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Briefings

Thought leadership for the independent schooling sector

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ECONOMIC FACTORS INFLUENCING THE HEALTH OF THE INDEPENDENT SCHOOLS SECTOR

From the Executive Director

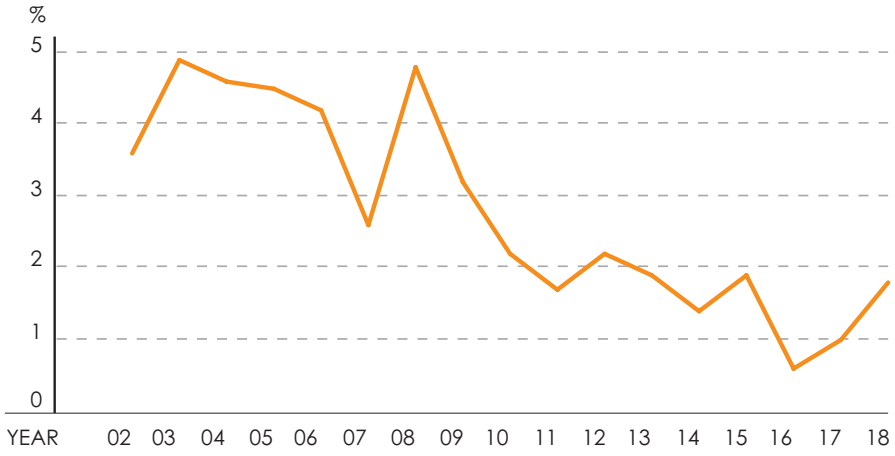
The independent schooling sector makes a significant contribution to the Queensland economy[1] – $4.1 billion, supporting 31,000 full-time jobs and over $1 billion in savings to governments and taxpayers. On the other side of the coin, the state of the economy is a key determinant of the health of the independent sector.

Parents who exercise their right of choice by enrolling their children in independent schools pay tuition fees and other charges. Data from the Independent Schools Queensland (ISQ) *What Parents Want Survey*[2] tells us that 83% of parents pay their child's school fees from their salary/wages. This is a significant commitment from after-tax income.

The typical situation is two working family members with one's income covering the mortgage, utilities and other living costs, whilst the other's income (which might be based on part-time employment) is utilised for more discretionary expenditure such as child care and school fees.

A healthy economy means more parents are in employment and earning the income which allows them to meet school fees.

Figure 1: Percentage Change in Queensland Independent Sector Enrolments



Source: Non-State School Census (State) February Collection 2018

Just as important, confidence in current and future economic conditions are a factor in any individual's decisions about expenditure. Parents enrolling their children in Prep are expecting to pay school fees for the next 13 years and their job security, predicted future mortgage and living costs will be taken into account in their decision making in relation to school choice.

As was evidenced in the first year of the Newman Government in Queensland, job security is important to parents paying school fees. It was clear during this period in 2014/15 that many parents delayed a choice of independent schooling or moved their children to state schools because of the cuts to public service employment. These parents had not actually lost their jobs but the uncertainty over whether or not they might lose their job in the future was a powerful influence which ultimately impacted on enrolments in the independent sector.

A pleasing increase in the enrolments in the Queensland independent sector in 2018 reflects a strengthening economy. As outlined in Figure 1, the recent February Census of schools has enrolments in the independent sector at nearly 121,000, an increase of 1.7% over 2017.

The 2018 increase follows two years of growth at less than 1%. It has been a tough market for independent schools since the Global Financial Crisis (GFC) in 2007/08 which saw the growth rate in the sector halved. Depressed

1 Economic Significance of Independent Schools to the Queensland Economy – An AEC Group Report (March 2016) available at https://rms.isq.qld.edu.au/files/Weblive_OSOF/AECGroupReportKeyFindingsPRINT.pdf
2 Available at https://rms.isq.qld.edu.au/files/Weblive_ReportsSurveys/WhatparentswantkeyfindingsPrint2015.pdf

ECONOMIC FACTORS INFLUENCING THE HEALTH OF THE INDEPENDENT SCHOOLS SECTOR

Figure 2: Queensland Gross Domestic Product[3]

