What has the greatest influence on student learning?   Geoff Petty

The work of John Hattie, Professor of Education University of Auckland is very informative in this respect. He has analysed 200,000 'effect-sizes' from 180,000 studies representing 50+million students and covering almost every method of innovation. This is just a summary, download Hattie's full paper 'Influences on Student Learning' from this page on his site:

He says 'effect sizes' are much the best way of answering the question 'what has the greatest influence on student learning'. An effect-size of 1.0 is typically associated with:

- advancing learner's achievement by one year, or improving the rate of learning by 50%,

- a correlation between some variable (e.g., amount of homework) and achievement of approximately .50.

- average students receiving that treatment exceeding 84% of students not receiving that treatment.

- A two grade leap e.g. from a C to an A grade.

An effect size of 1.0 is clearly enormous! (It is defined as an increase of one standard deviation)

Professor John Hattie's average effect sizes.

Effect sizes above 0.4 are above the bold line. These are above the average for educational research. The 'number of effects' column gives the number of effect sizes of this type that have been averaged to create the 'effect size' in the next column.

Mean effect-sizes from over 500 meta-analyses of various influences to achievement.   Professor John Hattie

Influence	No. of effects	Effect-Size
Feedback	139	1.13
Students' prior cognitive ability	896	1.04
Instructional quality	22	1.00
Instructional quantity	80	.84
Direct instruction	253	.82
Acceleration	162	.72
Home factors	728	.67
Remediation/feedback	146	.65
Students disposition to learn	93	.61
Class environment	921	.56
Challenge of Goals	2703	.52
Bilingual programs	285	.51
Peer tutoring	125	.50
Mastery learning	104	.50
Teacher in-service education	3912	.49
Parent involvement	339	.46
Homework	110	.43
Questioning	134	.41

OVERALL EFFECTS	500,000+	.40
Peers	122	.38
Advance organizers	387	.37
Simulation & games	111	.34
Computer-assisted instruction	566	.31
Instructional media	4421	.30
Testing	1817	.30
Aims & policy of the school	542	.24
Affective attributes of students	355	.24
Calculators	231	.24
Physical attributes of students	905	.21
Learning hierarchies	24	.19
Programmed instruction	220	.18
Audio-visual aids	6060	.16
Individualisation	630	.14
Finances/money	658	.12
Behavioural objectives	111	.12
Team teaching	41	.06
Ability grouping/Streaming	3385	.05
Physical attributes of the school	1850	-.05
Mass media	274	-.12
Retention	861	-.15

Professor John Hattie's Table of Effect Sizes

Terms used in the table:
- An effect size of 0.5 is equivalent to a one grade leap.
- An effect size of 1.0 is equivalent to a two grade leap.
- 'Number of effects' is the number effect sizes from well designed studies that have been averaged to produce the average effect size.
- An effect size above 0.4 is above average for educational research

The effect sizes are averaged, and are a synthesis of research studies thought to be well designed and implemented by research reviewers. Hence they are the best guess we have about what has the greatest effect on student achievement.

Some effect sizes are 'Russian Dolls' containing more than one strategy e.g. 'Direct instruction' is a strategy that includes active learning, structured reviews after one hour, five hours and 20 hours study, there is also immediate feedback for the learners, and some corrective work if this is necessary.

Hattie terms broken down:

Feedback Hattie has made clear that 'feedback' includes telling students what they have done well (positive reinforcement), and what they need to do to improve (corrective work, targets etc), but it also includes clarifying goals. This means that giving students assessment criteria for example would be included in 'feedback'. This may seem odd, but high quality feedback is always given against explicit criteria, and so these would be included in 'feedback' experiments.

As well as feedback on the task Hattie believes that students can get feedback on the processes they have used to complete the task, and on their ability to self-regulate their own learning. All these have the capacity to increase achievement. Feedback on the 'self' such as 'well done you are good at this' is not helplful. The feedback must be informative rather than evaluative. See the feedback page on my website or Teaching Today chapters 6 and 43.

Students prior cognitive ability: This is IQ and similar measures

Instructional quality: This is the students view of the teaching quality, the research was done mainly in HE institutions and colleges.

Instructional quantity: How many hours the student is taught for.

Direct instruction: Active learning in class, students work is marked in class and they may do corrective work. There are reviews after one hour, five hours, and 20 hours study.

