

Effect Sizes and Evidence-based Teaching



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Effect Size Research

- Seeks to answer the question ‘what has the greatest effect on student learning?’ and includes innovations in teaching practice and learner factors
- Little effect size research has been done in a TESOL context, perhaps surprisingly
- It is calculated by dividing the difference of two means (i.e. mean test results for two groups) by the standard deviation for the whole population
- An effect size of 1.0 is defined as an increase of one standard deviation and reflects a 50 % advance in achievement or the rate of learning. Typically this might be an increase in GCSE results from grade ‘C’ to ‘A’.

How is the research done?

- Two classes are formed, a control group and an experimental group
- As far as possible variations between the two groups are eliminated
- Before teaching, both groups are tested
- The control group is taught using a standard method, the experimental group with the same method with one additional feature or one additional variable (e.g. experimental group has a higher identified motivation or aptitude)
- At the end of the course, both groups are re-tested
- The difference in the mean of the two sets of results and the standard deviation (usually for the whole population) are used to calculate the effect size

Test before teaching

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graph TD; A[Test before teaching] --> B[Control group/experimental group]; B --> C[Test after];
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Control
group/experimental group

Test after

Analysis of the research

- John Hattie (1999) has analysed 180,000 effect size studies covering almost as many different teaching innovations and other factors for 50 million + learners
- Research covers all age groups from primary to FE and HE - the majority in schools. Results are quite stable across age groups
- A typical effect size is + 0.4 for innovations introduced by the teacher - just less than a one grade GCSE leap or equivalent
- To calculate the effect size for a particular feature, the average is calculated from a number of research studies – e.g. 3912 studies measuring the effects of teacher INSET

Effect sizes $0.3 > 0.5$

Peer tutoring	0.5 (125)
Mastery learning (frequent formative testing)	0.5 (104)
Teacher INSET programmes	.49 (3912)
Homework	.43 (110)
Teacher questioning learners (high order questions)	.41 (134)
Advance summaries of learning	.37 (387)
Games and simulation activities	.34 (111)
Computer-aided instruction (also IWBs etc)	.31 (4987)
Standard Testing	.30 (1817)

Source: Hattie 1999

Effect Sizes higher than 0.5

Feedback against explicit criteria	1.13 (139 studies)
Students' prior cognitive ability (e.g. IQ)	1.04 (896)
Instructional quality (learner perception)	1.00 (22)
Instructional Quantity (increasing hours)	.84 (80)
Remediation strategies	.65 (146)
Students disposition to learn	.61 (93)
Challenge of goals	.52 (2703)
Bilingual programmes	.51 (285)

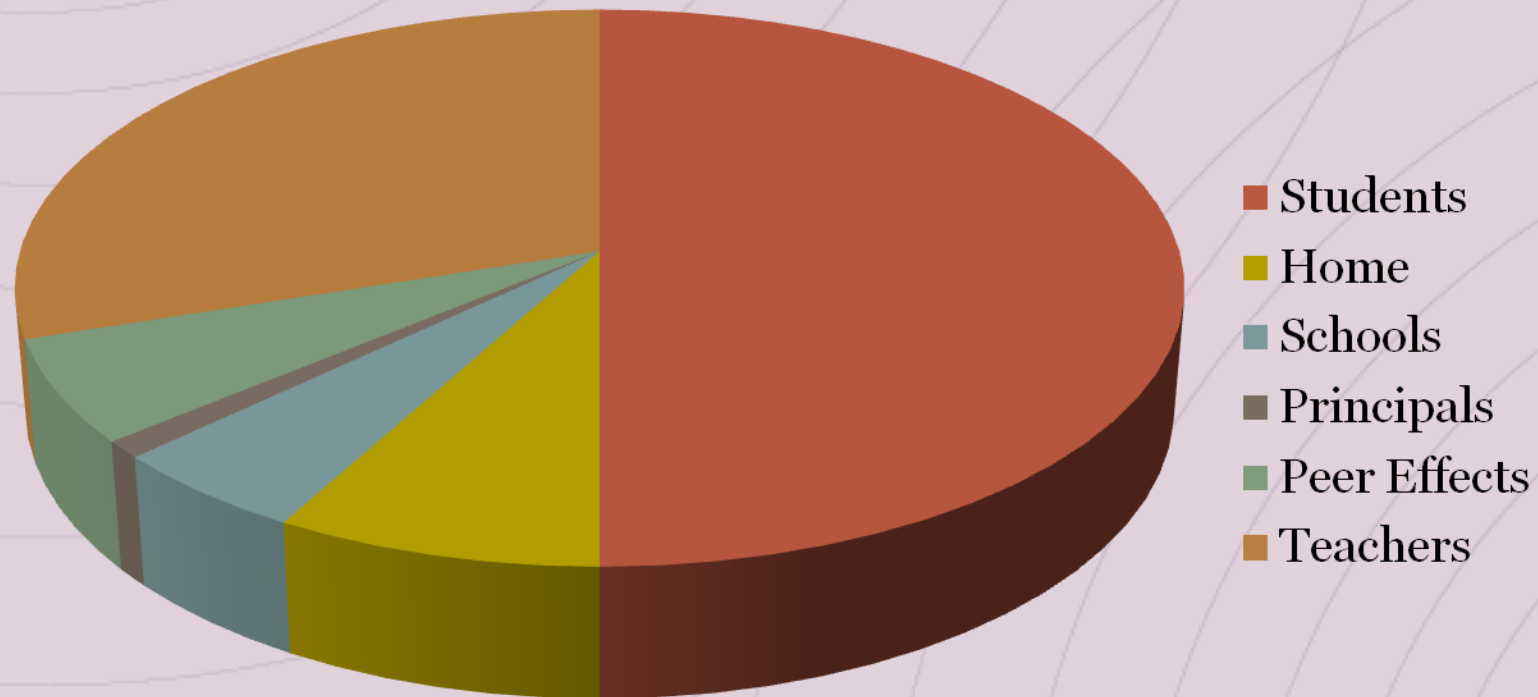
(source: Hattie 1999)