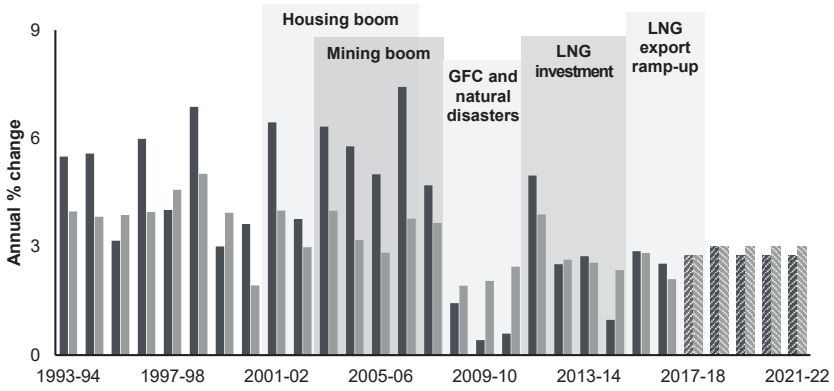
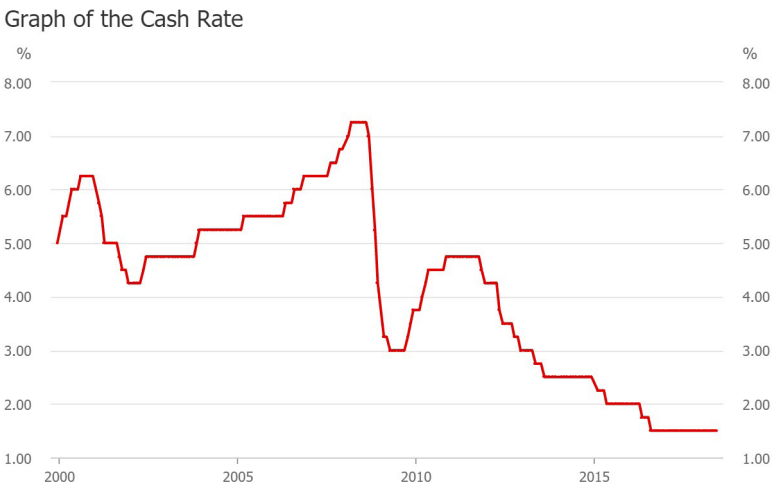


Figure 3: Low Interest Rates



Source: RBA

economic conditions resulting from various natural disasters in recent years have also played a role in the declining growth, along with a change in circumstances for the mining industry based on world prices.

As outlined in the Queensland 2018/19 Budget papers, Gross Domestic Product has been on the rise (see Figure 2). Growth of 3% is projected for 2018/19 including a strong recovery in some Queensland regional areas.

Australia is indeed a 'lucky country' when it comes to economic growth. We have experienced only four recessions since 1960 in 1961; 1974-75; 1982-83; and 1990-91 (a recession is defined as two or more consecutive quarters of negative growth). Although it is nearly 30 years ago, many in the independent sector will remember the significant impact the 1990-91 recession had on independent school enrolments.

The prospect of another recession is rigorously debated by economists on a regular basis. It is something that every school board should regularly factor into its considerations and risk management. The capacity of government to respond to a downturn in the economy with appropriate stimulus packages might be part of those considerations, remembering that Australia was one of the few countries not to suffer a recession during the GFC principally because of the Rudd Government's increased government spending (which included the Building the Education Revolution). Government debt levels are massively higher now than the pre-GFC era, thereby potentially limiting the traditional Keynesian responses to economic downturns.

There are other economic indicators that have a significant influence on parental decisions about school choice. Interest rates are at record lows (see Figure 3). This is not only good news for schools in terms of capital borrowings, but for parents with mortgages. The positives for parents in terms of them having available more discretionary income to potentially spend on school fees is partly offset by high housing costs and increasing utilities and transport costs.

Boards in their planning might be mindful that during the 1990s interest rates reached a high of around 18%. Considering how your school's parent body might respond to changed economic circumstances is sensible risk management.

3 Available at https://budget.qld.gov.au/files/BP2-2018-19-2%20Economic%20Performance.pdf

Perhaps the most significant economic challenge facing most schools is the continued higher than Consumer Price Index (CPI) increases in school fees. Increases in school fees have been above CPI for over ten years (see Figure 4). Although fee increases across the sector have moderated to around 3-4% in the past couple of years, CPI continues to be around 2%.

Coupled with the low level of wages growth currently being experienced in the Australian economy, many parents will be under increasing pressure to meet school fee commitments. As illustrated in Figure 5, the Wage Price Index is at its lowest point for the past twenty years.

