School and Teacher Effectiveness

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INTRODUCTION

The following briefing was originally produced in September 1994 for Staffordshire LEA, as part of their 1994/5 Resource Review. Officers, advisers, headteachers and teachers met to discuss alternative funding options available to the Authority. The LEA asked NFER to provide guidance by drawing on key research studies and reviews which would shed light on resource issues. The LEA was primarily concerned with research in the United Kingdom and North America which had examined Teaching Effectiveness, School Effectiveness, School Improvement, and Class Size.

The purpose of the briefing was to report succinctly and objectively the main findings and recommendations of a series of research studies. The briefing is organised into three parts: research on teacher effectiveness, research on school effectiveness and related research on class size.

The NFER is grateful to Staffordshire LEA for permission to reproduce the briefing for wider distribution. The author would like to acknowledge warmly the contributions and insights provided by LEA officers and advisers, primarily Tim Hine, Tim Legge and Colin McShane.

A. RESEARCH ON TEACHER EFFECTIVENESS

Brophy and Good (1986)[1] undertook a major review of the work which reversed 1960s thinking, which had suggested that teachers did not have important differential effects on student achievement.

Rosenshine (1971)[2] was one of the first to note that data from different investigations using different methods indicated that certain teacher behaviours were consistently correlated with student achievement gain (not all results were significant; all results were marginal to moderate in strength):

- strong criticism of students was correlated negatively with achievement gain (mere negation of incorrect responses was unrelated or correlated positively)
- positive correlates included teacher warmth, businesslike orientation, enthusiasm, organisation, variety in materials and academic activities
- and high frequencies of clarity, structuring comments, probing questions asked as follow-up to initial questions, and focus on academic activities
- no significant correlations were found for nonverbal expressions of approval, use of student ideas, or amount of teacher talk
- mixed results found for verbal praise, difficulty level of instruction or of teacher questions, and amount of student talk

Rosenshine (1971) also highlighted methodological problems and difficulties with interpreting these kinds of studies. He pointed out that the studies identified correlates not causes and sometimes hid possible relationships. For instance, where poor classroom managers frustrated by disruption might resort to strong criticism more frequently, the findings for the negative correlation between strong criticism and lower achievement might have to be reconsidered as a secondary, not a main effect.

Dunkin and Biddle (1974)[3] reviewed extant research and critiqued methods, and called for more comprehensive studies designed to develop theory and explain findings rather than to garner support for pet ideas. Process-product research followed in the 1970s, at a much higher level than hitherto.

The Canterbury (NZ) studies in the early 1970s (e.g. Wright and Nuthall, 1970[4]; Hughes, 1973[5]; Nuthall and Church, 1973[6]) examined teaching behaviours and student achievement in science lessons. Taken together, the studies found:

- content coverage determined achievement more directly than the particular teacher behaviours used to teach the content

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[1]BROPHY, J. and GOOD, T.L. (1986). 'Teacher behaviour and student achievement'. In: Wittrock, M.C. (Ed) *Handbook of Research on Teaching*. London: Collier Macmillan.
[2]ROSENSHINE, B. (1971). *Teaching Behaviours and Student Achievement*. London: NFER.
[3]DUNKIN, M. and BIDDLE, B. (1974). *The Study of Teaching*. New York: Holt, Rinehart and Winston.
[4]WRIGHT, C. and NUTHALL, G. (1970). 'Relationships between teacher behaviors and pupil achievement in three experimental elementary science lessons', *American Educational Research Journal*, 7, 4, 477-91.
[5]HUGHES, D. (1973). 'An experimental investigation of the effects of pupil responding and teacher reacting on pupil achievement', *American Educational Research Journal*, **10**, 1, 21-37.
[6]NUTHALL, G. and CHURCH, J. (1973). 'Experimental studies of teaching behaviour'. In: Channan, G. (Ed) *Towards a Science of Teaching*. London: NFER.

- younger students needed to participate overtly in recitations and discussions, but older ones did not require such active participation
- questions should be asked one at a time, be clear, and be appropriate in level of difficulty so that students could understand them (most will be lower order)
- teacher responses that convey enthusiasm for the content and support (with occasional demandingness, if necessary) to the students were more motivating than matter-of-fact reactions
- teacher structuring of the content, especially in the form of reviews summarising lesson segments, was helpful

The Flanders studies took place in the 1960s and 1970s and investigated the effects of teacher "indirectness" (more questioning and less lecturing, more praise and use of student ideas and feelings) on student attitudes and achievement. He started with a belief that teachers talked too much and made too little use of students' contributions. In a review of his own work (Flanders, 1970[7]), however, he observed (NB the correlations were stronger for attitude than achievement):

- teachers did not talk too much and teacher talk correlated positively with student attitude and achievement - although about two thirds of classroom talk was teacher talk, there was no evidence that it was inappropriate or unduly dominant
- correlations with indirectness, praise and acceptance of student ideas tended to be positive
- correlations with restrictiveness and negative authority tended to be negative
- the negative correlations tended to be stronger and more consistent than the positive
- flexibility (teachers tailoring techniques to the situation) correlated positively with student attitude and achievement

The last finding underlines that many of these relationships were not linear: they may be curvilinear or non-linear - optimal teacher behaviour may vary with the situation. Flanders suggested that lower levels of indirectness might be appropriate for factual or skill learning tasks and higher for tasks involving abstract reasoning or creativity. The Flanders studies have now been superseded primarily because of shortcomings of his observation schedules, but they have been well regarded and have led researchers to investigate some of the key factors more rigorously.

Soar and Soar (e.g. 1979[8]) worked to develop important conceptual distinctions between teacher factors which are not necessarily related to each other. They distinguished between *emotional climate* factors (positive or negative affect exhibited by teachers and students) and *teacher management* (or control) factors. In the teacher management sphere, they proposed distinctions too, between *control of pupil behaviour* (physical movement, opportunity to socialise), *control of learning tasks* (what tasks are selected and how they are carried out), and *control of thinking processes* (degree to which students are encouraged or allowed to approach tasks at a variety of cognitive levels or to pursue divergent ideas). Finally, the Soars distinguished between teacher control exercised through establishing rules and routines (*established structures*) or by issuing directives, asking questions or otherwise structuring pupil response through face-to-face interaction (*current interaction*).

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[7]FLANDERS, N. (1970). *Analyzing Teacher Behavior.* Reading, MA: Addison-Wesley.
[8]SOAR, R.S. and SOAR, R.M. (1979). 'Emotional climate and management'. In: Peterson, P. and Walberg, H. (Eds) *Research on Teaching: Concepts, Findings, and Implications.* Berkeley, CA: McCutchan.

Soar and Soar found that:

- both neutral (i.e. no strong teacher criticism or student resistance) and warm (more praising) emotional climates correlated positively with achievement - negative climates are dysfunctional, but neutral climates are at least as supportive as warm
- students learned more in classrooms where teachers established structures that limit student freedom of choice, physical movement and disruption, and where there was relatively more teacher talk and teacher control of pupils' task behaviour
- students learned more where there was higher control of learning tasks - more teacher-focused academic instruction (whole class or small group), pupils usually engaged in their tasks and alternative activities available when they finished)
- inverted-U relationships were found for recitation activity, for drill, and for teacher-directed (as opposed to student-selected) activity
- results for teacher control over thinking varied with student ability and grade level, with the Soars concluding that "...greater amounts of high cognitive-level interaction are dysfunctional for young pupils, especially those of lower ability, but may become functional for older elementary pupils, especially those of higher ability". (Soar and Soar, 1979)

Hence "the teachers who exerted greater control generally elicited higher achievement, but the relationship was ultimately curvilinear. Beyond an optimal level, additional teacher direction, drill or recitation became dysfunctional (not because the extra instruction undermined existing learning, but because it was unnecessary and used up time that could have been spent moving on to new objectives)" - quotation from Brophy and Good (1986).

Stallings' research (much targeted at reading instruction) through the 1970s indicated a clear and widespread pattern of clear academic focus (time spent in academic activities, frequency of small or large group lessons in basic skills, frequencies of supervised seatwork activities - and not time on non-academic activities such as story, music, dance, arts and crafts) positively affecting achievement as tested. Almost anything connected with the classic recitation pattern of teacher questioning (particularly direct, factual questions rather than more open), followed by student response, followed by teacher feedback correlated positively with achievement. Instruction in small groups (up to 8) correlated positively in first grade and instruction in large groups (9 or more) in third grade. The major finding was that students who spent most of their time being instructed by their teachers or working independently under teacher supervision made greater gains than those who spent a lot of time in non-academic activities or who were expected to learn largely on their own. Frequent instruction was especially important for the less able. See for example, Stallings et al. (1978)[9].

Brophy, Evertson and colleagues completed research, mainly in mathematics and reading in the 1970s, and found:

- on presage factors, the teachers who produced the most achievement were businesslike and task oriented, they enjoyed working with students but interacted primarily on a teacher-student basis, they operated their classrooms as learning environments, spending most time on academic activities
- the teachers who produced the least achievement were those who were more concerned with personal relationships and affective objectives than cognitive (another group of least effective were those disillusioned and bitter, who disliked their students and concentrated on discipline and authority issues)

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[9]STALLINGS, J., CORY, R., FAIRWEATHER, J. and NEEDELS, M. (1978). *A Study of Basic Reading Skills Taught in Secondary Schools.* Menlo Park, CA: SRI International.

- teachers who produced the most achievement also assumed personal authority for doing so - they felt efficacy and an internal locus of control, they showed a tendency to organise their classrooms and to plan proactively on a daily basis, they had a "can do" attitude
- the strongest and most consistent process variable correlates with achievement were those suggesting maximal student engagement in academic activities and minimal time spent in transitions and dealing with procedures or conduct:
  i. teachers were "with it", monitoring the whole class while instructing, moving around during seatwork, avoiding target (blaming the wrong student) or timing (waiting too long to intervene) errors
  ii. they were more likely to be coded as overreacting to minor incidents, but with warning not threat
  iii. they were proactive (articulating expectations), vigilant and consistent in dealing with conduct
  iv. they demanded not so much compliance with authority as productive engagement in academic activities
  v. such activities were well prepared, ran smoothly and had only brief transitions
  vi. seatwork assignments were well matched to student abilities (some individualisation typically)
  vii. students who needed help could get it
  viii. students were accountable for careful, complete work which they knew would be checked and followed up
  ix. students knew what further options were open on completing their work
  x. in higher ability classes, it was especially important for teachers to be intellectually stimulating and to provide interesting things once students had finished assignments whereas in lower groups, it was especially important for teachers to give students assignments they could handle, and to see that those were done
- success rates on seatwork were high (authors speculate that optimal learning occurs where students move at a brisk pace but in small steps so that they experience continuous progress and high success rates, averaging perhaps 75% during lessons when teacher is present and 90-100% when the students must work independently)
- high achievement occurred where criticism was rare but present for poor academic responses or work
- in English, results were harder to discover because content varied enormously, but they did find that achievement was higher in lower grades where praise was relatively frequent and greater gains were made with less able classes where teachers were friendlier, more accepting, encouraged students to express themselves but nevertheless were strict disciplinarians
- in mathematics, the more successful teachers asked many more questions and the research showed the importance of getting questions at the right level (eliciting and reinforcing positive responses)

See for example Evertson, Emmer and Brophy (1980)[10]. Brophy and Good (1986) conclude that: "classroom processes and process-product relationships vary with grade level. The primary grades stress instruction in basic skills, it is important to see that each student participates actively in lessons and gets opportunities to practise and receive feedback. In the higher grades, more time is spent learning subject matter content, and students are more able to learn efficiently from listening to the teachers' presentations or to exchanges between the setter and other students. There is less need for small-group instruction and for overt involvement of each student. However, it is important that teachers maintain attention to

[10]EVERTSON, C., EMMER, E. and BROPHY, J. (1980). 'Predictors of effective teaching in junior high mathematics classrooms', *Journal for Research in Mathematics Education*, **11**, 3, 167-78.

well-prepared and well-paced presentations, and that these presentations be kept clear and complete enough to enable the student to master key concepts and apply them in follow-up assignments." The research of Good and Grouws (1979)[11], in mathematics, reinforced these findings.

