Graham Nuthall Annual Lecture, 2008

A model for teaching and learning

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Graham Nuthall Classroom Research Trust
September, 2008

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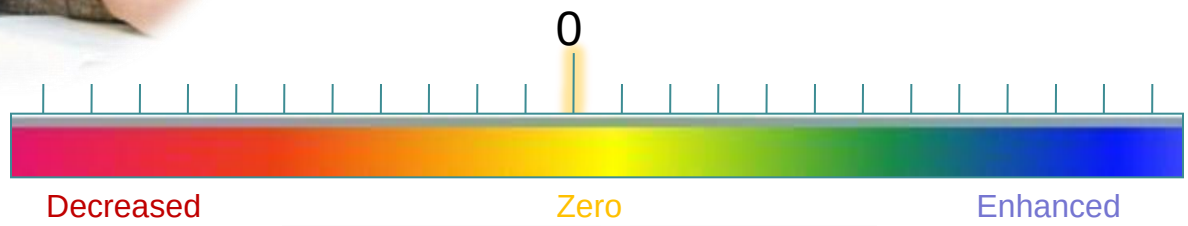
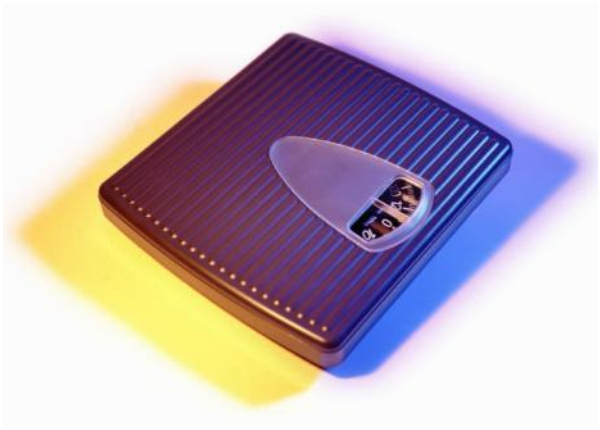
Influences on Achievement ?





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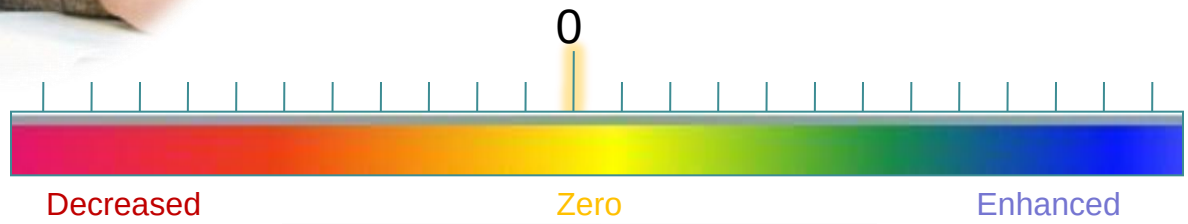
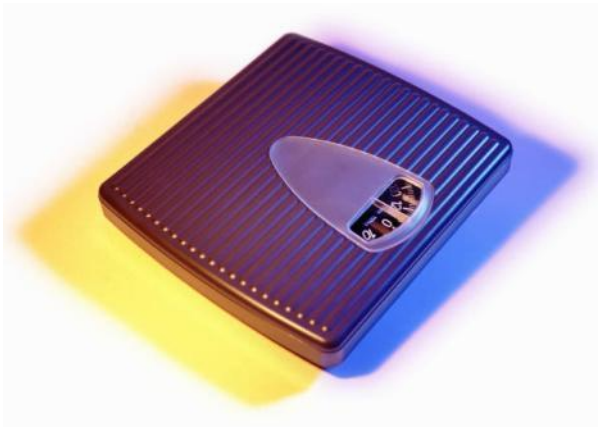
Reducing Class Size on Achievement?

What is the effect of reducing class size

Hundreds of evaluations of reducing class size ….





