Learning studio pilot review
This publication has been produced as a reference document for those involved in providing new or remodelled facilities on school sites.
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Background

In 2008, the Ministry of Education (Ministry) invited schools entitled to replacement or additional classrooms to participate in a pilot project to develop a ‘learning hub of the future’ – the Learning Studio Pilot.

The project scoped was to develop a group of flexible spaces that would enable teachers to teach and students to learn, in a variety of ways. The openness and flexibility created by operable walls and significant internal glazing, would allow a variety of teaching and learning styles, furniture arrangements and locations from which to teach and learn.

Students would be able to work individually, in small groups, as a whole class or in bigger groups.

The concept is modelled on the published work of Prakash Nair and Randall Fielding “The Language of School Design – Design Patterns for the 21st Century” and Dr Kenn Fisher “Linking Pedagogy and Space.”

The budgets for the projects reflected the design concept and the high quality required of the internal environment.

Criteria for participation included

• Schools will be free to design their own site specific solution that blends with their buildings but must meet the concepts and detail of the specification.

• Plans and specifications are to be reviewed by a Ministry appointed consultant to ensure the design meets the criteria in the specification.

“Schools will be free to design their own site specific solution that blends with their buildings”
The furniture and equipment budget will be as per the standard classroom rates but additional funding will be provided for furnishing the shared area and for sound enhancement systems if required. It is expected appropriate ergonomic furniture will be used and furniture that allows for a variety of room layouts ie not basic desks.

Underpinning the concept are the Ministry’s Modern Learning Environment criteria which seek to establish excellence in Interior Design, Function, Aesthetics, Acoustics, Lighting, Heating, Insulation, Ventilation and Indoor Air Quality.

Five schools were selected and Learning Suites were established in Te Puke, Napier, Wellington (2) and Christchurch. Each Suite comprises a number of learning studios grouped around a shared learning area. The various floor plans are illustrated in Appendix 1.

In 2012 (approximately 2 years after their completion) the Ministry conducted this ‘Post Occupancy Evaluation’ to obtain feedback from the principal stakeholders of the project and to evaluate the teaching and learning outcomes resulting from it.

The POE evaluates the concept, the construction process and the completed project in use, to identify the positive factors (so that they can be repeated), the negatives, (so that they are not replicated) and aspects worthy of further consideration in future projects.

Comments were obtained from Principals, Studio teaching staff and some Project Managers, BOT representatives and Architects (refer Appendix 2 for details). These are summarised below.

The results showed overwhelming support for the concept, but, as with anything new, there were some disappointments, some frustrations and some design details that could have been improved.
Positive outcomes

From BoT, principals and staff

Each of the developments had their individual challenges, but the two adjacent comments capture the very positive feedback that was encountered at all of the schools.

Parents

Parents respond very positively to the Studio environment which creates an atmosphere where they feel very comfortable.

ERO

ERO had a positive reaction after observing our team-teaching practices.

BoT

In most cases, felt the financial allocation was ‘fair’ and if the specific design was to be repeated, considerable savings should be achieved in consultant fees (refer below where one school felt disadvantaged when extensive sub-floor expenses eroded the available budget).

Principals and teachers

- Learning benefits that accrue from the concept are very difficult to assess, but the range of spaces offer opportunities that support enhanced education outcomes.

- Our school had been losing 52% of Yr 7 students to private schools and other providers, but after the Suite was completed, this was reduced to approx 2%. Now we are turning away prospective enrolments.

- The shared learning area is used and enjoyed by students from other parts of the school, because we keep it free of ‘class specific’ items.

So pleasing to see staff so positive about the teaching environment —

Overall, the Learning Suite concept provides a very good model for the future
The Studio concept

- encourages team teaching, allowing teachers to develop their skills in this technique
- requires negotiation over activities, use of spaces etc
- works well with the numbers of teachers involved
- operates with fewer resources (items are readily shared and each class doesn’t need ‘a set’).

The size of the shared Learning area

- is good for the number of students using it.