Seatwork has been the term commonly used by U.S. researchers to refer to work assignments undertaken by students in their seats, i.e. not under direct teacher instruction.

The California **Beginning Teacher Evaluation Study** (Powell, 1980[12]) conducted research into experienced teachers in order to inform their teacher preparation programmes. The research found the largest adjusted gains occurred in classes of teachers who:

- were well organised
- maximised time devoted to instruction and minimised time for preparation, procedure or discipline
- spent most of their time actively instructing the students and monitoring their seatwork
- caused students to be actively engaged when working alone and who were mostly attentive to lessons

In second grade time spent overtly practising specific skills (word attack, computation) was positively correlated with achievement. By fifth grade, time spent on these basic skills was negatively associated but time spent on applying these skills (reading comprehension and mathematical problem solving) was positively associated.. Over the whole study, no teacher behaviour measures was a significant predictor for both subjects (reading and mathematics) at both grade levels - evidence against the assumption that there are generic teaching skills appropriate or desirable for every teaching situation. Ethnographic follow-up led to the conclusions that more effective teachers tended to:

- enjoy teaching and be generally polite/pleasant in their daily interactions
- call their students by name, attend carefully to what they said, accept their statements of feeling, praise their successes and involve them in decision-making
- be less likely to ignore, belittle, harass, shame, put down or exclude their students - to show and generate mutual respect
- be businesslike and make demands on their students, encouraging them to work hard and take personal responsibility for academic progress, monitoring that progress and following through consistently on directions and demands
- be more knowledgeable about their subject matter and effective in structuring it for their students, pacing movement through the curriculum, individualising instruction, and adjusting to unexpected events or emergent opportunities, involving all their students, asking more open-ended questions and awaiting the response
- involve adults if they were available in the instruction
- avoid management errors (e.g. switching between instruction and behaviour management abruptly back and forth, treating the whole group as one to maintain order) and be more committed to (and demanding in) instructing their students in the subject matter
- use classroom management skills to support their academic skills

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[11]GOOD, T. and GROUWS, D. (1979). *Experimental Study of Mathematics Instruction in Elementary Schools* (Final Report, National Institute of Education Grant No. NIE-G-79-0103). Columbia: University of Missouri, Center for the Study of Social Behavior.

[12]POWELL, M. (1980). 'The beginning teacher evaluation study: a brief history of a major research project'. In: Denham, C. and Lieberman, A. (Eds) *Time to Learn*. Washington, DC: National Institute of Education.

Teacher and student mobility was greater in the more effective second grade class; by the fifth, small group work was largely phased out.

Ultimately, BTES developed the concept of *academic learning time* (ALT) which they defined as the time students spent engaged in academic tasks which they could perform with high success: ALT showed consistent and significant positive relationships with achievement. This coincides well with findings that brisk paced, small step, positive feedback approaches fare well. The studies also found great variance in allocated time, engaged time and success rates. Across a school year, some second grade classes received an average of 15 minutes mathematics instruction per day, while others averaged 50. Whatever the allocated time, some classes were attentive or engaged for 50% of the time, others averaged 90%. Some classes frequently were left to struggle with tasks beyond their abilities while others rarely endure low success.

Rosenshine (1979)[13] reported data from Phase III of BTES to demonstrate that for grade 2, the average picture was:

- in reading, for an average of 85 allocated minutes there was an average of 63 engaged minutes (proportion = 0.71)
- in mathematics, for an average of 37 allocated minutes there was an average of 26 engaged minutes (0.70)
- in other academic subjects, for an average of 9 allocated minutes there was an average of 7 engaged minutes (0.78)

For grade 5, a similar trend emerged:

- in reading, for an average of 113 allocated minutes there was an average of 84 engaged minutes (0.74)
- in mathematics, for an average of 41 allocated minutes there was an average of 31 engaged minutes (0.76)
- in other academic subjects, for an average of 21 allocated minutes there was an average of 16 engaged minutes (0.76)

Of course, it is the quality of the engaged time and activities that are of utmost importance.

The BTES studies also highlighted the tensions that exist between attempts to maximise student engagement and attempts to maximise success rate. Engagement is generally higher during activities conducted by the teacher than during independent seatwork, yet group activities expose all to the same content and eventually result in moving too slowly for the brightest and too quickly for the slowest. Differentiated seatwork responds to this problem but requires more teacher preparation and more complex classroom management, results in lower engagement rates despite the increased success rates, and tends to increase differences between higher and lower achievers in the class. See Denham and Lieberman (1980)[14] for discussion of this and other dilemmas raised by the BTES findings.

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[13]ROSENSHINE, B.V. (1979). 'Content, time and direct instruction'. In: Peterson, P. and Walberg, H. (Eds) *Research on Teaching: Concepts, Findings and Implications*. Berkeley, CA: McCutchan.
[14]DENHAM, C. and LIEBERMAN, A. (1980). *Time to Learn.* Washington, DC: National Institute of Education.

The **Stanford studies** associated with N.L.Gage and his students (see Clark et al., 1979[15]) support other work indicating the importance of teachers' structuring their content through clear presentations, providing feedback to student responses, and attempting to improve responses that are incomplete or incorrect AND indicating that a predominance of lower order questions is associated with high achievement gain, even on items dealing with higher order content.

Various **clarity studies** (e.g. Smith and Land, 1981[16]) have demonstrated that in teachers' presentations vagueness, false starts and halts in speech, and discontinuities reduce student achievement. Several studies (e.g. Borg, 1979[17] and Galton and Simon, 1980[18]) have investigated *time-on-task* or time allocation to investigate whether or not high levels are associated with high achievement. Brophy and Good (1986) pointed out that a better concept is opportunity to learn, which takes proper account of the combination of time-on-task ("which does not translate into achievement in any simple or direct way") and type or quality of task. Tobin and Capie (1982)[19] studied teacher *wait-time and quality of questioning* (cognitive level, clarity, relevance) in middle school science lessons: in experimental studies, wait-time showed a significant positive correlation with achievement and positive but non-significant relationships showed on the dimensions of question quality. The interactions suggest that longer wait times were especially important when instruction deals with higher cognitive level objectives, and that a mix of cognitive level questions produces the highest achievement. The **Teacher Education Project** (Wragg, 1984)[20] stressed the value of high order questioning in which students are made to think and reason. Bennett, Desforges, Cockburn and Wilkenson (1981)[21] point out that in general *errors* should be held to a minimum, but add that early in a unit, when new learning is occurring, relatively frequent errors may be expected; later, when mastery levels are supposed to have been achieved, errors should be minimal. A more recent study on direct and indirect teaching (Westerhof, 1992[22]) reinforced the evidence that direct teaching enhances achievement, as measured in pupils studying mathematics in grades 4, 6 and 8 in the Netherlands but found no significant gains for the same grades in the subject of "world orientation".

In their major review, **Brophy and Good** (1986) conclude that to maximise student achievement, the teacher should manipulate:

- **Quantity and Pacing of Instruction** - *this is the most consistently replicated of the research findings*

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[15]CLARK, C., CAGE, N., MARX, R., PETERSON, P., STAYROOK, N. and WINNE, P. (1979). 'A factorial experiment on teacher structuring, soliciting, and reacting', *Journal of Educational Psychology,* **71,** 4, 534-52.

[16]SMITH, L. and LAND, M. (1981). 'Low-inference verbal behaviors related to teacher clarity', *Journal of Classroom Interaction,* **17**, 1, 37-42.

[17]BORG, W. (1979). ' Teacher coverage of academic content and pupil achievement', *Journal of Educational Psychology,* **71**, 5, 635-45.

[18]GALTON, M. and SIMON, B. (1980). *Progress and Performance in the Primary Classroom.* London: Routledge & Kegan Paul.

[19]TOBIN, K. and CAPIE, W. (1982). 'Relationships between classroom process variables and middle-school science achievement', *Journal of Educational Psychology,* **74**, 3, 441-54.

[20]WRAGG, E.C. (1984). *Classroom Teaching Skills.* London: Croom Helm.

[21]BENNETT, N., DESFORGES, C., COCKBURN, A. and WILKINSON, B. (1981). *The Quality of Pupil Learning Experiences: Interim Report.* Lancaster: University of Lancaster, Centre for Educational Research and Development.

[22]WESTERHOF, K.J. (1992). 'On the effectiveness of teaching: direct versus indirect instruction', *School Effectiveness and School Improvement,* **3**, 3, 204-15.