School boards should be asking the question as to whether fee increases above the rate of CPI coupled with low wages growth are sustainable for their school into the future.

A key to these considerations for boards is knowing the characteristics of the school's parent body. Most schools undertake on a regular basis detailed demographic studies of their catchment areas. Boards might consider whether such studies should be extended to the economic circumstances of parents.

Whilst many factors are involved in the number of enrolments at each independent school, the projections on continued economic growth are a positive for the sector. There are however significant risks associated with fee increases and the pressures on parents in terms of the costs of living.

Although governments have continued to increase expenditure on schooling, including through increased funding for independent schools, it is likely that most independent schools will need to rely on increased parental contributions into the future to sustain the high-quality education provision and associated facilities that parents rightly expect.

Figure 4: Consumer Price Index Versus School Fees
Annual Percentage Change (March Quarter)

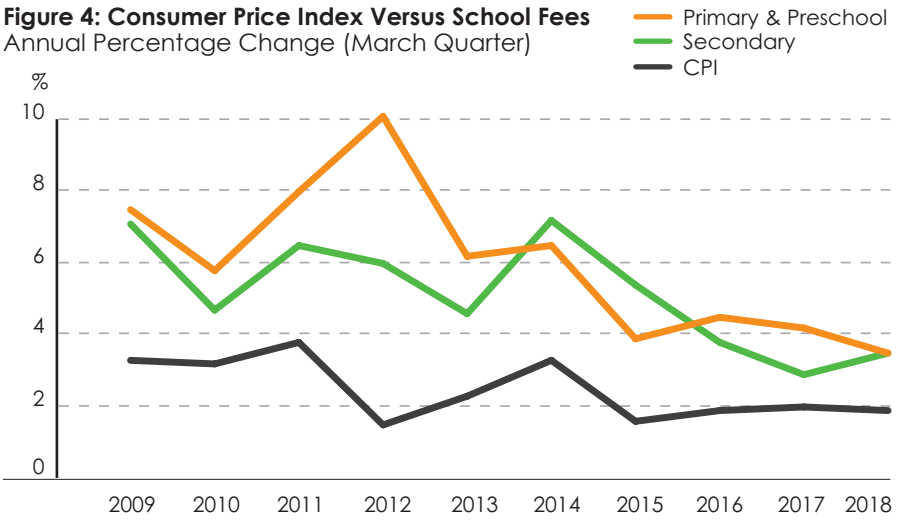
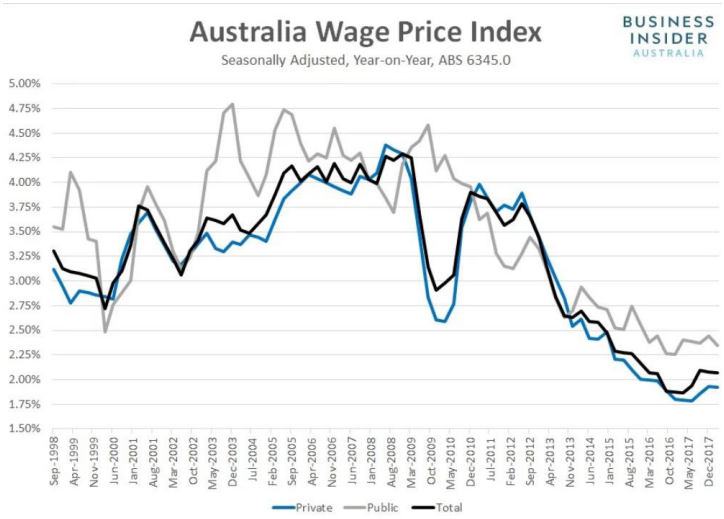


Figure 5: Low Wages Growth[4]



In this regard, it is time to refocus the narrative about independent schooling from one of the cost to parents to that of it being a highly valued investment in a child's future. The continued focus of the independent sector on achieving high academic standards and providing a valued well-rounded education positions the sector confidently. It assures parents and the community that expenditure from after-tax income on school fees is not just an economic cost to families but a valued and worthwhile investment in their children's education, which is recognised as providing the foundation for a successful and prosperous future.

DAVID ROBERTSON
Executive Director

4 Available at https://www.businessinsider.com.au/australia-wage-price-index-pay-growth-inflation-interest-rates-rba-2018-5

ACCOMMODATING THE LEARNING LIMIT OF STUDENTS

MARK NEWHAM
Director (School Performance & Improvement)

Dylan Wiliam has described Cognitive Load Theory as "the single most important thing for teachers to know".