The size of the learning studios

- is good for junior classes where most activity takes place at group tables
- is just adequate for students with individual desks (refer Problems Encountered In Use below, for comments relating to the 1:15 and 1:18 spaces and to future developments in communities where students are physically bigger).

Teachers

- love coming to work in the Studio, its warmth, colour, comfort
- still learning ‘to use’ it and get the best from the room configurations
- enjoy not feeling isolated (as in cellular rooms)
- have ‘cover’ (if they need to leave the Studio) and immediate support in an emergency
- feel its social functioning is very flexible and ‘awesome’
- plan their lessons and use of the block, collaboratively
- each have individual strengths which can be readily shared

“Love coming to work in the Studio, its warmth, colour, comfort.”
Learning Studio Pilot Review – Positive outcomes

- gain professional development (techniques / ways of doing things) from observing and interacting with their peers (particularly helpful for beginning teachers)
- become more accomplished / confident managing larger groups
- each get to know and interact with all the students, allowing more comprehensive achievement assessment.

The Studio design has

- varying amounts of interior glazing, but in those where it is extensive (from interior windows, sliding and folding doors) the interior spaces have excellent visibility allowing good supervision
- high stud and the resulting room volume creates an excellent environment (although this has heating implications).

All spaces are warm in winter and cool in summer

- Where underfloor heating is provided, its warmth is especially enjoyed by pupils sitting on the floor.

Acoustics are excellent

- Can leave inter-connecting doors open and not be distracted by noise from adjacent activities.
- No need to raise your voice to be effectively heard (teacher and pupils alike).
- They are so good that I can hear the noise from the fan on the fresh-air delivery system.

(PS) Mechanical fresh-air delivery system

- works so well that the windows never need to be opened
- heat is recovered from exhaust air and is used to heat incoming air.

(PS) Wireless IT creates excellent flexibility for connectivity

Water bottles

- (PS) aren’t encouraged so drinking fountains (with good splash-backs) are provided inside all 3 learning studios
- (PS) students fill them from an outdoor drinking fountain (with water bottle outlet) and because bottles have sufficient capacity (for junior pupils) there is no need to re-fill during class time

No need to raise your voice to be effectively heard (teacher and pupils alike)
• (PS) Chilled drinking water units are provided in the shared learning area and are so popular the whole school uses them.

(PC) Where a separate Teacher Workroom is provided, it is enjoyed because
• administrative activities can be kept away from the learning studios
• there is desk space and storage for each teacher
• personal items can be secured.

Students
• have a significant ‘buy-in’ to the aura of the Suite, love and respect the environment
• (PS) have established a ‘restorative’ process which is a powerful tool managing behaviour and dynamics within the Suite. Behavioural issues have diminished significantly and are noticeably better
• (PS) operate an active ‘buddy’ system where Yr 7 / 8s assist Juniors with certain tasks and get an opportunity to enjoy the Suite’s features
• have different personalities / traits, and having more than one teacher ensures that their needs and behaviours are more adequately catered for and managed
• benefit from being exposed to the different skills of the individual teachers
• get to know their peers and teachers better, as a result of the regular interaction
• are not distracted by activities taking place in adjacent spaces (which can be seen easily with the extensive use of glass)
• (PS) clean the Studio and payment is credited to them. They co-operatively plan the items they purchase with the funds they raise (BBQ etc)
• (PS) appreciate the full length mirror (fitted in toilets) which encourages pride in appearance.

The Cleaner is appreciative of lights on sensors (when working at night)
Problems encountered during project design phase

Most of the comments recorded below are ‘project specific’ (PS)

General

[PS] BoT followed MoE guidelines to appoint a Project Manager but had no detailed knowledge of what was expected of the PM. Led to confusion over roles

[PS] Where the same firm was both PM and Architect, the school felt disadvantaged by the absence of independent advocacy

- Unsure about how much they could influence design (had difficulty getting aspects of sketch plans modified: design was ‘not negotiable’).
- Architect did not have in-depth knowledge of teaching requirements.
- Considered that some design features incurred unnecessary expense.
- Tender was below budget but restoration of the grounds surrounding the Suite and providing essential drainage had not been included in the Contract.
- Ongoing concern about the height of the floor in relation to the rest of the site (which is prone to flooding).
- Had appointed a Landscape designer but the Architect did not engage with them.