- increase opportunity to learn - partly by extending the school day and year, and partly by the variables below
- emphasise academic instruction as a major part of their role, expect students to master the curriculum, and allocate most of the available time to curriculum-related activities
- ensure high engagement rates, by organising and managing the classroom efficiently, making transitions brief, activities run smoothly, giving little time to organisation or inattention/resistance - e.g. by installation of rules and procedures at the start of the year, "withitness", momentum in lesson pacing, variety and appropriate challenge in assignments, consistent accountability, follow up of seatwork, clarity about when and how students can get help, and what to do when finished
- ensure engagement in activities that are appropriate in difficulty level and otherwise suited to achievement levels and needs - ensuring brisk pace through the curriculum, continuous progress, moving through small steps with moderate or high success rates and minimal confusion or frustration (hence teachers must be effective in diagnosing learning needs and prescribing appropriate activities)
- undertake active teaching, with frequent lessons in which the teacher presents information and develops concepts through lecture and demonstration, elaborates this information in the feedback following responses to recitation or discussion questions, prepares the student for follow-up seatwork activities by giving instructions and going through practice examples, monitors assignment work during seatwork, and follows up with appropriate feedback and reteaching where necessary - the teacher carries the content to the teachers personally rather than depending on the curriculum materials o do so, but conveys information mostly in brief presentations
- manipulate group size to adapt to task, but recognise that small group work is more complex than whole class, and that individualised instruction which relies heavily on unsupervised independent seatwork is not as effective as teacher-led instruction

- **Giving Information**

  - structure the information, by beginning with overviews, advance organisers or review of objectives; outlining the content and signalling transitions; calling attention to main ideas; summarising subparts as lesson progresses; and reviewing main ideas at the end - organising concepts and analogies help, overviews and outlines help, rule-example-rule patterns and internal summaries help memory and recognition of the wholeness of the information and the inter-relationships of its parts
  - present information with a degree of redundancy, repeating and reviewing general rules and key concepts
  - make presentations clear
  - be enthusiastic
  - pace rapidly, but at higher grades move more slowly with abstract or complex content

- **Questioning the Students**

  - ensure most questions elicit correct answers
  - adapt questioning to context: fast-paced drill-review questions for basic skills during which most questions should be answered rapidly and correctly; raise questions on higher level content that few can answer or for which there is no single answer - and build on incomplete and incorrect responses
  - ask more lower order than higher order questions
  - ensure questions are clear and ensure a response (not necessarily correct)
  - vary the length of wait-time according to the question's complexity
  - ensure all students take part

- **Reacting to Student Responses**

  - acknowledge correct responses, mainly with overt feedback, and don't over-praise - be specific with praise
  - affirm those parts of answers that are correct and then follow up by giving clues or rephrasing questions
  - indicate incorrect answers by simple negation and rephrase (as above) while avoiding "pointless pumping"
  - train students to respond overtly even if only to say "I don't know"
  - answer relevant student questions or redirect them to the class - as grades rise, the use of student ideas becomes more important

- **Handling Seatwork and Homework Assignments**

  - make assignments varied and interesting enough to motivate student engagement
  - make assignments new or challenging enough to constitute meaningful learning rather than pointless busywork - while making them easy enough to allow success with reasonable effort
  - where students work alone on assignments, make the likely success rate near 100%, lower where students who need it can get help quickly
  - explain the work and go over practice examples in advance
  - circulate to monitor work and provide help where needed (if preparation is right, most of these helps will be brief)
  - ensure students know what work they are accountable for , how to get help and what to do when finished
  - monitor work for completion and accuracy
  - give timely and specific feedback
  - reteach and follow up where performance is poor

- **Context**

  - in early years, instruct students in desired routines and procedures; less so later but still be clear about expectations and follow up on accountabilities
  - in early years, ensure each student participates overtly and often; later, it's less important to be overt
  - show in the later grades interest and respect for the students' contributions
  - for lower ability, provide more control and structure: more active instruction and feedback, more redundancy, smaller steps with higher success rates, more review, drill, practice - thus more lower-level questions
  - for lower ability, emphasise mastery which means coverage of less material - and still ensure as brisk pace as possible through what they do
  - for higher ability, ensure academic stimulus and demands
  - for lower ability provide more warmth and support, encourage more for their efforts and praise for their successes - ensure overt responses to questions, and be more accepting of call-outs

Mortimore (1993)[23] notes that in the UK, Her Majesty's Inspectors (DES: HMI, 1982[24]; DES: HMI, 1988[25]) have through school inspections built a picture of the constituents of

[23]MORTIMORE, P. (1993). 'School effectiveness and the management of effective learning and teaching', *School Effectiveness and School Improvement*, **4**, 4, 290-310.

effective teaching. In 1982, they focused on 8 factors - relationships with pupils, classroom management, planning and preparation, aims, objectives and their achievement, choice of materials, marking, the match of work to pupils, and question/answer techniques. In 1988, the factors were altered slightly to: classroom organisation, planning and preparation, match of work to pupils, classroom interaction, mastery of subject, and competence in teaching skills.

Silcock (1993)[26] argues that little is thus demonstrated by research into effective teaching, other than to confirm the need for practitioners to fulfil their prescribed roles: "Effective teachers are those who provide pupils with maximum opportunity to learn. The assumption that, beyond this, there are skills more likely to guarantee a teacher's success overstretches the responsibilities of the teacher and diminishes the responsibilities of the learner".

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[24]GREAT BRITAIN. DEPARTMENT OF EDUCATION AND SCIENCE. HER MAJESTY'S INSPECTORATE (1982). *The New Teacher in School* (Matters for Discussion 15*)*. London: HMSO.
[25]GREAT BRITAIN. DEPARTMENT OF EDUCATION AND SCIENCE. HER MAJESTY'S INSPECTORATE (1988). *The New Teacher in School*. London: HMSO.
[26]SILCOCK, P. (1993). 'Can we teach effective teaching?', *Educational Review*, **45**, 1, 13-19.

B. RESEARCH ON SCHOOL EFFECTIVENESS AND IMPROVEMENT (with references to further work on teacher effectiveness)

The slogan of the school effectiveness movement is that "schools make a difference" (Brookhover et al., 1979[27]). **Levine and Ornstein (1989)**[28] reviewed research on school and classroom effectiveness to discern lessons for improving big city schools:

- improve classroom management - effective teachers make sure students know what they expect, make certain students know what to do if they need help, follow through with reminders and rewards to enforce the rules, provide smooth transitions between activities, give students assignments of sufficient variety to maintain interest, monitor class for signs of confusion or inattention, use variations in eye contact, voice, movement and academic activities to focus attention during lessons, and arrange the physical environment to complement instruction
- ensure direct or explicit teaching - effective teachers begin lessons with review of relevant previous learning and a preview and goal statement regarding what is to be learned, present material in small steps with clear and detailed explanations and active student practice after each step, guide students in initial practice by asking questions and checking for understanding, provide systematic feedback and corrections, supervise independent practice and monitor and assist seatwork, and provide weekly and monthly review and testing
- effect high time-on-task - increase the time spent on actual learning activities but also ensure activities are suitable, ensure high student success rates (avoiding the risk of trivialisation, so keep challenge), maintain motivation, and avoid time wasted on the routine (no more than 50-70% of the elementary school day and 30-40% of the high school day is devoted to academic instruction: Ornstein, 1988[29])
- ensure effective questioning - asking questions in a manner which ensures participation and mastery of academic content, provide adequate wait time, use more higher order questioning (see Samson et al., 1987[30])
- provide explicit comprehension instruction - review, teacher presentation, guided practice, feedback, independent practice - while ensuring application of concepts, monitoring of students' comprehension, and explicit training in summarising, inference, and other problem-solving strategies (including prediction, cooperative learning, extensive writing, concept mapping, story outlining, using computer simulations, metacognitive learning whereby students monitor and assess their own learning process, concept development techniques, learning to learn strategies, etc.)
- ensure cognitive instruction for low achieving students - which needs constant teacher mediation of work, improvements in student motivation and basic knowledge in diverse curriculum areas, and work on thinking skills (see Levine and Cooper, 1990[31])

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[27]BROOKHOVER, W., BEADY, C., FLOOD, P., SCHWEITZER, J. and WISENBAKER, J. (1979). *School Social Systems and Student Achievement: Schools Can Make a Difference*. New York: Praeger.
[28]LEVINE, D.U. and ORNSTEIN, A.C. (1989). 'Research on classroom and school effectiveness and its implications for improving big city schools', *The Urban Review*, **21**, 2, 81-94.
[29]ORNSTEIN, A.C. (1988). 'Questioning - the essence of good teaching, part II', *NASSP Bulletin*, **72**, 505, 72-80.
[30]SAMSON, G.E., STRYKOWSKI, B., WEINSTEIN, T. and WALBERG, H.J. (1987). 'The effects of teacher questioning levels on student achievement', *Journal of Educational Research*, **80**, 5, 290-5.
[31]LEVINE, D.U., and COOPER, E.J. (1990). 'The change process and its implications in teaching thinking'. In: Idol, L. and Jones, B.F. (Eds) *Organising for Learning*. Reston, VA: National Association of Secondary School Principals.

And for effective schools, Chubb (1988)[32] noted: "School performance is unlikely to be significantly improved by any measure or set of measures that fails to recognise that schools are institutions - complex organisations composed of interdependent parts, governed by well-established rules and norms of behaviour, and adapted for stability". Key factors are:

- a *safe and orderly environment* that is not oppressive and is conducive to teaching and learning
- a *clear school mission* through which the staff shares a commitment to instructional goals, priorities, assessment procedures, and accountability
- *instructional leadership* by a principal who understands and applies the characteristics of instructional effectiveness
- a climate of *high expectations* in which staff demonstrate that students can master basic skills
- high *time-on-task* brought about when a high percentage of students' time is engaged in planned activities to master basic skills
- frequent *monitoring of student progress*, using the results to improve individual performance and to improve the instructional programme
- positive *home-school relations* in which parents support the school's basic mission and play an important part in helping to achieve it

In order to effect improvement, the authors proposed that:

- substantial staff development time must be provided preferably at least in part during the regular working day
- faculties must early address improvement of instruction
- while avoiding getting bogged down at the start in training all staff in the details of a particular instructional technique
- improvement goals must be sharply focused to avoid teacher and school overload
- significant technical assistance must be made available to faculties participating
- work should be data-driven
- avoid reliance on bureaucratic implementation stressing forms and checklists,, and mandated components rigidly applied
- seek approaches and materials used effectively elsewhere
- judiciously mix autonomy for participating faculties and directiveness form the central office

Reynolds (1990)[33] observed that an impressive array of researchers in Britain (Rutter, Reynolds, Mortimore, Gray and Galloway), in the USA (Edmonds, Brookhover and Austin) and elsewhere (Scheerens, Creemers, Chapman and Caldwell) have demonstrated large school effects. The important factors Reynolds identifies as site management, leadership, staff stability, curriculum organisation, staff development, maximised learning time, recognition for academic success, and parental involvement in school. These factors are associated in effective schools with the following process characteristics within the culture of the school: collaborative planning, a sense of community, clear expectations shared among staff, and firm order and discipline.

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[32]CHUBB, J.E. (1988). 'Why the current wave of school reform will fail', *Public Interest*, **90**, 28-49.
[33]REYNOLDS, D. (1990). 'An introduction to managing school effectiveness', *School Organisation*, **10**, 2&3, 163-5.

Wang, Haertel and Walberg (1990)[34] undertook a comprehensive meta-review of research on variables related to learning. They examined 228 items related to school learning, organised into 30 categories. They examined 179 authoritative papers. The analysis confirmed the primacy of student, classroom, home and community influences on learning relative to more distal policy variables such as district characteristics. Additionally, the variables highlighted the importance of metacognition, classroom management, quantity of instruction, classroom interactions and climate, and the peer group.