(Wiliam, as cited in CESE, 2017)

The Centre for Education Statistics and Evaluation (CESE) last year published a paper on Cognitive Load Theory (CLT) and the issues raised in it will be discussed in this briefing paper. This is timely given the increasing focus on evidence-based pedagogy through the National Professional Standards for Teachers and the recommendations from the *Review to Achieve Educational Excellence in Australian Schools* (Gonski 2.0). Specific strategies that teachers can use that take CLT into account will also be explored.

CLT rests on two ideas. Firstly, that there is "a limit to how much new information the human brain can process at one time. The second is that there are no known limits to how much stored information can be processed at one time. The aim of cognitive load research is therefore to develop instructional techniques and recommendations that fit within the characteristics of working memory, in order to maximise learning" (CESE, 2017, p. 2).

As an example, an important factor that contributes to someone's cognitive load is the number of elements that are involved. So, if trying to memorise a list of eight things such as: house, dog, cheese, essay, painting, holiday, desk, football; most people will have reached the limits of their working memory.

If more items are added such as: plant, floor, computer, window, bin, kitchen, shoe, plate; then our processing is unable to handle the load. It is at this point that, if we are to recall the elements, we need to develop or use techniques to draw from our stored memory. This has obvious implications for teaching if we want students to move their learning into their long-term memory or stored memory.

Theoretical background

As the CESE paper outlines, Cognitive Load Theory developed from the work of John Sweller and colleagues in the 1980s and 1990s and is based on several widely accepted theories about how human brains process and store information. These assumptions

While individuals might vary in their capacity, there is research that suggests that an average person can only hold about four chunks of information in their working memory at one time (Cowan, as cited in CESE, 2017).

include: "that human memory can be divided into working memory and long-term memory; that information is stored in the long-term memory in the form of schemas; and that processing new information results in 'cognitive load' on working memory which can affect learning outcomes" (CESE, 2017, p. 2).

Peterson & Peterson 1959, as cited in CESE, 2017, describe working memory as the memory system where small amounts of information are stored for a very short duration. It usually refers to what we are consciously thinking of. While individuals might vary in their capacity, there is research that suggests that an average person can only hold about four chunks of information in their working memory at one time (Cowan, as cited in CESE, 2017).

Long-term memory, on the other hand, can hold large or even unlimited amounts of information. It can be imagined as a filing cabinet that holds what we know. Some theorists contend that it is only when something has moved into long term memory that anything can be considered to have been learnt. Cognitive load theory assumes that knowledge is stored in long term memory in the form of 'schemas'. These schemas organise knowledge and become more and more complex as more knowledge is gained. An example might be that the idea of voting might be added to the concept of electorates and then those concepts would link to the concept of democracy and so on in an increasingly complex schema construction. This then allows automation to become possible. Automation is the process whereby information can be processed automatically with minimal conscious effort and limited use of working memory. This is important because, if working memory is overloaded, there is a greater risk that the content being taught will not be understood by the learner; will be misinterpreted or confused; will not be effectively encoded in long-term memory, and that learning will be slowed down (Martin, as cited in CESE, 2017).

Table 1: Types of cognitive load

Load type	Source	Effect on Learning	Example
INTRINSIC LOAD	The inherent complexity of the material and the prior knowledge of the learner	Necessary to learning (but potentially harmful if too high, because it can cause cognitive overload)	Learning how to solve the mathematical equation *a / b = c, solve for a* Learning this equation might have a high intrinsic load for a novice maths student, but would have a low intrinsic load for an expert mathematician
EXTRANEOUS LOAD	Poorly designed instruction that does not facilitate schema construction and automation	Harmful because it does not contribute to learning	The student is required to figure out how to solve the equation themselves, with minimal guidance from the teacher This imposes a high cognitive load, but does little to encourage schema construction because the student's attention is focused on *solving* the problem rather than on *learning* the technique
GERMANE LOAD	Well-designed instruction that directly facilitates schema construction and automation	Helpful because it directly contributes to learning	The student is explicitly taught how to solve the problem and given lots of worked examples demonstrating how to do it This imposes a lower cognitive load on the student, enabling them to learn and remember *how* to solve the problem when faced with it again

Adapted from Centre for Education Statistics and Evaluation (2017, p. 3)

Types

Cognitive load theory identifies three different types of cognitive load: intrinsic, extraneous and germane, and they are generally assumed to be additive. That means the load from each type is added to determine the total cognitive load. Cognitive overload then occurs when the total cognitive load exceeds the working memory capacity of the learner (Gerjets, Scheiter & Cierniak, as cited in CESE, 2017).