Effect Sizes 0.3 and lower

Attitudes, beliefs and feelings of learners	.24 (355)
Audio-visual aids	.16 (6060)
Individualisation (e.g. differentiated programmes)	.14 (630)
Teacher sets behavioural objectives	.12 (111)
Reducing class size	.09 (540)
Team Teaching	.06 (41)
Ability grouping	.05 (3385)
Physical attributes of the school	-.05 (1850)
Television	-.12 (367)
Retention (repeating classes)	-.15 (861)

Source: Hattie 1999

Major sources of variance in achievement



The importance of feedback

Feedback to learners would seem to have a fundamental role to play in effective teaching and learning. We should:

- tell learners what they have done well/less well, but in an informative rather than evaluative way
- set clear targets and do corrective work
- clarify and refine the goals of a learning programme regularly
- give learners feedback on the processes they have used to complete a task and their ability to regulate their own learning
- have regular in-class assessment of learners' work and give them corrective work to do
- It's not enough to say 'you did well'!

Implications for TESOL

- Some effects may be different in a TESOL/MFL context – e.g. IQ may be less important than specific language aptitude
- Effect sizes based on concepts of **active learning** are among the highest – i.e. activities requiring learners to construct their own meanings from the concepts being taught, and getting them to practise key skills
- Communicative approaches variously emphasize:
 - freer practice of the L2 and skills development
 - personalization and individualization
 - learners demonstrating their understanding of key concepts
 - learners ‘noticing’ specific features of the language
 - Learners using their knowledge to fulfill certain tasks
- There is a good correlation between CLT approaches and the research on effect sizes

Implications (continued)

- Teacher INSET/CPD has an effect size of .49 and is a valuable source of further innovation and discussion
- Good teachers matter to learners more than up-to-date resources or swanky buildings (discuss
- Formative formal and informal assessment of learners plays an important role: it is not the test per se that promotes learning so much as what you do with the results and the feedback you give on it (cf 'mastery learning', 0.5)
- Effect sizes of below .4 should not be dismissed as they can add value in combination with other approaches, particularly in the short term – e.g. providing an advance summary of the day's learning objectives
- Cooperative/group activities have an effect size of .76 compared with teaching that does not use them
- Smaller class sizes seem to have little or no effect on learning

Some implications for teacher training

- Teachers need a deep understanding of content so they can set appropriately challenging goals and know what can be used as feedback
- Teachers additionally need training in the individual variations among learners – e.g. the different ways in which they receive, understand and use language
- We need to set appropriate goals for initial teacher training but also for experienced teachers needing to improve their expertise through in-service training and CPD
- All initial and advanced TTEd programmes should include sessions on developing schemes of work, how learners learn, how learners conceive of their learning, how the feedback cycle informs learning over time