The variables they investigated were:

- State and District Variables
  - district demographics and attributes (e.g. district size)
  - state level policy (e.g. on teacher contracts)

- Out-of-school Context Variables
  - community attributes (e.g. socio-economic levels)
  - peer group attributes (e.g. level of peers' academic aspirations)
  - home environment and parental support (e.g. in ensuring homework is completed)
  - student use of out-of-school time (e.g. participation in clubs and extra-curricular activities)

- School Level Variable
  - demographic characteristics (e.g. size of school)
  - decision-making (e.g. principal actively involved with instructional programme)
  - school culture/ethos (e.g. school wide emphasis on and recognition of academic achievement)
  - school-wide policy and organisation (e.g. discipline policy)
  - accessibility (e.g. avoidance of communication or environmental barriers to learning)
  - parental involvement policy (e.g. parental involvement in school improvement or instructional programme)

- Student Variables
  - demographic (e.g. gender)
  - history of schooling (e.g. if retained in previous grade)
  - social and behavioural (e.g. positive, non-disruptive behaviour)
  - motivational and affective (e.g. attitude toward subject matter instructed)
  - cognitive (e.g. level of specific academic knowledge in subject area instructed
  - metacognitive (e.g. comprehension monitoring, evaluating learning strategies)
  - psychomotor (e.g. skills specific to area instructed)

- Programme Design Variables
  - demographic (e.g. size of instructional group - whole class, small group, one-to-one)
  - curriculum and instructional (e.g. alignment among goals, contents, instruction, assignments and evaluation)
  - curriculum design (e.g. use of advance organisers)

- Implementation, Classroom Instruction and Climate Variables
  - classroom implementation support (e.g. establishing efficient class routines)
  - classroom instruction (use of clear and direct instruction)
  - quantity of instruction (e.g. time on task)

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[34]WANG, M.C., HAERTEL, G.D. and WALBERG, H.J. (1990). 'What influences learning? A content analysis of review literature', *Journal of Educational Research*, **84**, 1, 30-43.

- classroom assessment (e.g. frequent, integrated assessment)
- classroom management (e.g. questioning that maintains active participation of students)
- teacher-student interactions - social (e.g. students respond positively to questions from other students and teacher)
- teacher-student interactions - academic (e.g. frequent calls for extended answers)
- classroom climate (e.g. cooperative class goals)

The study does not demonstrate different findings from **What Works** (U.S. Department of Education, 1986[35]), but the analysis is broader and deeper. Highest ratings overall went to Programme Design Variables and Out-of-School Context Variables, then Classroom Instruction and Climate, closely followed by Student Variables. The individual ratings with the highest scales were: metacognition, classroom management, quantity of instruction, student-teacher interactions - social, classroom climate, and peer group influences.

In the Programme Design Variables, the most highly rated items were size of instructional group (whole class, small group or one-to-one), number of classroom aides, and resources needed. "Thus, the most important aspect of program design appeared to be the intensity of educational services provided to each learner." Also: "The items most important to learning outcomes were those that were directly tied to students' engagement with the material to be learned."

Weindling (1989)[36] summarised research that demonstrated that school effectiveness, measured in terms of high student outcomes (especially good results after controlling for pupil home background and ability/achievement on entry), was usually promoted by:

(a) academic emphasis:
- high teacher academic expectations of students
- a belief that all students can learn and that teachers can teach
- visible rewards for academic success and progress
- regular setting and marking of homework

Fullan (1985)[37] concurs: there is a need for an emphasis on curriculum instruction, clear goals and high expectations for students. Rutter et al.(1979)[38], in the **Fifteen Thousand Hours** study in ILEA, found better results where teachers had high expectations of and positive views of the capabilities of their pupils. This study also found positive effects related to homework. Reynolds (1991)[39] emphasised high expectations academically and of behaviour linked to a positive view of pupils' home backgrounds and communities. Lezotte (1989)[40] found in elementary schools that achievement is improved by teacher behaviours that convey the expectation that all students are expected to obtain at least a

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[35]U.S. DEPARTMENT OF EDUCATION (1986). *What Works: Research about Teaching and Learning*. Washington, DC: US Department of Education.
[36]WEINDLING, R. (1989). 'The process of school improvement: some practical messages from research', *School Organisation*, **9**, 1, 53-64.
[37]FULLAN, M. (1985). 'Change processes and strategies at the local level', *The Elementary School Journal*, **85**, 3, 391-420.
[38]RUTTER, M., MAUGHAN, B., MORTIMORE, P., OUSTON, J. with SMITH, A. (1979). *Fifteen Thousand Hours*. London: Open Books.
[39]REYNOLDS, D. (1991). 'School effectiveness in secondary schools: research and its policy implications'. In: RIDDELL, S. and BROWN, S. (Eds) *School Effectiveness Research: its Messages for School Improvement*. Edinburgh: HMSO.
[40]LEZOTTE, L. (1989). 'School improvement based on the effective schools research', *International Journal of Educational Research*, **13**, 7, 815-25.

mastery of simple skills. Corcoran and Wilson (1989)[41] emphasised a positive attitude towards the students by the principal and teachers, and an emphasis on high achievement in academic subjects.

(b) good classroom management:
- high proportion of lesson time on the subject matter of the lesson (not on setting up, or dealing with disciplinary matters, etc.)
- some whole class and some small group teaching, some individual work
- lessons beginning and ending on time
- clear and unambiguous feedback to pupils on their performance and what is expected of them
- ample praise for good performance

The Rutter study found positive effects for pupils participating in classroom activities, clear and explicit academic goals, good models of teachers for time-keeping, prepared lessons in advance, teachers keeping attention of whole class, maintaining discipline in unobtrusive way, rewards for good behaviour, and swift action to deal with the disruptive.

(c) good discipline and pupil conditions:
- keeping good order and maintaining appropriate rule enforcement
- orderly and safe climate
- buildings in good repair and decoration

Rutter (1979) found positive effects for the use of rewards, praise, encouragement and appreciation more than punishments. Reynolds (1991) emphasised the importance of low levels of certain institutional controls (tolerant attitude to rule enforcement, e.g. on school dress) and low concentration on punishment (use of more verbal sanctions). Fullan (1985) agreed on "an orderly and secure climate". Weber (1971)[42] concurred on relative orderliness. Rutter, (1979) also pointed to good working conditions for pupils and teachers, with buildings well cared for and well decorated, and ample opportunities for pupils to take positions of responsibility, to participate in the running of the school and in classroom activities. Teachers should also show apparent willingness to deal with pupils' personal and social problems. Reynolds found effects for the co-option of large proportion of pupils into a prefect system and use of pupil monitors to help distribute books and equipment. Corcoran and Wilson (1989) added the issue of intensive and personal support services for at risk students.

(d) school management
- positive leadership from the headteacher (U.S.: "instructional leadership")
- attention by the headteacher to classroom instruction and learning
- a management style which encourages collegiate work by staff and shared decision-making
- headteacher and senior management staff knowledgeable about the management of change and the application of strategic planning

Fullan (1985) concurred on instructionally focused leadership. Lezotte (1989) emphasised strong principal leadership and attention to the quality of instruction. Corcoran and Wilson (1989) itemised strong and competent leadership. Reynolds

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[41]CORCORAN, T. and WILSON, B. (1989). *Successful Secondary Schools: Visions of Excellence in American Public Education*. London: Falmer Press.

[42]WEBER, G. (1971). *Inner-City Children Can Be Taught To Read: Four Successful Schools*. Washington, DC: Council for Basic Education.

underlined incorporative strategies for pupils and teachers, not coercive. Cuttance (1988)[43], in Scotland, demonstrated that Catholic schools which drew on socially disadvantaged areas fared better - perhaps because of shared goals or ethos. Lee, Dedrick and Smith (1991)[44] also found U.S. Catholic schools has higher effectiveness but demonstrated, in a study that emphasised the importance of a cooperative school environment together with reasonable teacher classroom autonomy, that the results could be explained by these and other organisational differences.

(e) clear goals and monitoring
- shared vision so that all know goals
- staff focused on the tasks deemed important
- continual monitoring of pupils' progress, to show if goals are being realised

Fullan (1985) agreed with "clear goals" and "a system for monitoring performance and achievement". Others highlight task orientation of the teachers. Lezotte (1989) emphasised the importance of the use of measures of pupil achievement as the basis for programme evaluation (elementary schools).

(f) staff development
- school-wide staff development, closely related to the school curriculum rather than specific to individual teachers
- an effective school development plan which integrates staff development, institutional development and curriculum development

Fullan agreed (1985) regarding ongoing staff development. Corcoran and Wilson, (1989) identified the importance of highly committed teaching staff. Weindling (1989) and Joyce and Showers (1988)[45] underlined the importance for new headteachers to build in time in first month, and the first year for a process of meetings (a little regular contact).

(g) parental involvement and support
- positive home-school relations where parents support the school's goals and help to support it

Fullan concurred on parental involvement. Reynolds highlighted attempts to enlist support by establishing close, informal or semi-formal relations between teachers and parents. Corcoran and Wilson emphasised stable leadership and public support in the catchment area for a period of years.

(h) LEA and outside support
- fundamental changes require LEA support
- most powerful effects emerge with balance of inside and outside influences on the school

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[43]CUTTANCE, P. (1988). 'Intra-system variation in the effectiveness of schooling', *Research Papers in Education*, **3**, 3, 180-216.
[44]LEE, V.E., DEDRICK, R.F. and SMITH, J.B. (1991). 'The effect of the social organization of schools on teachers' efficacy and satisfaction', *Sociology of Education*, **64**, 3, 190-208.
[45]JOYCE, B. and SHOWERS, B. (1988). *Student Achievement through Staff Development*. London: Longman.

Fullan (1985) agreed on "district support". **The Dissemination Efforts Supporting School Improvement Study** (DESSI: see Crandall and Loucks, 1983[46]) found that critical roles played by central (LEA) staff were scanners, adaptors and advocates of promising new practices, direct implementation assisters to teachers, providing assistance after external facilitators had concluded the front-end training, and training of principals and teachers. It was important for them to be actively engaged throughout the change process, not just at initial planning or final evaluation stages. Joyce and Showers (1988) reinforced the importance of sustaining the support over time, not as a one-off.

Weindling (1989) underlined that school effectiveness has not clearly been associated with:

- resources: global factors like pupil-teacher ratios and overall expenditure on resources and salaries appear to have little effect (Reynolds, 1991 disagrees)
- school size: mostly, no effect although the ILEA junior project (Mortimore, 1986[47] and 1988[48]) showed some small positive effect from smaller schools
- class size: some suggestion that pupils in larger classes fare better but little apparent difference in 25-40 pupil range (Rutter, 1979 concurs but Reynolds, 1991 disagrees)
- organisational structure: factors such as mixed ability teaching, house/year systems, single sex/mixed do not appear related to effectiveness, after controlling for intakes (Rutter concurs but the more recent ILEA study suggests combined junior and infant were more effective)
- nor ages and characteristics of buildings, nor split-site, single site (Rutter, 1979).