Policy issues

[PS] School was advised that if they didn’t meet the Design Brief (in a way that could be replicated) the project would not proceed

The Suite was only approved after excess numbers of pupils were already on-site, so anything that delayed completion was very frustrating (refer Peer Review of Compliance with the Brief below)

[PS] School was entitled to a 1:15 space (smaller size) and this had to be included in the project. Yr 7 / 8 students occupy the other learning areas (good experience for their final primary school years)
but school has to use the 1:15 space for New Entrants (not an ideal age mix) because the space is too small for any group needing individual desks

[PS] Not sufficient funding to place Suite in the ideal location (2 existing rooms needed to be repositioned). This has resulted in a development where
- the Suite is isolated from the rest of the school
- sewerage needs to be pumped (2 pumps provided for safety), with ongoing associated costs.

[PS] Site was sloping and with subterranean water issues. The costs associated with the additional foundations and waterproofing, reduced the available budget and required significant design compromises (and 2 Peer Reviews)

[PS] The Suite replaced some existing classrooms so there was no Furniture and Equipment grant. Getting the most flexible use of the shared Learning area demands that its main furniture items are on castors. The school has not had the resources to provide appropriate furniture

Some features (mentioned in the Brief and consequently incorporated) have not proven to be the most cost effective (ie underfloor heating, costly to run and slow to respond)

[PS] An Enviroschool (has achieved Green-Gold status) consulted widely with pupils to see what they felt the new Suite should reflect
- wanted it to be a 2nd home with kitchen, decks etc
- wanted the environmental theme to be incorporated in the design (water collection for irrigation, solar panels, environmental science facilities etc).

School
- commissioned architects to prepare sketch plans on this basis but these were rejected by MoE
- felt that they wasted approx $20k in fees associated with the rejected design and Peer Reviews.
Planning aspects

Brief made no separate space provision for storage of Coats/Bags. These were to be accommodated within cupboards or on interior walls. Insistence that the Brief be adhered-to, has led to poor solutions

- inadequate space provision for the number and type of items (additional mobile storage units required in some cases, taking up valuable floor space)
- congestion during peak use
- located on opposite side of rooms from entry doors (carpet implications particularly during inclement weather)
- located over data and socket outlets
- space consuming on valuable display surfaces
- wet apparel, lunch odours etc, unpleasant in the rooms
- (PS) where provision was made on the building exterior (under wide eave)
  - items at the ends are subject to rain wetting
  - sun overheats lunches (have to be stored elsewhere).

Peer review of compliance with the brief

All schools felt

- time and funding was wasted providing the information and analysis of options for Peer Review (in one case, project took 2 years from approval until completion – excessive and unnecessary)
- fees associated with this process were expensive and this money could have been better spent on Capital items.

(PS) The initial design was Peer Reviewed before an Estimate of Cost was prepared

- budget was exceeded and design needed to be amended by simplifying the roof and altering the cladding (natural light, cross-ventilation, appearance compatibility were all compromised)
- new design required another Review
- school had not been forewarned that fees for the Reviews would be a cost against the project.
Asphalt contractor withdrew from the contract after the Christchurch earthquake because there were more financially rewarding and urgent issues elsewhere.

Observations expressed on the construction process

**Associated with specific projects**

- (PS) Project’s Foreman was ‘contracted’ by the construction company for only this project and had commitments on other sites, reducing his effectiveness.
- (PS) No adequate instruction at handover, on the use of the building’s special features and systems.
- (PS) Asphalt contractor withdrew from the contract after the Christchurch E/Q because there were more financially rewarding and urgent issues elsewhere.
Problems encountered in use

Problems common to all suites

Size of spaces
• Where learning studios are occupied by students with conventional, individual desks, there is insufficient space to allow a variety of layouts (as required by the Brief).

