burns and drowning. Intentional injuries result from interpersonal violence (domestic violence, child abuse, bullying, fighting) and suicide. Urban area dwellers and especially inner-city residents, tend to experience much higher rates of interpersonal victimization and perpetration than those who live in suburban and rural areas [8].

Educators are faced with the issues of assaults, rapes, suicide, gang membership and weapon carrying in their schools [9]. An increasing number of students and adolescents are not only becoming victims of violence but also are routinely witnessing violence in their communities [10]. It is a concern that is no longer limited to large urban areas, but extends to smaller cities and rural areas as well [11]. Seven of every ten inner city Chicago students report that they have witnessed a murder, shooting, stabbing or robbery- half of which involved friends, family members, class mates or neighbors [12]. Presences of violence in children contribute to a lack of motivation to achieve in school [13]. Once a gun is readily accessible, a youth can easily bring it to school [14]. Sexual harassment is unwanted and unwelcome. When school officials fail to respond appropriately, students may develop feelings that 'they are incapable of standing up to injustice or acting in associating with peers who are being harassed or bullied [15].

2. Tobacco Use

Most adults, who smoke / use tobacco, began it during childhood or early adolescence. The earlier they began, the less likely they will quit. Risky healthy practices, such as cigarette smoking, poor diet, physical inactivity and substance abuse are linked to poverty [16]. Children who grow up under these adverse environmental conditions show a higher risk of developing a pattern of processes in adolescence doing poorly in school, dropping out, becoming adolescent parents, becoming delinquent, and using a cycle of misery and hopelessness [17]. Passive smoking also causes thousands of children to develop asthma each year [18]. Research studies show that being exposed to high particulate levels increases the likelihood of having persistent causes, respiratory illness and severe asthmatic attacks [19].

3. Alcohol and Other Drugs Use

There is an increasing rate of using alcohol, marijuana, cocaine, anabolic steroids from school life. Drug free school zones show a united front of schools, students, parents and communities in working together to establish drug free school and communities by decreasing drug trafficking around school [20].

4. Sexual Behaviors That Result In HIV Infection, Other STDs and Unintended Pregnancy

The sexual behavior of today's students is alarming. By the age of 15, 25% of the students had sexual intercourse at least once. By the age of 17, 75% of both male and female students have had intercourse at least once. More than one third of the high school students reported having had more than two sexual partners. Human immunodeficiency viruses (HIV), sexually transmitted diseases (STDs), and unintended pregnancies are also one of the problems of school children. The number of 12-21 years old in the US who has become infected with HIV has increased by 77% since 1991. The significant proportion of young adults who currently have Acquired Immunodeficiency Syndrome (AIDS) were infected with HIV during adolescent years because of risk behaviors they practiced [21]. Commonly STDs reported in students include Chlamydia, Gonorrhea, Syphilis, Cancroids, Genital herpes and Genital Warts. One in six adolescents develops one or more of these STDs each year. This means that more than 3 million adolescents are infected each year with one or more STDs [22].

Students who chose to be sexually active often face the consequence of unintended pregnancy. Those becoming pregnant before the age of 15, 60% will have 3 children by the age of 19 [23].

5. Dietary Patterns That Contribute to Disease

The dietary guidelines should be strictly followed. Over 25% of high school students reported eating more than two servings of foods high in fat content [24].

6. Insufficient Physical Activities

There has been a significant decline in the percentage of adolescents who can satisfactorily perform a series of physical fitness tests when compared to adolescents of previous pregnancies.

The five major common health problems in the school children of developing countries like Nepal are:

1. Parasitic diseases
2. Infectious disease
3. Upper respiratory infections
4. Malnutrition
5. Disease related to skin, ear and dental problems

These conditions are the major causes of mortality and morbidity in children. Regular check up of children in their respective school together with emphasis on health education is believed to reduce the morbidity and mortality in children.

A child spends almost one third of daily time in the school. The school thus must be able to provide the child with a healthy environment to ensure best physical, social and emotional health of the children. A healthy environment can be created by keeping in mind the *following points*.

(a) Environment of the School

A safe and healthful school environment is an environment that attends to the physical and aesthetic surroundings and psychological climate and culture that maximizes the health and safety of students and staff. All students respond to their environment. Favorable environmental conditions stimulate healthful growth and development, unfavorable conditions impede well-being. The environment of the school makes a great difference in the health aspect of the children. The surrounding area including the environment must be safe and comfortable. Similarly, the school site, structure, classroom, furniture, lights both natural and artificial, colors, laboratories, canteens, ventilations, sanitation, water supply, prevention from accidents, ground for play and recreation must be good. There should be effective classroom management, emotional security positive nutritional environment as well as safe school transportation to protect students as they travel to and from school [25], [26].