In the context of school effectiveness, but raising mainly teaching issues, Scheerens (1990)[49] looked at what review literature says are factors associated with achievement:

- effective learning time or "time on task" (duration of day, school week and school year, whether or not students get homework assignments, amount of official duration of lessons that is actually spent on task-related work, absenteeism, drop-out of lessons, etc.) - issues of school discipline are also relevant here - and note (1) "it is obvious that extending the official school hours must at some point become counter-productive"; and (2) moderate increases in learning time have only yielded moderate effects on achievement (e.g. Walberg, 1984[50])
- structured or direct teaching
- opportunity to learn or content covered - close relation between what is taught and what is tested
- teacher attitudes and expectations - enthusiasm (and high expectations)
- enhancing student motivation (through reinforcement and positive feedback)
- alterable curriculum of the home - parental interest in what children do at home, reading to children at home and moderate television viewing

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[46]CRANDALL, D.P. and LOUCKS, S.F. (1983). *A Roadmap for School Improvement: Executive Summary of Dissemination Efforts Supporting School Improvement (DESSI)*. Andover, Mass: The Network Inc..

[47]MORTIMORE, P. (1986). *The Junior School Project: Main Report Parts A, B, C and Technical Appendices*. London: Inner London Education Authority, Research and Statistics Branch.

[48]MORTIMORE, P., SAMMONS, P., STOLL, L., LEWIS, D. and ECOB, R. (1988). *School Matters*. Somerset: Open Books.

[49]SCHEERENS, J. (1990). 'School effectiveness research and the development of process indicators of school functioning', *School Effectiveness and School Improvement*, **1**, 1, 61-80.

[50]WALBERG, H. (1984). 'Improving the productivity of American schools', *Educational Leadership*, **41**, 8, 19-27.

Mortimore (1991)[51] proposed that certain specific factors support school effectiveness:

- leadership

a leader who is purposeful
neither too authoritarian nor too democratic
who is able to share ownership of the school with colleagues
ability to delegate to a deputy without feeling threatened
ability to involve staff in planning and management

- management of pupils

pupils are involved
pupils can be rewarded for effort
control of behaviour by methods neither too weak nor too harsh
sessions that are structured, work-centred and include intellectually challenging teaching

- management of teachers

involving teachers in the corporate life of the school
pursuing consistency in teachers' approach to pupils
encouraging teachers to be good models of punctuality, politeness and consideration
classrooms which have positive psychological climates in which pupils are encouraged to communicate frequently with teachers
a broad and balanced curriculum which recognises the academic but also values the special needs students
in primary, having a limited focus in sessions to avoid teachers and students being pulled in different directions

- pupil care

treating pupils with dignity and encouraging them to participate in the organisation of the school
positive signals that pupil are valued
using rewards rather than punishment to change behaviour
involving parents in the life of the school
increasing confidence of the community in the school
systematic records of pupil progress to enable curriculum to have coherence for pupils

- school environment

attractive and stimulating
taking trouble over class displays, removing graffiti

- school climate

endeavouring to reach consensus on values shared by the school
general attitude towards learning and positive about young people
clear rules and guidelines for pupil behaviour
maintaining high expectations for all pupils

"The research on school effectiveness offers a salutary reminder that what matters in education is the quality of learning and teaching. This cannot be guaranteed by legislation or by policy formulation. It is a product of deliberate strategies of teachers and the purposeful commitment of pupils within the positive climate of the school." (Mortimore, 1991)

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[51]MORTIMORE, P. (1991). 'The nature and findings of research on school effectiveness in the primary sector'. In: RIDDELL, S. and BROWN, S. (Eds) *School Effectiveness Research: its Messages for School Improvement.* Edinburgh: HMSO.

Mortimore (1993)[52] went further, to examine what constitutes effective learning (learning which is active rather than passive, overt rather than covert, complex not simple, affected by individual differences among learners, and influenced by a range of contexts) and set these assumptions against the teacher and school effectiveness research. His message for policy-makers and for schools was to emphasise systematic planning (both at the classroom and at the school level), and a focus on ends not means (outcomes "must constantly be kept in sight"), while addressing those means which have best been demonstrated to influence effective learning and teaching, viz.: (a) at the school level, leadership providing clear aims and commitment within a positive ethos, management which is efficient and skilful and which uses resources efficiently, machinery for policy formulation which involves staff and where appropriate the community, parents and students in developing strategies appropriate to the aims of the school, an environment which is both intellectually stimulating and safe, a school-wide curriculum and assessment process, staffing policies which are cost-effective and which draw fully on the potential of individuals, adequate levels of resources including books, learning materials and information technology equipment, and the capacity to cope with and benefit from change, and (b) at the classroom level, expectations pitched high and sustained over time, classroom management which is systematic and fair and which stresses rewards rather than punishment, well prepared teaching, detailed and positive feedback, support for students who need supplementary help, an appropriate and balanced curriculum and flexible ways of working which relate well to school-wide aims and initiatives.

Alexander et al. (1991)[53] evaluated a Primary Needs Programme in Leeds LEA and concluded that successful schools should:

- give children enough time on every learning task to complete it satisfactorily and provide adequate adult help to support all children
- encourage teachers to be meticulous planners and managers of the curriculum
- ensure teachers constantly provide children with "genuine open ended challenges"
- ensure children have supportive feedback at all times

Lezotte (1989) proposed a five factor theory of school effectiveness:

- strong principal leadership and attention to the quality of instruction
- a pervasive and broadly understood instructional focus
- an orderly, safe climate conducive to teaching and learning
- teacher behaviours that convey the expectation that all students are expected to obtain at least a mastery of simple skills
- the use of measures of pupil achievement as the basis for programme evaluation

Interestingly, Holdaway and Johnson (1993)[54] have recently reported a study in which headteachers, teachers and superintendents in Alberta, Canada were asked in which areas they believed they had made least progress towards effectiveness, or where progress was most difficult. Schools were rated by those taking part as most effective in maintaining an appropriate climate, which people perceived to be the most important issue (or one of the

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[52]MORTIMORE, P. (1993). 'School effectiveness and the management of effective learning and teaching'. Paper given at the International Congress for School Effectiveness and Improvement, Norrkoping, Sweden, January.

[53]ALEXANDER, R.,WILLCOCKS, J. and KINDER, K. (1991). *Changing Primary Practice*. London: Falmer Press.

[54]HOLDAWAY, E.A. and JOHNSON, N.A. (1993). 'School effectiveness and effectiveness indicators', *School Effectiveness and School Improvement*, **4**, 3, 165-88.

most). But effectiveness was shown to be a very complex construct and areas rated important but perceived as least effective included: in junior high, the recognition of accomplishments and the satisfaction and cooperation of staff; in elementary, maintaining high expectations and the exercise of effective leadership. Are these the areas schools find hardest to get right?

Studies of parents' perceptions throw further light on the concept of school effectiveness. A small-scale study of 200 parents by Glover (1992) indicated that they found work emphasis, subject support for pupils, examination results, teaching method, discipline, staff demeanour, success in getting higher education places, and pupil appearance to be among the "highly important" features of a school.

Preece (1993)[55] looked at research pitfalls of school effectiveness research, including:

- mistaking correlation for causation
- getting statistical significance wrong or not reporting null results
- mistaking statistical for educational significance
- instrumentation limitations
- controlling for background factors (or not)
- effects due to regression to the mean
- measurement of change
- non-linear relationships and aptitude-treatment indicators
- inappropriate choice of level of analysis
- and to deny the full importance of the opinions and findings of the educational researcher

Apparent school effects are frequently mirages that shrink or disappear on close inspection.

Despite this, there is little argument now that schools can and do have an effect. The seminal 15000 Hours study (Rutter, 1979) found that after adjusting for intake characteristics, children at the most successful secondary school got an average of four times as many examination passes as children at the least successful school. Children in the bottom 25% of verbal ability in the most successful school on average obtained as many passes as children in the top 25% of verbal ability at the least successful school. The Rutter study also found that these differences in outcome measures were relatively stable over 4 or 5 years. Certainly these data show clearly the worth of improving the quality of the worst of our schools. The School Matters study (Mortimore et al., 1988) achieved similar findings from following a cohort of nearly 2000 students through 4 years of schooling, from age seven to eleven: "We found considerable differences between schools. Interestingly, some schools appeared better able to foster progress in some aspects of student development than in others although, overall, of the forty nine schools that remained in the sample at the end of the study, fourteen appeared to foster progress across the board." (Mortimore, 1991)[56]

Using data from ILEA, **Nuttall et al.** (1989)[57] studied the examination performance of over 30,000 students from 140 schools. Using intake measures including a verbal reasoning score, ethnic details, sex and a measure of family income, the team investigated differences between ethnic groups. There were school performance differences along several dimensions, with clear powerful school effects. Nuttall et al. did however find variation over time, with some schools being more effective in one year than in others.

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[55]PREECE, P. (1989). 'Pitfalls in research on school and teacher effectiveness', *Research Papers in Education*, **3**, 2, 97-8.

[56]MORTIMORE, P. (1991). 'School effectiveness research: which way at the crossroads?', *School Effectiveness and Improvement*, **2**, 3, 213-29.

[57]NUTTALL, D.L., GOLDSTEIN, H., PROSSER, R. and RASBASH, J. (1989). 'Differential school effetiveness', *International Journal of Educational Research*, **13**, 7, 769-76.

Recent debate has begun over the question of *differential effectiveness*: whether or not schools do better for pupils of particular characteristics, usually different abilities. Nuttall (1990)[58] found evidence of differential effectiveness, Jesson and Gray (1991)[59] argue that there is no conclusive evidence for it More recent work by Goldstein et al. (1992)[60] and reanalysis of the ILEA data by Sammons et al. (1993)[61] supported its existence. It is important for, if it exists to a notable extent, then single feature measures of school effectiveness such as are considered for league tables are brought further into question.

As an aside, recent work has been undertaken by the former ILEA team (see Sammons et al., 1994)[62] on behalf of OFSTED and has been important for two practical purposes. The team has examined GCSE examination results and intake data (pupil-level prior attainment and background data) from 94 schools in eight LEAs, in order "to develop measures that can be reliably used to group schools into broadly similar categories for the purpose of assessing school performance". First, this should help OFSTED to make decisions about the inspection data they need in order to make a fair judgement of schools' success. Second, it should inform current discussion about ways in which schools are funded.

On the funding issue, the team's findings confirm previous observations that current arrangements for allocating funds between schools need to be amended and improved. The Department of the Environment's calculations of LEAs' Standard Spending Assessments includes an Additional Educational Needs (AEN) component, which is based on census measures and covers 3 elements: income support, lone parent and ethnicity. West et al. (1993)[63] found a correlation (R squared) of 0.47 between the proportion of pupils with no graded examination result and these elements in the AEN index, and argue that the index currently is: skewed against inner city areas where there is likely to be more under-recording of disadvantage; is not responsive to demographic change because of the 10 year census cycle; does not account for differences in the take-up of private education in different areas; and ignores data concerning refugees, the homeless and travellers. The authors argue that there is a case for using school-based data instead.