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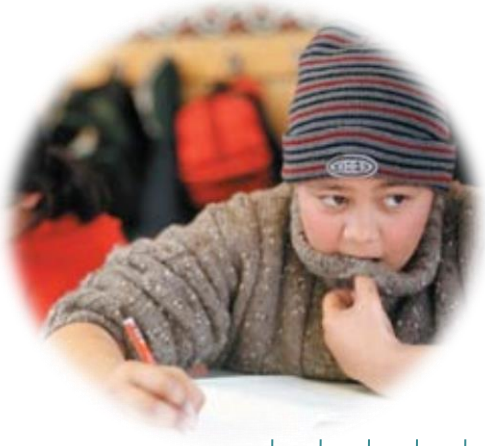
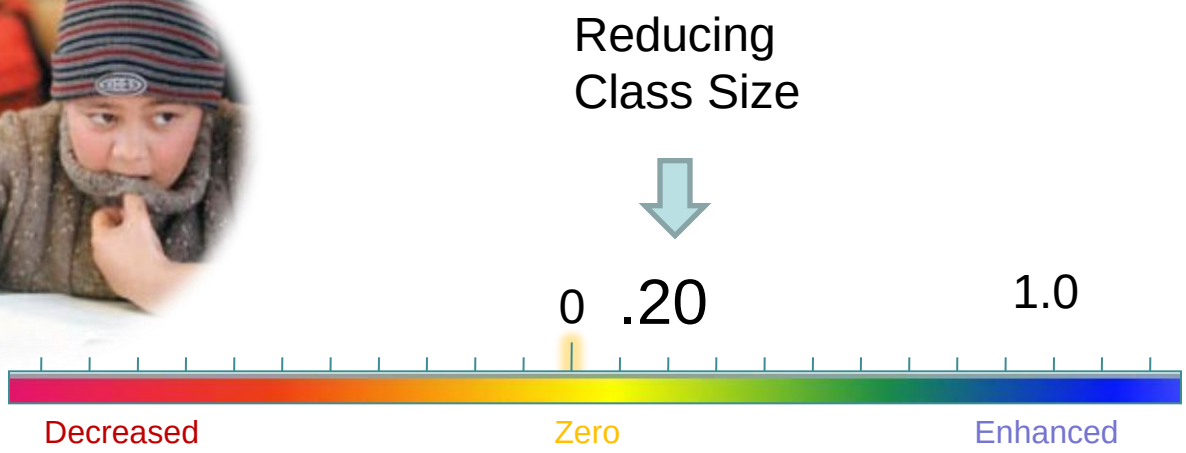
Effect on Achievement over time?





An effect-size of	.20	1.0
advancing achievement	9 mths	3 yrs
% improving rate of learning	10%	45%
r variable & achievement	.10	.45
% of students with treatment exceeding those not treated	8	34

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The typical influence on achievement

So what is the typical effect across

- **800+ meta-analysis**
- **50,000 studies, and**
- **200+ million students**

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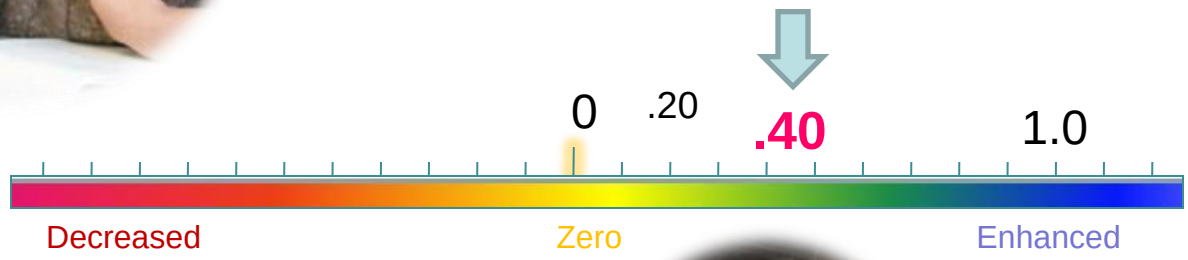
Effect on Achievement over time?