Acceleration This is very bright students being put forward a year in schools

Home factors Issues such as social class, help with homework, extent to which the learners education is thought important; etc

Remediation/feedback Diagnosing what students find difficult, and getting students to fix it.

Students disposition to learn student motivation

Class environment not sure what this means exactly I am trying to find out.

Challenge of Goals students being given challenging but at least partially achievable goals

Bilingual programs self explanatory??

Peer tutoring students teaching each other, peer-explaining, peer-checking, peer-assessing etc

Mastery learning A system of tests and retests of easy material with a high pass mark, if a students does not pass they must do extra work and then take a retest on the material they were weak at. See Teaching Today by Geoffrey Petty.

Teacher in-service education Staff development and staff training sessions You may be on one now!

Parent involvement self explanatory?

Homework self explanatory?

Questioning Students being questioned. The most effective questions are high order 'why' 'how' and 'which is best' questions that really make students think. They need to be given time to think too, and can do better if they work in pairs than work alone.

Effect sizes Below 0.4 now follow. Some of these add a lot of value in a short time so don't ignore them...

Advance organizers A summary of the material in advance that puts some sort of structure to it. This can take a matter of moments and is best referred back to often.

Computer-assisted instruction Effect sizes for this are gradually rising as the instruction becomes more interactive, more engaging and generally better designed.

Instructional media using state of the art visuals, videos, etc

Testing testing by itself is not as effective as remediation/feedback where the test is used to find what the student needs to improve and they then do corrective work.

Affective attributes of students the attitudes beliefs and feelings of students

Programmed instruction a form of instruction that involves students being taught by a computer or set of workbooks, by doing a series of prescribed tasks, if the student gets an answer wrong they are directed back to correct their misunderstanding. Devised by Skinner in the 1960s, but not much used now.

Individualisation Students working on an individualised programme of learning. This may work better if students are not working in a solitary way.

Finances/money funny ….. this seems to have a larger effect when paid to me…

Behavioural objectives Having and using objectives in the form: "The students should be able to…" immediately followed by an <u>observable</u> verb. For example 'explain' is okay because you can listen to, or read the student's explanation. However 'understand' isn't behavioural because you can't see or read the understanding.

Retention Students who do not do well enough in one school year, being kept back to do the year again.

Beware Over-interpretation!

- Surface learning (e.g. rote remembering without understanding) could produce high effect sizes short term for low cognitive skills such as remembering. For example the use of mnemonics has an effect size of about 1.1 (There is more to learning than passing memory tests.)

- Most of the research was done in schools, though Hattie says effect sizes are remarkably stable and not much influenced by age

- Some high-effect strategies are 'Russian Dolls' with other strategies 'inside'.

Some low effect sizes are not very time consuming and well worth trying for their additive effect.

Walberg's study

An earlier study by Walberg reviewed effect sizes in education to produce the following table. Notes on vocabulary:

'Reinforement' means praise and other rewards

'Cues' are attention cues, that is, suggestions by the teacher for the student to pay special attention in a given area

'Cooperative learning' is learning assignments done in groups in a particular manner, this is very popular in the States and there is lots on the internet about it. I am doing an Action Research Proposal on it.

Instructional Strategy Effects on Student Learning Outcomes

Rank order	Method	Effect Size	Percentile
1. Reinforcement		1.17	88
2. Cues and feedback		.97	84
3. Graded homework		.79	79
4. Cooperative learning		.76	78
5. Class morale		.60	73
6. Personalized instruction		.57	72
7. Home interventions		.50	69
8. Adaptive instruction		.45	67
9. *Tutoring*		.40	66
10. Instructional time		.38	65
11. Home environment		.37	64
12. Higher-order questions		.34	63
13. Individualized instruction		.32	63
14. Individualized mathematics		.32	63
15. Teacher expectations		.28	61
16. Assigned homework		.28	61
17. Computer-assisted instruction		.24	59
18. Peer group		.24	59
19. Sequenced lessons		.24	59
20. Advanced organizers		.23	59
21. *Homogeneous groups*		.10	54
22. Class size		.09	54
23. Programmed instruction		-.03	49

- Source: Data from Herbert Walberg, "Improving the Productivity of America's Schools," Educational Leadership, 41, no. 8 (1984): 24. (Borg & Meredith, 1989)