LEAs in turn mostly use a very simple approach to funding allocation, using free school meals as the sole factor in adjusting formula funding. Bullock and Thomas (1993)[64] noted that free school meals, on its own, is an inadequate measure of social deprivation. Sammons

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[58]NUTTALL, D.L. (1990). *Differences in Examination Performance* (RS 1277/90). London: Inner London Education Authority, Research and Statistics Branch.

[59]JESSON, D. and GRAY, J. (1991). 'Slants on slopes: using multi-level models to investigate differential school effectiveness and its impact on pupils' examination results', *School Effectiveness and School Improvement*, **2**, 3, 230-71.

[60]GOLDSTEIN, H., RASBASH, J., YANG, H., WOODHOUSE, G., PAN, H., NUTTALL, D. and THOMAS, S. (1992). 'Multilevel models for comparing schools', *Multilevel Modelling Newsletter*, **4**, 2, 5-6. (London: University of London, Institute of Education, Department of Mathematics, Statistics and Computing).

[61]SAMMONS, P., NUTTALL, D.L. and CUTTANCE, P. (1993). 'Differential school effectiveness: results from a reanalysis of the Inner London Education Authority's Junior School Project data', *British Educational Research Journal*, **19**, 4, 381-405.

[62]SAMMONS, P., THOMAS, S., MORTIMORE, P., OWEN, C. and PENNELL, H. (1994). *Assessing School Effectiveness: Developing Measures to put School Performance in Context*. London: Office for Standards in Education (OFSTED).

[63]WEST, A., WEST, R. and PENNELL, H. (1993). *Additional Educational Needs Allowance: Examination of Options for Change*. London: London School of Economics, Centre for Educational Research.

[64]BULLOCK, A. and THOMAS, A. (1993). 'Comparing school formula allocations'. In: Wallace, G. (Ed) *Local Management and Central Control*. London: Hyde.

(1993)[65] found more sophisticated approaches were used by some LEAs (who had developed an educational priority index - an ILEA initiative primarily), e.g.: eligibility for free school meals or receipt of family credit; parental occupation (semi or unskilled manual or unemployed); English as a Second Language (defined as 2 years in school with English as the medium of instruction); special circumstances (traveller, refugee, in care, living in temporary accommodation); cumulative disadvantage; pupil mobility; and low reading test at secondary transfer (secondary schools only). Refer to Alston and De Vaney (1991)[66]. The Sammons (1994) study found 62 per cent of school level variance in students' total performance scores accounted for by school's intake characteristics.

School improvement studies, especially in U.S. urban schools, have built on the school effectiveness literature and gained increasing interest in the U.K. where early initiatives are being undertaken in certain LEAs. The early studies in the U.S. were well reviewed by Clark et al. (1984)[67] and a register is now compiled of studies and projects (Northwest Regional Educational Laboratory, 1989)[68]. Cross (1990)[69] reported that of the 16000 school districts in the U.S., more than half "have implemented some form of effective schools programme". A summary of early UK initiatives is in Reynolds (1989)[70]. Major projects have also taken place in the Netherlands, Australia and New Zealand.

Early U.S. studies included the New York School Improvement Project (SIP), reported in Eubanks and Levine (1983)[71], which focused on administrative style, instructional emphasis on basic skills, school climate, ongoing assessment of pupil progress and teacher expectations. The **Improving the Quality of Education for All** (IQEA) project at the Cambridge Institute of Education (Ainscow and Hopkins, 1992)[72] has been pupil outcome oriented but also involves within-school study of school processes from a qualitative orientation. Twenty-five schools in several LEAs are taking part and findings are that school improvement works best when a clear and practical focus for development is linked to simultaneous work on the internal conditions (staff development approaches, opportunities for leadership at different levels, search for increased clarity and shared meanings, etc.) within the school. The **Cardiff Change Agent Study** (summarised in the follow up study six years later by Reynolds, Davie and Phillips, 1989[73]) similarly promoted empirical research and

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[65]SAMMONS, P. (1993). *Measuring and Resourcing Educational Needs: Variations in LEAs' LMS Policies in Inner London* (Clare Market Paper no.6). London: London School of Economics, Centre for Educational Research.

[66]ALSTON, C. and DE VANEY, K. (1991). *Educational Priority Indices and School Resourcing in Hackney* (LMS Supplementary Paper). London: London Borough of Hackney.

[67]CLARK, D.L., LOTTO, L.S. and ASTUTO, T.A. (1984). 'Effective schools and school improvement: a comparative analysis of two lines of enquiry', *Educational Administration Quarterly*, **20**, 3, 41-68.

[68]NORTHWEST REGIONAL EDUCATIONAL LABORATORY (1989). *Effective Schooling Practices Update*. Portland, OR: NREL.

[69]CROSS, C.T. (1990). 'National goals: priorities for educational researchers', *Educational Researcher*, **19**, 8, 21-4.

[70]REYNOLDS, D. (1989). 'School effectiveness and school improvement: a review of the British literature'. In: Reynolds, D. et al. (Ed) *School Effectiveness and Improvement: International Conference Proceedings*. Cardiff: University of Wales, College of Cardiff, School of Education.

[71]EUBANKS, E.E. and LEVINE, D.U. (1983). 'A first look at effective schools projects in New York and Milwaukee', *Phi Delta Kappan*, **64**, 10, 697-702.

[72]AINSCOW, M. and HOPKINS, D. (1992). 'Aboard the moving school', *Educational Leadership*, **50**, 3, 79-81.

[73]REYNOLDS, D., DAVIE, R. and PHILLIPS, D. (1989). 'The Cardiff programme - an effective school improvement programme based on school effectiveness research', *International Journal of Educational Research*, **13**, 7, 800-14.

practitioner knowledge, attention to top down and bottom up approaches, and attention to school outcomes and processes.

In New Haven, Connecticut, a combined approach to school effectiveness and child development has been pioneered for elementary schools by Dr James Comer, Dean of the Yale University Medical School. The approach has been developed now more widely in the United States: see summary in Fitz-Harris (1993)[74]. The **Comer approach** identifies six developmental pathways which need to be addressed: the physical (physical health, exercise, nutrition, and responsible decision making), the psycho-emotional (feelings of adequacy, positive self-esteem, internal systems to manage emotions, and ability to accept differences in others), the social-interactive (ability to work in a group, development of empathy, of appropriate communication skills, development and maintenance of good relationships) speech and language (development of receptive language, of expressive language, ability to process communications), moral (knowledge of appropriate behaviour, internalisation of appropriate/inappropriate judgements, decision-making based on internalisations, ability to respect rights and integrity of self, and ability to respect rights and integrity of others), and cognitive-intellectual (flexibility of thought, ability to think logically, ability to manipulate information, self-initiated interaction with environment, acquisition of basic academic skills, and ability to adapt to environment).

According to Fullan (1985) school improvement is achieved by:

- a feel for the improvement process on the part of the leadership
- a guiding value system
- intense interaction and communication
- collaborative planning and implementation

Weindling (1989) adds that for change to be effected, teachers need to be provided with additional resources, primarily release time during the school day or secondment; it is important to recognise that local teacher development is a time-consuming process that if rushed is likely to fail. **The Rand Study** (Berman and McLauglin, 1975)[75] was early to indicate that successful change needed time for mutual adaptation of teachers and innovation. Time equals resources.

Miles et al. (1986)[76] reported that successful school improvement is more likely when those in leadership positions have a style in which they:

- have a well-developed philosophy or vision of what the school should look like, build a shared vision and a vision of how they will get there
- cope actively and find rapid solutions to the many implementation problems
- provide a good mix of delegating but following through
- maintain good environmental contact with other agencies that can support, and build networks with the environment

Young (1991)[77] provided an example of a district's commitment to its school improvement process. The district defined its intentions in the following terms:

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[74]FITZ-HARRIS, B. (1993). 'The American way', *Managing Schools Today*, **2**, 7, 24-8.
[75]BERMAN, P. and McLAUGHLIN, M. (1975). *Federal Programs Supporting Educational Change. Vol.4. The Findings in Review*. Santa Monica, CA: The Rand Corporation.
[76]MILES, M.B. et al. (1986). *Improving the Urban High School: Lessons for Managing Implementation*. Boston, MA: University of Massachusetts, Centre for Survey Research.

"An effective school is one in which all students learn the basic curriculum regardless of their previous academic performance, handicap, family background,, socio-economic status, race and/or gender. For a school to be effective, two standards must be achieved: Quality - the achievement level of all students must be high; and Equity - the distribution of high achievement is consistent across the major subsets of the student population. District #86 considers a school to be effective when it has achieved or exceeded the following standards:

1. 95% of students must demonstrate a mastery at the 80% level or above on criterion referenced tests,
2. On a norm referenced test, all students must score at the 50% percentile or higher based upon national norms,
3. There shall be no significant difference in the proportion of students demonstrating mastery of the basic curriculum as a function of socio-economic status as indicated by the educational level of the mother,
4. The preceding criteria must be attained for a minimum of three consecutive years."

Scheerens (1992)[78] published a welcome distillation of research evidence for policy-makers. In his view, the evidence on effectiveness indicates that:

- some factors have multiple empirical research confirmation (the determination to achieve better results, maximisation of actual net learning time, and the use of structured teaching)
- some have a reasonable empirical basis (the opportunity to learn what is to be assessed, the pressure to achieve, high expectations, and parental involvement)
- some a doubtful empirical confirmation (pedagogic leadership by the principal and others, the institution's capacity to assess and evaluate, and school climate)
- and some are mere hypothesis (recruiting staff and using external stimuli to make schools effective).

Refreshingly at least, Scheerens reduced the advice to schools to address just three factors: (1) the determination to achieve better results, (2) the maximisation of actual net learning time, and (3) structured teaching. Heck and Mayor (1993)[79] concur that determination to succeed is a critical factor; their empirical study of 250 schools identified a school's "press for achievement" (attitudes towards achievement) as exerting small but significant effects. Scheerens additionally stated what many of the researchers in these fields recognise, namely that current research generally depends on cognitive outcomes in basic subjects: "the model could become different if other types of educational outcomes were considered". Angus (1993)[80] went further, criticising the school effectiveness movement for its weak approach to theory, and its concomitant failure to address the broader questions of what should schools be for, how should achievement be addressed and measured, and how the broader social context limits and affects both the processes and the outcomes of schooling.

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[77]YOUNG, C. (1991). 'School improvement process based on effective schools research: a historical perspective', *Network News International* (The Official Newsletter of the International Congress for School Effectiveness and School Improvement), **1**, 2, 4-5.