Intrinsic

Intrinsic cognitive load refers to the difficulty of the subject matter that is being learnt. The CESE paper argues that the level of difficulty is a result of the complexity of the material and the prior knowledge of the learner. Therefore, a task that has a high intrinsic load for someone inexperienced with the subject matter might have a much lower intrinsic load for an expert.

Extraneous

Extraneous cognitive load relates to the way the subject matter is taught. With this type of load, if instruction is provided that does not lead to schema construction and automation, it is considered extraneous – it creates a high cognitive load with little benefit.

ACCOMMODATING THE LEARNING LIMIT OF STUDENTS CONTINUED

Germane

Germane cognitive load refers to the load imposed on the working memory by the process of learning – that is, the process of transferring information into the long-term memory through schema construction. This is aided by effective instructional techniques (CESE, p. 4).

As stated above, if the different types of load are additive, the need to decrease extraneous load while increasing germane load to stay within the limits of working memory is essential.

Questions around cognitive load research

The paper argues that, in the main, researchers accept that the capacity of working memory is limited, and that learning is most effective when it is designed to accommodate these limitations. There are, however, questions raised about some aspects of the theory. Predominately those questions are concerned with how to measure cognitive load and how to distinguish between the types of load. The importance of being able to distinguish between types of load is found in the arguments for what CLT means for classroom instruction. If the types can't be easily distinguished then how to manage them could become problematic for the teacher (CESE, 2017, p. 5).

Classroom practices

There are several instructional techniques based on CLT that are directly transferable to the classroom.

Worked example effect

A worked example is a step-by-step demonstration of solving a problem so that a learner is guided throughout the entire process. Taking a complex maths question, for example, and breaking it down into its constituent parts reduces the intrinsic load on the learner and increases the likelihood the learner will transfer the information into their long-term memory. Further, by transferring the information into a schema they will be able to retrieve the information and, if done frequently enough, automation will occur. Over time, the need for worked examples will not be as great once the learner is no longer a novice. Indeed, only using worked examples could become inefficient once a learner is no longer a novice, as there might be insufficient intrinsic load that is necessary for learning.

The split attention effect

The split attention effect occurs when a learner is required to focus on more than one source of information at a time. For example, a worked example might include a diagram where the formula or text might be placed elsewhere. This requires the learner to have to hold the two bits of information in their working memory while trying to process them. This would be an example of extraneous load and could be reduced by removing any competing stimulus or combining the information into one diagram (see Figure 1).

The 'modality effect'

The 'modality effect' is related to the split attention effect, but offers an alternative technique to physically integrating separate sources of information to reduce cognitive load. It is possible to decrease extraneous load on working memory by using more than one mode of communication – both visual and auditory (CESE, 2017).

For example, if a student is watching an animation and the text is concurrently on the bottom of the screen, the student can't simultaneously view the animation and read the text. Trying to do both places too heavy a cognitive load on the student's working memory. A solution to this problem would be to present the text in spoken form, as narration. By splitting the processing into two channels, visual and auditory, the learner can reduce the cognitive load (Mayer and Mareno, 2003).

Table 2 (page 8) provides more strategies for load reduction.

If teachers place too heavy a cognitive load on the working memories of their students then this will prevent students from transferring what we are learning into their long-term memory.

Conclusion

If teachers place too heavy a cognitive load on the working memories of their students then this will prevent students from transferring what we are learning into their long-term memory. If, however, teachers incorporate techniques such as worked examples, and attention is given to avoiding redundancy effects and split attention effects when presenting information, then students will be better able to access the schemas that allow them to make sense of what they are learning.