Typical Effect Size



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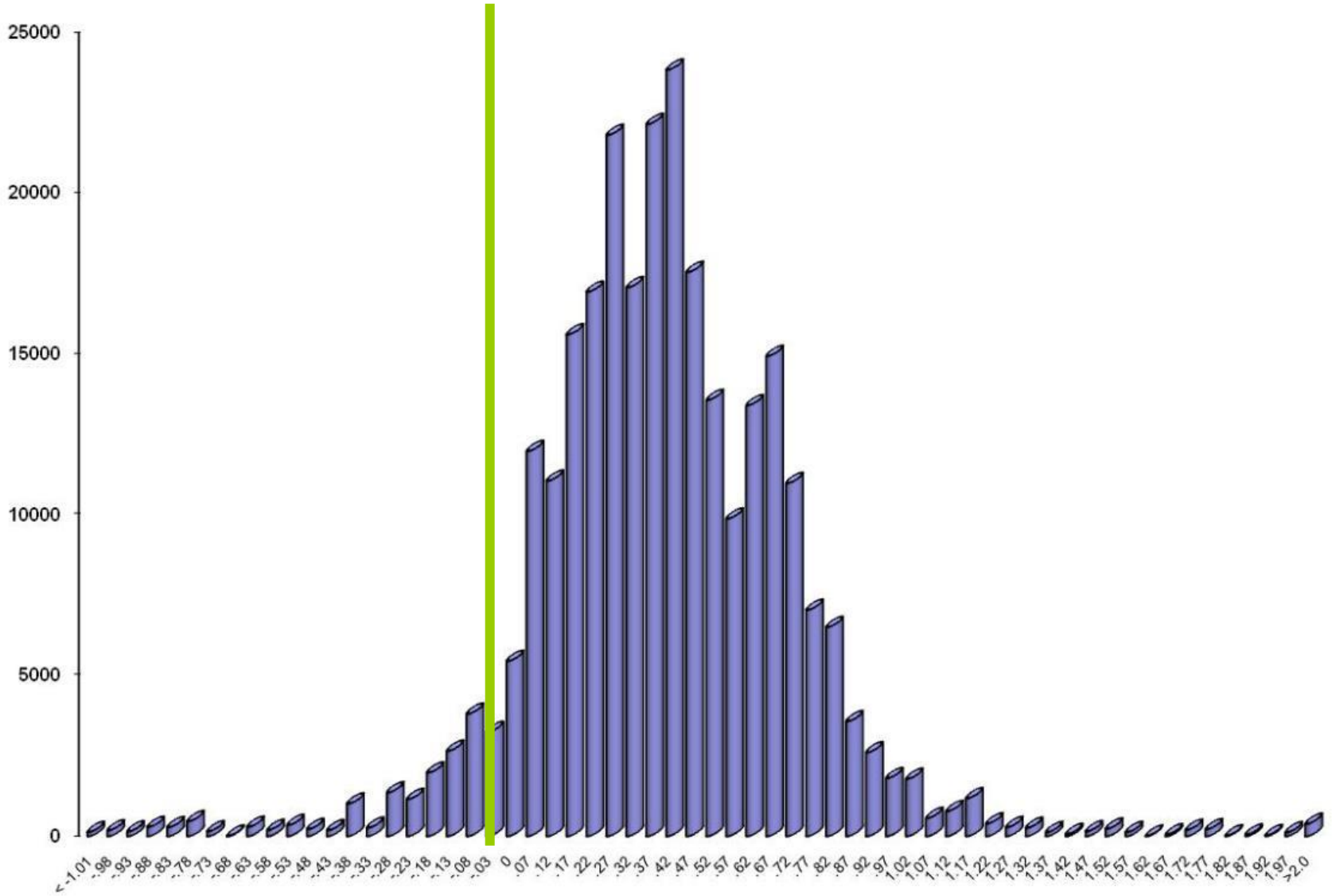
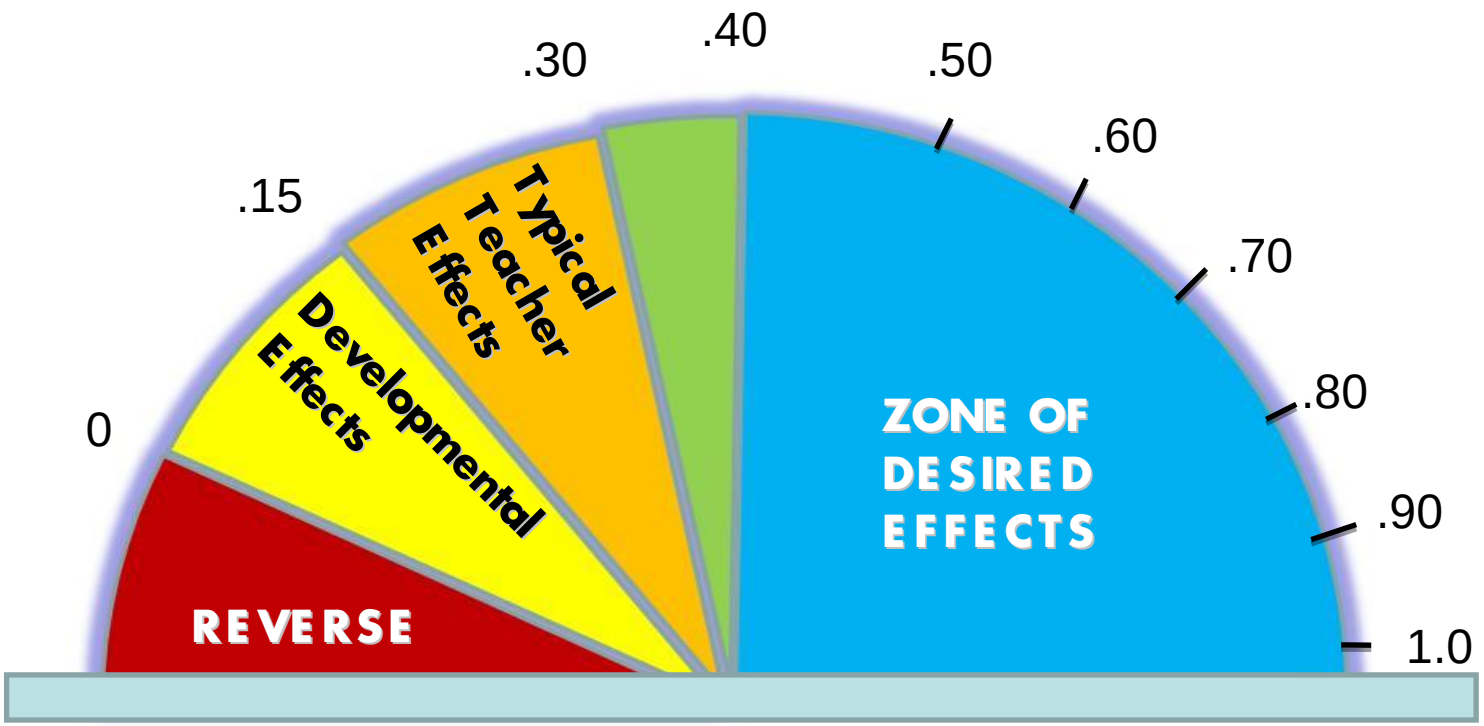
Distribution of effects