[78]SCHEERENS, J. (1992). *Effective Schooling: Research, Theory and Practice*. London: Cassell.

[79]HECK, R.H. and MAYOR, R.A. (1993). 'School characteristics, school academic indicators and student outcomes: implications for policies to improve schools', *Journal of Educational Policy*, **8**, 2, 143-54.

[80]ANGUS, L. (1993). 'The sociology of school effectiveness', *British Journal of Sociology of Education*, **14**, 3, 333-45.

Reynolds et al. (1993)[81] have contrasted the way that approaches to school improvement have changed over the last 30 years:

	1960s	1980s
Orientation	'top down'	'bottom up'
Knowledge Base	elite knowledge	practitioner knowledge
Target	organisation or curriculum based	process based
Outcomes	pupil outcome orientated	school process orientated
Goals	outcomes as given	outcomes as problematic
Focus	school	teacher
Methodology of Evaluation	quantitative	qualitative
Site	outside school	within school
Focus	part of school	whole school

This research on school improvement has been closely related to **principal or headteacher research**, which has tried to discern the key leadership and management characteristics associated with school effectiveness. See for example, work on the positive contribution made by principal's instructional leadership and actions such as involvement in classroom visits (Heck, Marcoulides and Lang, 1991)[82]. Southworth (1990)[83] summarised what is known about leadership and headship for effective primary schools. An effective headteacher fulfils the following:

- emphasises the centrality of teaching and learning, via his/her commitment, persistent interest in children's work and development, and attention to teachers' plans, practice, reflections and evaluations
- ensures that there are explicit curriculum aims, guidelines and pupil record-keeping systems and that all of these are used by teachers and other staff to establish consistency, continuity and coherence
- acts as an exemplar - regularly teaches, leads assemblies, works long and hard for the school
- ensures teachers have some non-contact time
- sets high expectations for self, children and staff
- encourages and develops others to lead and accept positions of responsibility
- involves the deputy head in decision-making - head and deputy operate as partners
- involves teachers (and sometimes others) in curriculum planning and school organisation - generally but not always adopts a consultative approach to decision-making
- is conscious of the school's and individual teacher's needs for INSET and is aware of own professional needs
- is considerate towards staff - offer psychological support, takes an interest in staff as people, is willing on occasions to help reconcile and make allowance for

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[81]REYNOLDS, D., HOPKINS, D. and STOLL, L. (1993). 'Linking school effectiveness knowledge and school improvement practice: towards a synergy', *School Effectiveness and School Improvement*, **4**, 1, 37-58.

[82]HECK, R.H., MARCOULIDES, G.A. and LANG, P. (1991). 'Principal instructional leadership and school achievement: the application of discriminant techniques', *School Effectiveness and School Improvement*, **2**, 2, 115-35.

[83]SOUTHWORTH, G. (1990). 'Leadership, headship and effective primary schools', *School Organisation*, **10**, 1, 3-16.

personal/professional role conflicts (health problems, domestic crises, clash of evening commitments)
- constantly enquires into many aspects of the school as an organisation - tours the school before, during and after school, visits staff in their classrooms and workplaces, perceives the school from different perspectives, observes and listens, manages by wandering about
- develops and sustains a whole-school perspective, with a shared and agreed vision of effective practice which is adopted by staff and becomes their collective mission
- nurtures and maintains a school culture inclusive of the staff and which facilitates professional and social collaboration
- is personally tolerant of ambiguity
- ensures the school has an explicit and understood development plan, has a sense of direction and anticipates future developments
- involves parents and governors in the work and life of the school, is an effective communicator of the school's successes and challenges, presents a positive image of the school, staff and children

Grady, Wayson and Zirkel (1989)[84] reviewed effective schools research as it relates to effective principals and suggested use, albeit cautious, of the effectiveness research to inform school leadership. Guthrie (1991)[85], for example, underlined the importance of the principal's vision and sense of purpose and suggested that effective leaders:

- possess a vision of what their organisation could be like
- know how to motivate and inspire those they work with
- understand the major operational levers which can be employed to change or control an organisation's course
- are intensely sensitive to and continually reflect upon the interaction of external environmental conditions and internal organisational dynamics
- understand the fundamental components of strategic thinking that can be used to guide or alter an organisation
- comprehend the symbolic significance involved in representing their organisation to the outside world

Bolam et al. (1993)[86] have produced one of the recent headteacher studies in the UK, albeit based on headteachers' and others' perceptions of effectiveness, which emphasises typical factors in effective management:

- formulating a clear vision, ideally arrived at collaboratively and shared by the majority of staff
- an open school culture in which professional collaboration is at a premium
- conditions of work which allow for active reflection and close scrutiny of teaching and learning
- acceptance of professional accountability
- strong, purposeful leadership which encourages a commitment to learning on the part of the teacher as well as the student, as part of continuing school improvement

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[84]GRADY, M.L., WAYSON, W.W. and ZIRKEL, P.A. (1989). *A Review of Effective Schools Research as it Relates to Effective Principals* (UCEA Monograph Series). Tempe, AZ: University Council for Educational Administration.

[85]GUTHRIE, J. (1991). 'Effective educational executives: an essay on the concept of strategic leadership'. In : Ribbins, P., Glatter, R., Simkins, T. and Watson, L. (Eds) *Developing Educational Leaders*. Harlow: Longman.

[86]BOLAM, R., McMAHON, A., POCKLINGTON, K. and WEINDLING, R. (1993). *Effective Management in Schools*. London: HMSO.

In one interesting angle on headteacher effectiveness research, Simkins (1994)[87] reported that now, under LMS, formula funding is tending to favour larger schools (who can better absorb funding reductions/increases). He noted however that there is not yet real evidence of the impact of LMS on effectiveness. But already, Simkins' study and others are cataloguing the increased separateness functionally of leaders from their staffs, under LMS. Will British headteacher experience come closer to the U.S. model, where there has in the past been a greater gulf to bridge in order to ensure principal involvement in instructional issues?

A recent spin-off has been research into **restructuring** schools: undertaking changes to teachers' contracts, career ladders, control over curriculum, policy and resources, broadened roles in school management, broader professional development and more opportunities for professional interaction. See for example Louis and Smith (1991)[88], which reported from two case study schools that restructuring has potential for improving teacher engagement in schools with mixed socioeconomic and racial populations. Or Louis and Miles (1991)[89] who identified that schools with the most impact on improving achievement and student and teacher attitudes have "focused on teacher or organisational changes to begin with, coped with the inevitable problems well, had internal and external constituencies supporting the change effort, and sustained the work for a longer period of time (typically 4-5 years)".

Chubb (1988) concurred that policy-makers and practitioners should also consider major structural changes in secondary schools, to aid improvement: major changes to traditional organisational patterns, reexamination of teachers' instructional techniques, major replacement of staff, placing students in reading and writing courses rather than traditional English classes, creation of a mini-school emphasising individualised instruction and a school-within-a-school which emphasised academic learning, discipline and attendance codes and policies, emphasis on guidance, systematic emphasis on school pride and spirit, parental contracts related to school rules, dress and assignments completed, parents monitoring attendance, teachers visiting homes of absentees, anti-graffiti squads, magnet centres for smaller classes and extra help in certain subjects. Chubb noted the **San Diego Achievement Goals Project** where a federal judge required the school district to improve achievement at 23 schools with 80% or more minority enrolment (programme of mastery learning, classroom management, time-on-task, direct instruction, provision of staff development, and the expansion of magnet schools). See Levine and Havighurst (1989)[90].

The Californian **Orchard Plan**, for restructuring primary education has taken radical steps to attempt to effect improvements in education, via reducing class size and changing the school year. Gandara and Fish (1991)[91] report the programme's reallocation of funding which created initially for 4 schools a 223 day extended year calendar, extra days tuition for at risk students, a reduction in class size by 2-3 students per class, a rotating system of classroom attendance (60 days on, 15 off), the opportunity for teachers to extend their length of contract

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[87]SIMKINS, T. (1994). 'Efficiency, effectiveness and the local mangement of schools', *Journal of Educational Policy*, **9**, 1, 15-33.

[88]LOUIS, K.S. and SMITH, B. (1991). 'Restructuring, teacher engagement and school culture: perspectives on school reform and the improvement of teachers' work', *School Effectiveness and Improvement*, **2**, 1, 34-52.

[89]LOUIS, K.S. and MILES, M.B. (1991). 'Managing reform: lessons from urban high schools', *School Effectiveness and School Improvement*, **2**, 2, 75-96.

[90]LEVINE, D.U. and HAVIGHURST, R.J. (1989). *Society and Education*. Needham Heights, MA: Allyn and Bacon.

[91]GANDARA, P. and FISH, J. (1991). 'An experiment in restructuring K-6 education: the Orchard Plan'. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois, April 3-7.

by 20%, restructuring of the curriculum into smaller units with built in review and more careful monitoring of students, voluntary participation. Early findings suggested this was a feasible alternative to the traditional school calendar and there were positive effects on student (and parent and teacher) attitudes.

Fullan, Bennett and Rolheiser-Bennett (1990)[92] reported the development of the **Learning Consortium** in Toronto (and includes the Halton district), which endeavoured to link school and classroom improvement methods. Teachers worked to improve content (their curriculum knowledge, that of child development and of learning styles), classroom management (action to prevent and respond to student misbehaviour), instructional skills (providing wait time, framing questions at different levels of complexity) and instructional strategies (strategies such as concept attainment and cooperative learning). Simultaneously, schools work to improve shared purpose (shared vision, goals, objectives, unity of purpose), norms of collegiality (valuing mutual sharing and assistance among teachers), norms of continuous improvement (constantly seeking better practices inside and outside the school) and structure (organisational arrangements, roles and formal policies that support and inspire movement in other cogs - creating time for joint planning and staff development policies, establishing mentoring roles, etc.). They used a teacher-as-learner concept at the centrepiece linking classroom and school improvement, and promoted leadership at all levels in the system.

[92]FULLAN, M.G., BENNETT, B. and ROLHEISER-BENNETT, C. (1990). 'Linking classroom and school improvement', *Educational Leadership*, **47**, 8, 13-19.

C. RESEARCH RELATED TO CLASS SIZE

Kumar (1992)[93] explored classroom interaction in English classes, in Indian schools. He found "in these classes, it is the nature of the teaching-learning activities and the teacher's role and attitude which influences the nature of learner participation and the patterns of interaction rather than class size *per se*." A relatively typical recent study is that by Caldas (1993)[94], which reported research in Louisiana to show that socioeconomic status and minority status are the strongest predictors of school achievement, with discrepancies between white and black students increasing with grade level. School size did not have any meaningful effect, "nor was the effect of class size significant for every subpopulation". Student attendance had a more substantial effect in every model. Input factors, across the study, accounted for as much as 68% of the variance of achievement whereas process factors accounted for no more than an additional 6% of explained variance.