(B) Health of the School Children and Staffs

Not only is the periodic medical examination of the school children but also the health of the staffs (teachers and other staffs) are important. At the initial time of examination, a thorough examination should be done. To be an effective teacher, a teacher must be aware of

the health status of the students. A teacher must be committed to working with students to maintain and improve their health status. A totally awesome is a teacher who is committed to promoting health literacy, improving health, preventing diseases and reducing health related behaviors in the students, and to creating a dynamic and challenging classroom where students learn and practice life skills for health [27]. Today's teacher must be totally awesome [27]. Teachers should inform to the program coordinator about the health of the school children. They should be involved in early identification of visual and auditory impairment, attention deficit, learning disabilities, regarding the growth and development of children and others. Thus, teacher (especially the class teachers) should be more concerned to the health of the children of their class.

(c) Follow up

Not only the initial examination is necessary, but also there should be a periodic health check up of both the children as well as the school staff.

(d) Prevention of Communicable Disease

There are many communicable diseases. So, to prevent from these, a thorough evaluation about the immunization is most emphasized in the school health program.

(e) First Aid Treatment

For the first aid and emergency care, the teachers should be trained on carrying out first aid measures in the school premises.

(f) Nutrition Aspects

Teachers of the school care hostel children. Therefore, they should be given adequate nutritious food. For the mid day school children, their tiffin should be observed. Well-facilitated filtered water and good canteen should be in the school. "*A carrot per day prevents the children from night blindness*". Therefore, it is very important to realize that whatever the children eat in the school and hostel should be hygienic, nutritious and provide adequate carbohydrate, protein, fats, vitamins and minerals to take care for the overall development of a child and provide sufficient calorie. Childhood overweight is one of the most serious problems currently affecting individual and public health. Schools represent a logical site for prevention because children spend 6-8 hours a day there during most of the year [28].

(g) Health Education

Through health education, we help people understand their behaviour and how it affects their health [5]. We encourage people to make their own choices for a healthy life [5]. We do not force people to change [5]. Health education about the personal hygiene, food habits, exercise and physical fitness, about the diseases and environment health should be given to all the school children in simple understandable terms. A planned curriculum must be designed to school health education. It includes a variety of topics.

- Mental and emotional health
- Family livings
- Growth and development

- Nutrition
- Personal health
- Alcohol, Tobacco and other drugs
- Com. And Chronic diseases
- Injury prevention and safety
- Consumer and community health
- Environmental health

(h) Counseling, Psychological and Social Services

These are services that provide broad based individual and group assessments, interventions and referrals that attend to the mental, emotional and social health of students.

(i) Physical Education

Quality physical education should promote through a variety of planned physical activities, each students optimal physical, mental, emotional, and social development, should promote activities and sports that all students enjoy and can pressure throughout their lives. Almost half of young people from low-income families do not participate in any extracurricular activities [29]. By the time that young people reach high school, the spontaneous expression of physical activity has often been curtailed [30].

(j) Disaster and Emergency Preparedness

Emergency preparedness plans should be made a periodically revived, tested and updated [31].

The *eight* components of the comprehensive SHP are almost the same as described before in health problems [31]. These will change the lifestyle of the school children, teacher and their families. Thus, an achievement will be gained which leads to the healthy child. School health program is defined with respect to environment, services and education.

Ignorance is the root of most of the health problems. Every school should more efficiently serve as an entry point for health promotion and a location for health intervention. Every school should enable children and adolescents at all levels to learn critical health and life skills. The community and the school should work together to support health and education. Policies, legislation and guidelines should be developed to ensure a comprehensive school health program at the local and national level. School health program should be a plan with a good vision so that it will be fruitful.

NEW MODALITY OF SCHOOL HEALTH PROGRAM

The modality of running the School Health Program (SHP) proposed by author (Dr. Adhikari) includes 18 points. This is a new concept of SHP, which an emerging need for developing countries like Nepal. This new modality starts from essential criteria.

Essential Criteria

(A) If the program is run by the government itself or by an organization without taking fees from the school students; they can follow 1-15 points.

OR

(B) If the program is run by any private sector or by any organization taking school health fees from school students, then; they have to follow these 1-18 points.

Therefore, this essential criteria will follow the basis whether to run this program with which criteria. The program will be effective once this SHP is launched with one of the above essential criteria. Below are the lists of points of essential criteria:

1. Health check up

There will be a school health camp six monthly. The school students, both diseased and nondiseased, can get benefit by doing health check up from the medical experts.