Influences on Achievement



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Rank these 12 effects: Answers

- Acceleration
- Feedback
- Student-teacher relationships
- Teaching study skills
- Reading Recovery
- Cooperative learning
- Homework
- Individualized instruction
- Ability grouping
- Open vs. traditional classes
- Retention (hold back a year)
- Shifting schools

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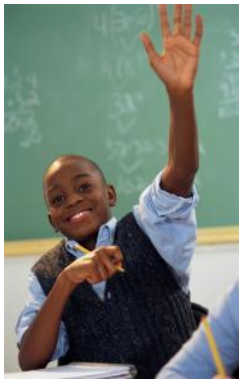
Rank these 12 effects: Answers

Acceleration	.88
Feedback	.73
Student-teacher relationships	.72
Teaching study skills	.59
Reading Recovery	.50
Cooperative learning	.41
Homework	.29
Individualized instruction	.22
Ability grouping	.12
Open vs. traditional classes	.01
Retention (hold back a year)	-.16
Shifting schools	-.34



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The Disasters ...

Rank	Influence	Studies	Effects	ES
130	College halls of residence	10	23	.05
131	Multi-grade/age classes	94	72	.04
132	Student control over learning	65	38	.04
133	Open vs. Traditional	315	333	.01
134	Summer vacation	39	62	-.09
135	On Welfare Policies	8	8	-.12
136	Retention	207	2675	-.16
137	Television	37	540	-.18
138	Mobility	181	540	-.34

The Disasters ...

Rank	Influence	Studies	Effects	ES
120	Mentoring	74	74	.15
121	Teacher education	85	391	.12
122	Ability grouping	500	1369	.12
123	Gender	2926	6051	.12
124	Diet	23	125	.12
125	Teacher subject matter knowledge	92	424	.09
126	Distance Education	839	1643	.09
127	Out of school curricula experiences	52	50	.09
128	Perceptual-Motor programs	180	637	.08
129	Whole language	64	197	.06

The Disasters ...