Burstall (1979)[95] reviewed the class size research for NFER and concluded that the research evidence was at best ambivalent. Improvements were needed in research design and in statistical analysis before researchers could get beyond the tangle of studies which indicate no significant effect or positive correlations between class size and achievement (i.e. larger classes lead to better achievement). In the **ORACLE** study (see Galton and Simon, 1980), teachers were found to compensate for larger classes by increasing their amount of interaction, mainly through working with pupils in groups; there was not more whole class teaching. Individual pupils in larger classes experienced less attention than pupils in smaller classes but the authors conclude: "Larger classes result in higher teacher workloads and lower levels of teacher-pupil contact but in the classrooms in the present study they did not result in lower rates of progress in the basic skills." International comparisons of student performance do not aid the class size debate. Schools in South Korea, which consistently leads international performance leagues in mathematics and language, have an average class size of 45 for 9 year olds. Some countries limit class size: Sweden has had a statutory maximum of 25 for pupils up to age nine; Denmark a maximum of 17 up to nine and then 25 for nine and ten year olds. Some German states halve classes when they reach 31. (These international figures are taken from Dewhurst, 1993[96] and may need checking and updating.)

In contrast, Achilles, Nye, Zaharias and Fulton (1993)[97] report the progress of **Project STAR** (Student Teacher Achievement Ratio), conducted in Tennessee from 1985-89. The Project, involving over 7000 pupils in 79 schools, has sought to provide lower class size for early primary pupils (ratio of 1:15 in K-3) and to track the impact on achievement. The experiment demonstrated that students in small classes (1:15) had statistically significant achievement advantages over students in regular classes and regular classes with full-time teaching aides. In their Lasting Benefits study, the Project demonstrated that the benefits remained after students returned to regular-size fourth and fifth grade classes. The authors make strong calls for policy-makers to pay attention to the results. "*The positive effects from involvement in a small-size class still remained pervasive two full years after students*

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[93]KUMAR, K. (1992). 'Does class size really make a difference? Exploring classroom interaction in large and small classes', *RELC Journal*, **23**, 1, 29-47.

[94]CALDAS, S.J. (1993). 'Reexamination of input and process factor effects on public school achievement', *Journal of Educational Research*, **86**, 4, 206-14.

[95]BURSTALL, C. (1979). 'Time to mend the nets: a commentary on the outcomes of class-size research', *Trends in Education*, **3**, 27-33.

[96]DEWHURST, J. (1993). 'Class size and pupil achievement in primary schools: a review of the research evidence', *Education 3-13*, **21**, 1, 15-18.

[97]ACHILLES, C.M., NYE, B.A., ZAHARIAS, J.B. and FULTON, B.D. (1993). 'Creating successful schools for all children: a proven step', *Journal of School Leadership*, **3**, 6, 606-21.

returned to regular-size classes" (emphasis is the author's). And also: "This does, in effect, deflect some of the criticism of the cost of reduced class size, since the benefits are spread out over more years than simply during the years of the class-size reduction." The authors quote Glickman (1991)[98] and the Baltimore "Success For All" programme (Slavin ,1990[99]) as producing complementary findings.

Gullo and Burton (1993)[100] report a study of 1573 children from a large urban district and present findings which indicate that pre-kindergarten experience is effective in promoting early school adjustment, regardless of socioeconomic background. They also indicate that, for both low and middle income groups of children, school adjustment was improved if class sizes were below 20 - but the class size differences were small and "not meaningful in and of themselves". The authors conclude: "What is important is to look at what happens within the instructional setting as a result of class size reductions."

Mortimore and Blatchford (1993)[101] reported the dearth of British research on class size and called for a "long overdue" study. Their report states that:

"Research evidence on the benefits of smaller classes is not entirely clear-cut, but from recent work in the US it appears that pupils educated in smaller classes during the first four years of schooling out-perform pupils in larger classes and maintain their academic advantage and demonstrate increased participation two years later. Children from disadvantaged backgrounds benefit most from smaller classes."

The authors pointed out, however, that reducing class sizes appears to make little difference to pupil achievement unless teachers alter their style of teaching to exploit the advantages of smaller groups. They note that primary PTRs in the UK (but not Scotland) are among the least favourable in the OECD, while secondary is close to the average.

Sylva and Moss (1992)[102], in a review of the importance of learning before school, report on the U.S. **High/Scope** programme which assigned children from impoverished families to a high quality, intellectually oriented nursery education programme intended to give a firm foundation for starting school. Children's progress was carefully followed until they were 19 and the most notable results came from the children as young adults, when they were more likely to have jobs, to have completed school or training, and less likely to have been sent to special education classes. Beruetta-Clement and colleagues (1984)[103] carried out a cost-benefit analysis to demonstrate marked savings during these children's schooling. **Jowett and**

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[98]GLICKMAN, C. (1991). 'Pretending not to know what we know', *Educational Leadership*, **48**, 8, 4-10.

[99]SLAVIN, R.E., MADDEN, N.J., KARWEIT, N.J., LIVERMON, B.J. and DOLAN, L. (1990). 'Success for all: first-year outcomes of a comprehensive plan for reforming urban education', *American Educational Research Journal*, **27**, 2, 255-78.

[100]GULLO, D.F. and BURTON, C.B. (1993). 'The effects of social class, class size and prekindergarten experience on early school adjustment', *Early Childhood Development and Care*, **88**, 43-51.

[101]MORTIMORE, P. and BLATCHFORD, P. (1993) *The Issue of Class Size* (NCE Briefing 12). London: National Commission on Education.

[102]SYLVA, K. and MOSS, P. (1992). *Learning Before School* (NCE Briefing 8). London: National Commission on Education.

[103]BERUETTA-CLEMENT, J., SCHWEINHART, L.J., BARNETT, W.S., EPSTEIN, A.S. and WEIKART, D.P. (1984). *Changed Lives: the Effects of the Perry Pre-School Programme on Youths Through Age 19* (Monographs of the High/Scope Educational Research Foundation No.8) Ypsilanti, MI: High/Scope Press.

Sylva (1986)[104] found in a 90 children study in the UK that "well-resourced nursery education, staffed by fully qualified teachers, fostered autonomy, perseverance and academic motivation in ways that playgroups operating on parental enthusiasm and a limited budget could not." Blackburne (1992)[105] showed that children who had experienced nursery education had higher SAT scores in year 2 than their peers without nursery experience, especially in mathematics.

Correa (1993)[106] noted that Glass and Smith (1978)[107], Glass et al. (1982)[108], Hanushek (1986[109], 1989[110]), Robinson and Wittebols (1986)[111] and Walberg (1985)[112] "found that available statistical analyses support the contradictory hypotheses that increments in class size increase, do not affect, or decrease student achievement." Notably, the **Glass and Smith meta-analysis** led those authors to argue that "..a clear and strong relationship between class size and achievement has emerged" while Robinson and Wittebols criticised the idea that an optimum class size can be specified in isolation from other factors, such as the age of pupils and the subject matter being taught. Correa economic-models (crudely) the behaviour of a teacher to argue mathematically that an increase in the number of students must lower their level of achievement. **Slavin** (1990)[113] and Tomlinson (1990)[114] argue that the gains do not justify the expense of employing more teachers.

In a classic issue of *Educational Psychologist*, Cooper (1989)[115] successfully argued to support the idea that small classes increased student and teacher morale and that small classes were significant in the primary grades. But when the debate looked at comparative data without coincidental work on teaching methods or structural reorganisation to accompany smaller classes, there was no evidence that achievement increased. Slavin (1989)[116] demonstrated that classroom studies showed that where classes had been halved (from an average of 31 down to 16), the net result was an "effect size" of only +0.04 (the difference between the experimental and control groups divided by the control's standard deviation - in general, one would be looking for a +0.25 effect size for educational significance). The effect size was greater for younger students: about +0.13.

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[104]JOWETT, S. and SYLVA, K. (1986). 'Does kind of pre-school matter?' *Educational Research*, **28**, 1, 21-31.
[105]BLACKBURNE, L. (1992). 'Nursery children get head start', *Times Educ. Suppl., 3969*, July 24, 1.
[106]CORREA, H. (1993). 'An economic analysis of class size and achievement in education', *Education Economics*, **1**, 2, 129-35.
[107]GLASS, G.V. and SMITH, M.L. (1978). *Meta-Analysis of Research on the Relationship of Class-Size and Achievement*. San Francisco, CA: Far West Laboratory for Educational Research and Development.
[108]GLASS, G.V., CAHEN, L.S., SMITH, M.L. and FILBY, N.N. (1982). *School Class Size*. Beverly Hills, CA: Sage.
[109]HANUSHEK, E.A. (1986). 'The economics of schooling: production and efficiency in schools', *Journal of Economic Literature*, **24**, 1141-77.
[110]HANUSHEK, E.A. (1989). 'The impact of differential expenditure on school performance', *Educational Researcher*, **18**, 4, 45-51.
[111]ROBINSON, G.R. and WITTEBOLS, J.H. (1986). *Class Size Research: a Related Cluster Analysis for Decision Making*. Arlington, VA: Educational Research Service.
[112]WALBERG, H.J. (1985). 'Synthesis of research on teaching'. In: WITTROCK, M.C. (Ed) *Handbook of Research on Teaching*. London: Collier Macmillan.
[113]SLAVIN, R. (1990). 'Class size and student achievement', *Contemporary Education*, **62**, 1, 6-12.
[114]TOMLINSON, T. (1990). 'Class-size and public policy', *Contemporary Education*, **62**, 1, 17-23.
[115]COOPER, H.M. (1989). 'Does reducing student-to-instructor ratios affect achievement?', *Educational Psychologist*, **24**, 1, 79-98.
[116]SLAVIN, R.E. (1989). 'Class size and student achievement: small effects of small classes', *Educational Psychologist*, **24**, 1, 99-110.

Slavin has continued his work into the **Success For All** initiative, mentioned above, which emphasises prevention and early intervention with students at risk. Prevention includes the provision of high-quality pre-school and/or full-day kindergarten programmes; research-based curriculum and instructional methods in all grades, pre-school to grade 5; reduced class size; activities to build positive relationships and involvement with parents; and other elements. Early intervention includes one-to-one tutoring in reading from certified teachers for students who are beginning to fall behind in 1st grade, family support programmes to solve truancy, behaviour problems, emotional difficulties, or health or social service challenges. Staff development programmes in school are a big part of the funded initiative. See Slavin (1993)[117]. Slavin reiterates that even the Tennessee project "found moderate effects" but later they were still positive, "but very small". He adds: "The effects of aides was near zero". And concludes: "Reducing class size may be part of an overall strategy for getting students off to a good start in school, but it is clearly not an adequate intervention in itself."

[117]SLAVIN, R.E., KARWEIT, N.L. and WASIK, B.A. (1993). 'Preventing early school failure: what works?', *Educational Leadership*, **50**, 4, 10-18.