References

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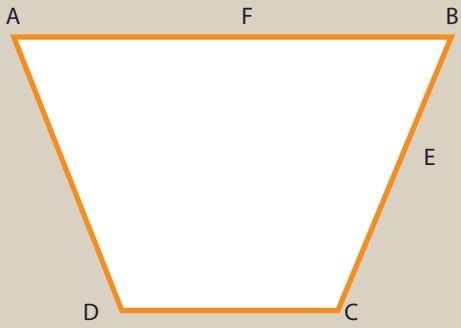
Figure 1: The Split Attention Effect

SPLIT ATTENTION IN A GEOMETRY WORKED EXAMPLE

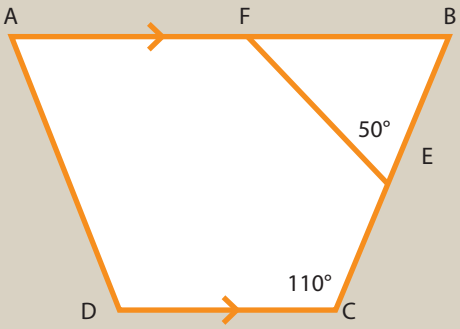


Task: In the above diagram find the value of angle BFE when line AB is parallel to line DC
Angle BCD = 110°
Angle BEF = 50°

Solution:
Angle FBE = 180 - 110 = 70° (Co-interior angles between parallel lines sum to 180°)
Angle BFE = 180 - 50 - 70 (Angles in a triangle sum to 180°)
= 60°

INTEGRATED WORKED EXAMPLE OF A GEOMETRY PROBLEM

2. Angle BFE = 180 - 50 - 70 = 60°
(Angles in a triangle sum to 180)



1. Angle FBE = 180 - 110 = 70°
(Co-interior angles between parallel lines sum to 180°)

Adapted from Ayres and Sweller (2014).

ACCOMMODATING THE LEARNING LIMIT OF STUDENTS CONTINUED

Table 2: Load-Reduction Methods for Five Overload Scenarios in Multimedia Instruction

Overload Scenario Type	Load-Reducing Method	Description of Research Effect	Effect Size
Type 1: Essential processing in visual channel > cognitive capacity of visual channel			
Visual channel is overloaded by essential processing demands.	Off-loading: Move some essential processing from visual channel to auditory channel.	Modality effect: Better transfer when words are presented as narration rather than as on-screen text.	1.17 (6)
Type 2: Essential processing (in both channels) > cognitive capacity			
Both channels are overloaded by essential processing demands.	Segmenting: Allow time between successive bite-size segments.	Segmentation effect: Better transfer when lesson is presented in learner-controlled segments rather than as continuous unit.	1.36 (1)
	Pretraining: Provide pretraining in names and characteristics of components.	Pretraining effect: Better transfer when students know names and behaviors of system components.	1.00 (3)
Type 3: Essential processing + incidental processing (caused by extraneous material) > cognitive capacity			
One or both channels overloaded by essential and incidental processing (attributable to extraneous material).	Weeding: Eliminate interesting but extraneous material to reduce processing of extraneous material.	Coherence effect: Better transfer when extraneous material is excluded.	0.90 (5)
	Signaling: Provide cues for how to process the material to reduce processing of extraneous material.	Signaling effect: Better transfer when signals are included.	0.74 (1)
Type 4: Essential processing + incidental processing (caused by confusing presentation) > cognitive capacity			
One or both channels overloaded by essential and incidental processing (attributable to confusing presentation of essential material).	Aligning: Place printed words near corresponding parts of graphics to reduce need for visual scanning.	Spatial contiguity effect: Better transfer when printed words are placed near corresponding parts of graphics.	0.48 (1)
	Eliminating redundancy: Avoid presenting identical streams of printed and spoken words.	Redundancy effect: Better transfer when words are presented as narration rather narration and on-screen text.	0.69 (3)
Type 5: Essential processing + representational holding > cognitive capacity			
One or both channels overloaded by essential processing and representational holding.	Synchronizing: Present narration and corresponding animation simultaneously to minimize need to hold representations in memory.	Temporal contiguity effect: Better transfer when corresponding animation and narration are presented simultaneously rather than successively.	1.30 (8)
	Individualizing: Make sure learners possess skill at holding mental representations.	Spatial ability effect: High spatial learners benefit more from well-designed instruction than do low spatial learners.	1.13 (2)

Numbers in parentheses indicate number of experiments on which effect size was based.
Adapted from Mayer and Moreno (2003)

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Independent Schools Queensland

Head Office
Level 1, 96 Warren Street, Spring Hill Q 4000
PO Box 957, Spring Hill Q 4004
P (07) 3228 1515 **E** office@isq.qld.edu.au

Professional Learning Centre
Level 5, 500 Queen Street, Brisbane Q 4000
P (07) 3228 1507 **E** events@isq.qld.edu.au

www.isq.qld.edu.au