Rank	Influence	Studies	Effects	ES
110	Learning hierarchies	24	24	.19
111	Co- Team teaching	136	47	.19
112	Web based learning	45.3	136	.18
113	Family structure	845	1733	.17
114	Extra-curricula Programs	102	68	.17
115	Teacher Immediacy	16	16	.16
116	Within class grouping	129	181	.16
116	Home-school programs	14	14	.16
118	Problem based learning	285	546	.15
119	Sentence Combining programs	35	40	.15

Not Worth it yet ...

Rank	Influence	Studies	Effects	ES
100	Finances	189	681	.23
101	Illness	13	13	.23
101	Religious Schools	71	71	.23
103	Individualized instruction	638	1185	.22
104	Visual/Audio-visual methods	359	231	.22
105	Comprehensive Teaching Reforms	282	1818	.22
106	Class size	96	785	.21
107	Charter Schools	18	18	.20
108	Aptitude/treatment interactions	61	340	.19
109	Personality	234	1481	.19

Typical “average teacher” territory …

Rank	Influence	Studies	Effects	ES
90	Exercise/Relaxation programs	227	1971	.28
91	Desegregation	335	723	.28
92	Mainstreaming	150	370	.28
93	Teaching test taking & coaching	275	372	.27
94	Use of calculators	222	1083	.27
95	Values/Moral Education Programs	84	97	.24
96	Competitive vs. individualistic learning	831	203	.24
96	Special College Programs	108	108	.24
98	Programmed instruction	493	391	.23
99	Summer school	105	600	.23

Typical “average teacher” territory …

Rank	Influence	Studies	Effects	ES
80	Decreasing disruptive behavior	165	416	.34
81	Drugs	467	1839	.33
82	Simulations	361	482	.33
83	Inductive teaching	97	103	.33
84	Ethnicity	9	9	.32
85	Teacher effects	18	18	.32
86	Inquiry based teaching	205	420	.31
87	Ability grouping for gifted students	125	202	.30
88	Homework	161	295	.29
89	Home visiting	71	52	.29

Closer to Average …

Rank	Influence	Studies	Effects	ES
70	Time on Task	100	136	.38
71	Computer assisted instruction	4899	8914	.37
72	Adjunct aids	73	258	.37
73	Bilingual Programs	128	727	.37
74	Principals/ School leaders	491	1257	.36
75	Attitude to Mathematics/Science	288	664	.36
76	Exposure to Reading	114	293	.36
77	Drama/Arts Programs	715	728	.35
78	Creativity	21	447	.35
79	Frequent/ Effects of testing	569	1749	.34

Average

Rank	Influence	Studies	Effects	ES
60	Mathematics programs	706	2404	.43
61	Behavioral organizers/Adjunct questions	577	1933	.41
63	Cooperative learning	306	829	.41
64	Science	884	2592	.40
65	Social skills programs	540	2278	.40
66	Reducing anxiety	121	1097	.40
67	Integrated Curricula Programs	61	80	.39
68	Enrichment	214	543	.39
69	Career Interventions	143	243	.38

Average

Rank	Influence	Studies	Effects	ES
50	School effects	168	168	.48
51	Motivation	327	979	.48
52	Early Intervention	1704	9369	.47
53	Questioning	211	271	.46
54	Pre school programs	358	1822	.45
55	Quality of Teaching	141	195	.44
56	Writing Programs	262	341	.44
57	Expectations	674	784	.43
58	School size	21	120	.43
59	Self-concept	324	2113	.43

Let's have them ....

Rank	Influence	Studies	Effects	ES
40	Keller's PIS	263	162	.53
41	Peer influences	12	122	.53
42	Classroom management	100	5	.52
43	Outdoor/ Adventure Programs	187	429	.52
44	Interactive video methods	441	3930	.52
45	Parental Involvement	716	1783	.51
46	Play Programs	70	70	.50
47	Second/Third chance programs	52	1395	.50
48	Small group learning	78	155	.49
49	Concentration/Persistence/ Engagement	146	587	.48

Exciting ….

Rank	Influence	Studies	Effects	ES
30	Worked examples	62	151	.57
31	Home environment	35	109	.57
32	Socioeconomic status	499	957	.57
33	Concept mapping	287	332	.57
34	Challenging Goals	604	820	.56
35	Visual-Perception programs	683	5035	.55
36	Peer tutoring	767	1200	.55
37	Cooperative vs. competitive learning	1024	933	.54
38	Pre-term birth weight	46	136	.54
39	Classroom cohesion	88	841	.53

Among the Winners ...