Coats and bags
• Inadequate consideration within the Brief, of the requirements for Coat / Bag / Shoe storage (refer Planning Aspects above).

Storage of resources
Inadequate consideration within the Brief, has resulted in
• cluttered interiors (particularly for junior classes)
• spaces that had been provided for other activities (cave, withdrawal) have become storage areas or occupied by the Teacher’s desk.

Where storage has been provided
• locations are limited by the extensive glazing
• wall shelving often obscures switches, sensors, electrical outlets
• mobile units take up valuable floor space and often block features such as doors to the exterior
• shelves not adjustable, wasting space.

Ability to conveniently secure (particularly after-hours) and charge laptops

Teacher’s workstation / personal effects storage
Inadequate consideration when establishing learning studio furniture layout at sketch plan stage
• sketch plans had teacher’s desk located in a cupboard
• have been located in areas designed for other activities (often in the ‘cave’) because there are few options within each learning studio
• needs to be considered in relation to location of Interactive Whiteboards.

Outdoor learning areas
Not designed in a way that will maximise opportunities for use
• protection from sun, rain and prevailing wind
• need sufficient seating to accommodate all students from the adjacent learning area (class activities and at lunchtime).

**Floor surface for wet activities**
• The amount of vinyl flooring in the shared learning area is inadequate for some activities (art, food-based etc).

**Problems encountered in some suites**

**Size of spaces**
Where 1:15 and 1:18 spaces were provided, they are adequate for junior classes (group tables) but are too small for senior classes requiring individual desks
• a 1:15 space was included in the allocation, but it is too small for all but New Entrants. The remaining learning areas are occupied by Yr 7/8 students, but mixing them with New Entrants is not ideal
  – socially
  – sharing toilet facilities

*The location of the Suite means that New Entrants are isolated from the rest of the school, its entry, Administration etc.*

**Wall surfaces**
Pinboard provides a more durable wall surface than paint
• design criteria recommended 2 walls only in each learning studio have acoustic pinboard surface. Where this has been adhered to, teachers have adopted other (often un-sightly) methods to display over painted surfaces (ie taut wires)
• in those Studios where all walls have pinboard fitted, there is no appreciable deterioration in the acoustic qualities of the space
• painted walls and exposed corners are already showing wear, particularly those adjacent to high-use areas ie bag storage units.

**Joinery units**
• Critical joinery units (ie with sinks for filling water bottles) have been constructed at adult height and are too high for easy access by junior students.

**Outdoor learning area**
Where a school went beyond the Brief and fitted expensive, electrically operated retractable awnings over their outdoor learning areas
• sensors automatically retract the units when wind speed approaches their design limit
• awning doesn’t adequately protect the seating below it.
Coat / bag units are exposed to the sun and lunches became too hot

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**Doors**

- Junior students have difficulty with heavy doors, closers, small ‘snib-type’ levers on locks (ie on exterior doors).
- Sound leakage occurs where doors are not fitted with acoustic-seals.
- Where Fire Design requires interior doors to be Smoke-stop, latches to hold them open and acoustic seals, are not permitted.
- Key locks on exterior doors are difficult to access when fitted behind long pull handles.
- An exterior hinged door opens back over an adjacent opening window.

**Toilets**

- Sound-proof construction of toilets (accessed from the exterior), prevented a junior pupil being heard (for an extended period) when they became locked inside (unable to release the door ‘snib’).
- The Dyson Airblade electric hand-driers fitted in the toilets are not used by junior students because the noise frightens them.
- The push-button time-control taps initially fitted, required too much pressure for younger students to be able to operate them.
- Absence of a urinal in Boys toilets has resulted in ‘mess’ problems around the pans.
- Gaps under the toilet doors allowed pupils to lock the doors from the inside and crawl out.