2. Blood grouping

This test will be done at the time of admission. Blood grouping is much more useful in certain circumstances such as accidents, shock etc.

3. Stool examination

Several study done in developing countries revealed that the parasitic infestations are common in school students. Thus, stool examination will be done to all the school students for ova and cyst six monthly and medicines will be given according to the worm infestations.

4. School Health Curriculum.

Health awareness class 4-6 classes per month by experts on Sanitation, tobacco use, smoking, alcohol, drug abuse, injury prevention and safety, environment and on different infectious and communicable diseases including Acquired immunodeficiency syndrome and sexually transmitted diseases.

5. School Health Environment

It includes:

- Improvement of physical, psychological and social environment
- Healthy organizational culture in the school
- Interaction between the School and the nearby community

6. Nutritional status

As already described that the child can study properly only when medical condition is fit and fine. So, in this type of new school health program, assessment of the nutritional status of school children and recommendation will be done.

7. Establishing School Health Clinics and Referral system

There will be 4-5 Clinics in one district depending upon the number of students attending Schools. The clinic will remain open daily. Investigations done will be at the hospital rate in this clinic. Poor patient get medicine free of cost. There will be also a referral system to the well-equipped hospital where they get treatment in subsidized rate. This will be until the hospital for this program is not started. Long-term plan of this program is to establish at least 3-4 hospitals in one district/state so that these school children will great benefit.

8. Counseling Center

There will be counseling centers on every school health clinics. This center will be provided with three counselors. When students have their mental/psychological/social problems, they can meet the counselor and solve their problems. In certain conditions such as mass hysteria, counselor will also go to schools and solve their problems.

9. First aid box and service

All the teachers and students will be taught about the first aid measures. The first aid box will contain the most essential drugs and instruments.

10. Training to class teacher

Teachers (especially class teacher) are more responsible for their respective class. Therefore, these class teachers will be given the training for early identification of disease of school children such as hearing impairment, refractive error etc. There will be also training classes to class teachers about the first aid.

11. Health Insurance Scheme

There is also a provision of health insurance. This scheme will be very useful especially to the poorer students whose parents cannot afford money to treat their children. So, it can be an alternative for poor family.

12. One Call Service

Program Coordinator (who is a medical expert) and his team will try to solve students' health problems and queries if they give a call to the helpline number. It is like a telemedicine where parents can ask any problem, their children had and can get relief for the time being. Later on, they can go to the school health clinic.

13. School health management team

There will be a team including –

1. Program coordinator (Medical expert)
2. Principal
3. Teacher (especially health teacher)
4. Student representative
5. Lower level staff (as they know more about sanitation/water/canteen/latrines)

This team will be in every School.

14. Mass casualty management team.

To manage a disaster problem in the school such as mass hysteria, diarrhea, cholera, accidents; there will be a mass casualty management team. The program coordinator of school health management team will coordinate in this type of disaster

This team includes –

- (a) Program Coordinator of school health management team
- (b) Principal
- (c) 2 senior doctors
- (d) 4 junior doctors
- (e) 4 nurses
- (f) 5 other staffs
- (g) Ambulance contacts
- (h) Hospital contact

This team will be also in every school.

15. School health records and Research

Personal file of the individual students should provide data about the health and disease of the school children, which should be useful in analyzing and evaluating School health program and providing a useful link between the home, School and the community. The SHP will also be research oriented. It can do knowledge, attitude and practices study / research on nutritional status, parasitic infestations/prevalence of different diseases such as ear disease, eye disease etc.

16. Internal Auditing of the School Health Program

The program will be successful only when it is audited properly. Registered auditors should audit every financial aspects of this program.

17. External Evaluation and Analysis Team and Recommendation from them

There will be the external evaluation of this school health program by the expert from nongovernmental organizations/international nongovernmental organizations/donors and give their expert opinion so that the program will attain a new height.

18. Annual Report

In every school, one of the auditors of SHP will present the audit in the anniversary day of every school so that every one can know the reality transactions and report of our program in that respected school. This can help to make a program more successful.

CONCLUSION

Therefore, I want to say, "Struggle for Health is Struggle for Justice". If we conduct such a program in a developing country like Nepal, then it is sure that we can reduce the mortality and morbidity of the children. So, I hope every health personnel will think it seriously about the concept of School Health Program. Initially it might be difficult in running but i hope this program will significantly reduce the health problem of school children Thus, SHP will definitely improve the health of large populations when implanted on a national scale.

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