Rank	Influence	Studies	Effects	ES
20	Problem solving teaching	221	719	.61
21	Labeling students	79	79	.61
22	Teaching strategies	5667	13572	.60
23	Cooperative vs. individualistic learning	774	284	.59
24	Study skills	668	2217	.59
25	Direct Instruction	304	597	.59
26	Tactile stimulation programs	19	103	.58
27	Phonics instruction	447	5990	.58
28	Comprehension programs	415	2653	.58
29	Mastery learning	377	296	.58

The Winners ...

Rank	Influence	Studies	Effects	ES
11	Teacher-Student relationships	229	1450	.72
12	Spaced vs. Mass Practice	63	112	.71
13	Meta-cognitive strategies	63	143	.69
14	Prior achievement	3607	9209	.67
15	Vocabulary programs	301	800	.67
16	Repeated Reading programs	54	156	.67
17	Creativity Programs	685	837	.65
18	Self-verbalization & Self-questioning	113	1150	.64
19	Professional development	537	1884	.62

The Winners ...

Rank	Influence	Studies	Effects	ES
1	Self-reported grades	209	305	1.44
2	Piagetian programs	51	65	1.28
3	Providing formative evaluation	30	78	.90
4	Micro teaching	402	439	.88
5	Acceleration	37	24	.88
6	Classroom behavioral	160	942	.80
7	Comprehensive interventions for learning disabled students	343	2654	.77
8	Teacher clarity	0	0	.75
9	Reciprocal teaching	38	53	.74
10	Feedback	1287	2050	.73

Various Influences

	Metas	Studies	People	Effects	ES	se
Teacher	29	2,052	.5m	5,379	.50	.05
Curricula	142	6,991	7m	29,813	.46	.07
Teaching	357	25,418	52m	53,829	.43	.07
Student	138	10,905	7m	38,091	.40	.04
Home	34	2,124	11m	5.095	.30	.06
School	100	4,144	4m	13,342	.23	.07
Average	800	51,634	83/237m*	145,549	.40	.06

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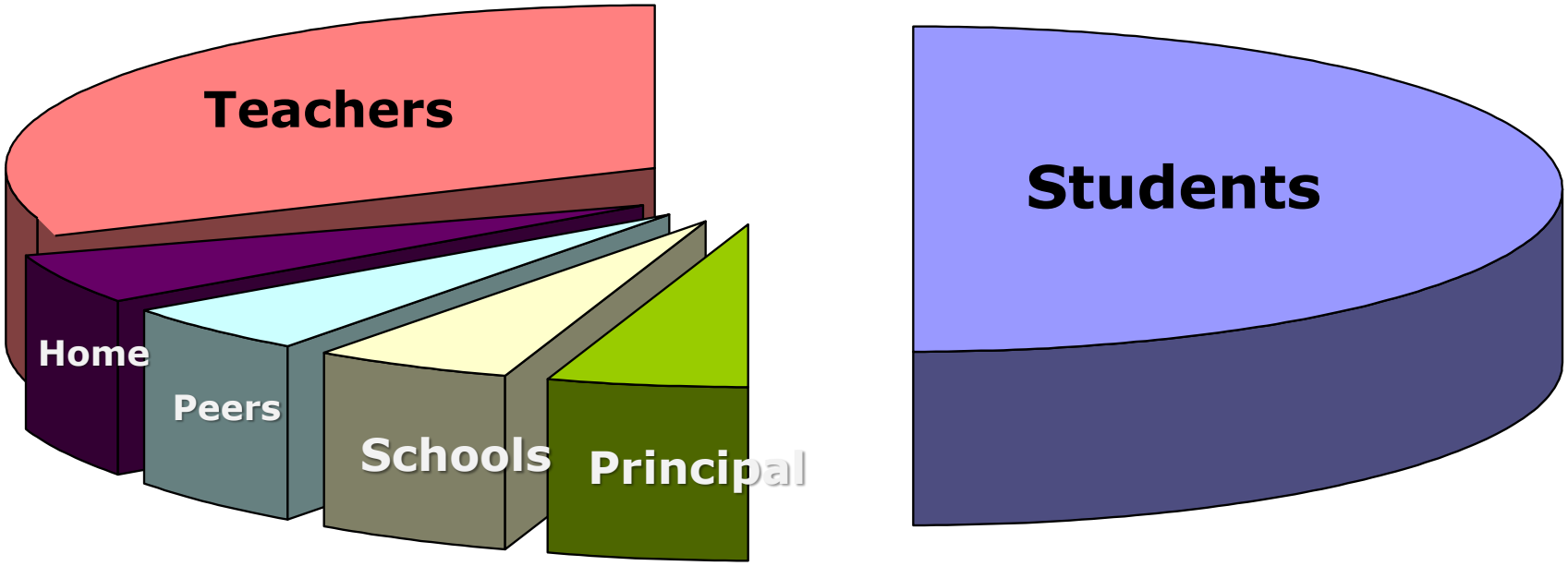
Identifying what matters

Percentage of Achievement Variance



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Visible teaching & Visible learning

- **What some teachers do!**
  - **In active, calculated and meaningful ways**
  - **Providing multiple opportunities & alternatives**
  - **Teaching learning strategies**
  - **Around surface and deep learning**
  - **That leads to students constructing learning**

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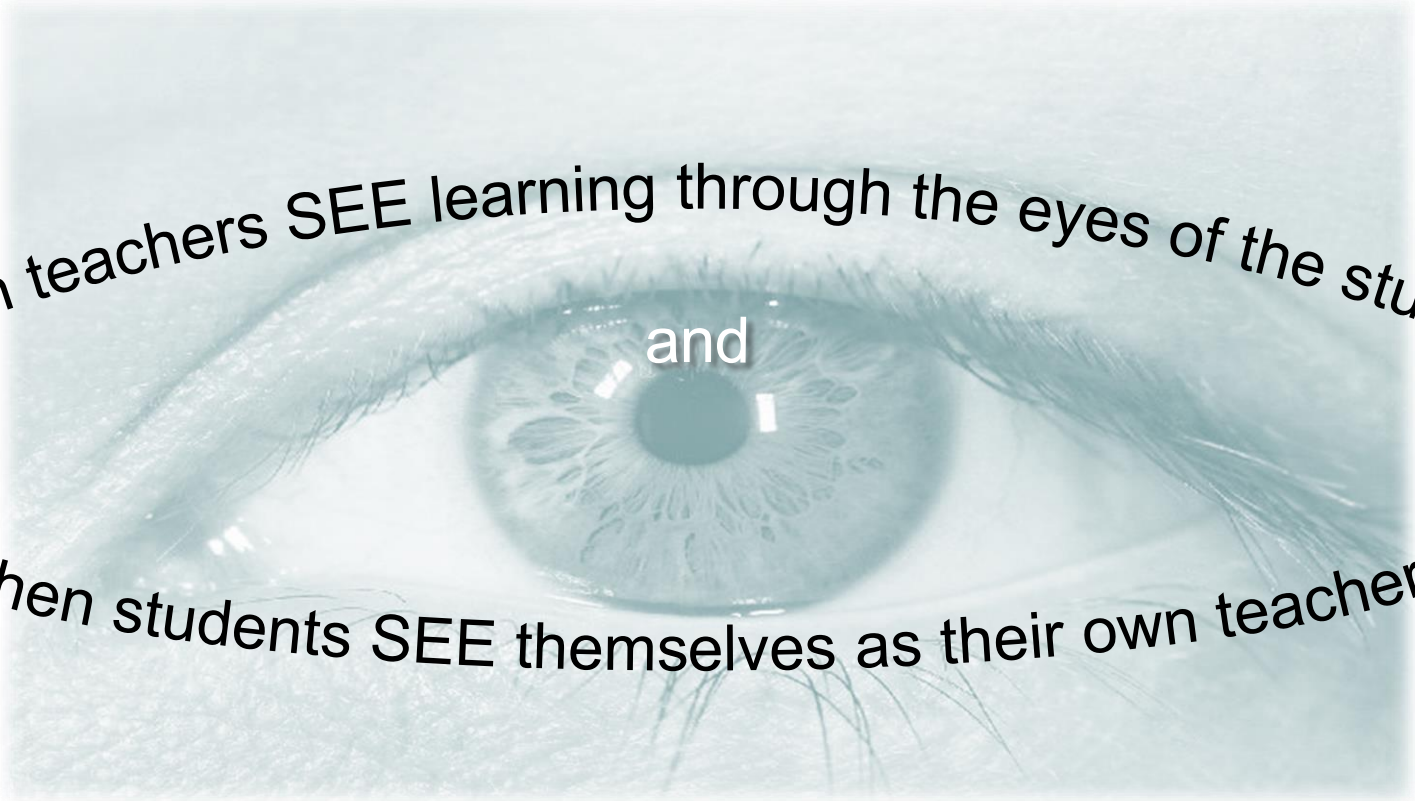
Visible Teaching – Visible Learning



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Teachers

- **Clear learning intentions**
- **Challenging success criteria**
- **Range of learning strategies**
- **Know when students are not progressing**
- **Providing feedback**
- **Visibly learns themselves**

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Students …

- **Understand learning intentions**
- **Are challenged by success criteria**
- **Develop a range of learning strategies**
- **Know when they are not progressing**
- **Seek feedback**
- **Visibly teach themselves**

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The Contrast

- **An active teacher, passionate for their subject and for learning, a change agent**

  OR

- **A facilitative, inquiry or discovery based provider of engaging activities**

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Activator or Facilitator ?

An Activator

Reciprocal teaching

Feedback

Teaching students self-verbalization

Meta-cognition strategies

Direct Instruction

Mastery learning

Goals - challenging

Frequent/ Effects of testing

Behavioral organizers

A Facilitator

Simulations and gaming

Inquiry based teaching

Smaller class sizes

Individualized instruction

Problem-based learning

Different teaching for boys & girls

Web-based learning

Whole Language Reading

Inductive teaching

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Activator or Facilitator ?

An Activator	*ES*
Reciprocal teaching	.74
Feedback	.72
Teaching students self-verbalization	.67
Meta-cognition strategies	.67
Direct Instruction	.59
Mastery learning	.57
Goals - challenging	.56
Frequent/ Effects of testing	.46
Behavioral organizers	.41
ACTIVATOR	***.60***

A Facilitator	*ES*
Simulations and gaming	.32
Inquiry based teaching	.31
Smaller class sizes	.21
Individualized instruction	.20
Problem-based learning	.15
Different teaching for boys & girls	.12
Web-based learning	.09
Whole Language Reading	.06
Inductive teaching	.06
FACILITATOR	***.17***

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Message for Learning

- Balance of surface, deep, & constructed knowing
- Teachers preach deep, students see surface!
- Learning strategies
  - To reduce cognitive load
  - To use when stuck (welcome error!)
- Requires deliberative practice
  - Builds expectations of "can do"
  - Thrives on challenge
  - Requires feedback

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Some worrying details

Influence	No. of Effect	Effects Size
Teacher training	53	0.11
Teacher subject knowledge	27	0.12
Gender (Girls - Boys)	2926	0.12
Principals on achievement	344	0.3
Instructional vs.		0.44
Transformation leadership		0.22

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Graham Nuthall's messages

The world of learning and classrooms from the student's personal viewpoint is so often unknown to the teacher

—hence reinforcing the major claim in this lecture about how teachers need to spend more time and energy understanding learning through the eyes of students.

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One of the most robust method of understanding teaching &learning through the eyes of the students

Up to 40% of what occurs among students is missed by teachers. No wonder critical reflection by teachers is barely adequate.

- “how little teachers knew about what was going on in their classrooms”.
- students already knew at least 40% of what teachers intend them to learn
- Teachers, rather than seeing learning through the eyes of students, knew their teaching was going well from signs that their students were actively engaged with learning activities.

Too often, the “criteria for successful learning are the same criteria for successful classroom management”

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“The teacher is largely cut off from information about what individual students are learning”

- They are sustained by the commonly held belief that if students are engaged most of the time in appropriate activities, some kind of learning will be taking place … Teachers depend on the responses of a small number of key students as indicators and remain ignorant of what most of the class knows and understands” (Nuthall, 2005, pp. 919–920).
- Students “most common response was that they were thinking about how to get finished quickly or how to the answer with the least possible effort”

Classroom observation

- Developing rich Reports about classroom interactions
  - Who talks to whom, for how long, about what
  - What is the nature and impact of peer interactions
  - What is the discussions/dialogue that lead to learning
  - How do students relate to the teacher during the class session
  - What are the nature of relationships between peers, and student and teacher
  - What is going on in the classroom
    - And how does this relate to learning

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A model for teaching and learning

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