**Coat / bag units**

Where located outside (under wide eave)

- *they are exposed to the sun and lunches became too hot (Lunches now stored in the IT cupboard and kept cool by its Heat pump)*
- *those at the ends get wet.*

**Ceilings**

- Longrun interlocking perforated metal ceiling does not permit easy access after installing (for cabling or other adjustments).

**Sewer pumps**

- The location of one Suite required sewerage to be pumped.
Pumps are subject to regular and ongoing maintenance issues.
**Underfloor heating**

- Inadequate consideration at the planning stage resulted in the heating reticulation being too close to the surface of the concrete and prevented fittings for folding interior glazed doors being adequately recessed.
- This heating type is slow to respond so tends to be left on for extended periods and school felt it is expensive to run (even though main energy source is a heat pump).

**Stacking / folding interior doors and operable walls**

- Some are awkward to position into wall pockets
- Awkward to lock into floor sockets
- Not designed to be acoustically isolating (no seals at the head, sill, styles)
- Not double glazed because of weight limitations of the supporting track
- Constantly needing adjustment by the installers.

**CO₂ sensors**

- Staff unsure of their reliability (gave unusual readings at times).
- Some had no audible signal (when acceptable limit was reached) and CO₂ levels were indicated by digital display with difficult-to-see coloured lights.
- In places, were obscured by wall shelving.

**Electrical outlet positions**

- Outlets located in the middle of wall panels were difficult to access when shelving units were fitted over them.

**Windows**

Problems created when

- Awning-type projects at head height when open
- Shaft and lever opening gear is fitted to open the windows, making it difficult to fit sun-control or blackout curtains
- High level electrically operated windows are located in positions where they can easily be seen so it is difficult to check whether they are open/closed
- High level windows allow glare to reflect on whiteboards.

**Lighting**

- Lighting on motion sensors is good but more than one sensor should be provided in bigger areas to detect movement when there are only a few occupants.
- Motion sensors in areas like toilets, should be over-ridden by a daylight cell to prevent fittings operating when there is adequate natural light.

**Skylights**

- Having to manually open skylights with a rod is awkward. Electric operation encourages use, provides more options and easier control.
Consultants’ comments

Architects and Project Managers provided a range of reflective comments on the process, the projects and specific features. Project Specific comments are again prefixed (PS)

Concept

- Undertaking pilot schemes to explore new ideas of linking pedagogy and space is important where laptops, tablets, smart boards, data projectors, small group learning, and spaces for individual work, are all part of the mix

- Learning Suites
  - allow a flexibility not available in a standard Classroom/Corridor model
  - improve the ratio of teaching area / m² of gross floor area through the absence of dedicated circulation space
  - create enriched, dynamic and interesting ways of teaching and learning
  - are a leap forward from the single cell prefabs.

Process

(PS) The relationship with the Ministry was not always satisfactory
- did not receive clear financial guidelines at critical points of the project,
- quicker response times needed during the approvals period (but with a new concept there were bound to be delays)
- A number of design decisions were overridden and features deleted
  - sheltered entry on a site exposed to the worst of weather
  - sustainable, integrated heating and ventilation solution.
Learning suites are a leap forward from the single cell prefabs

Budget

- Incorporating all of the learning studio design features was a challenge due to the funding constraints.
- Placement of the building was complicated and difficult. The preferred siting option was a better solution but required the repositioning of other classroom buildings and could not be afforded within the budget.
- Many compromises were made with both materials and the design, to compensate for the shortfalls in the budget.
- All sites are different and need a procedure to deal with the cost implications that arise from this. We had a sloping site, strong southerly winds and underground water issues.
- To demonstrate by quantitative method, (calculation by Services Engineer) that DQLS standards will be achieved, incurs considerable cost. The budget doesn’t anticipate these costs.
- Surprised to find that Peer Review fees came from the budget with no prior warning or control over the cost.

Design fees

- It was a financial loss. Fees were not adjusted for
  - changes to the scope of works
  - extensive reporting and multiple submissions required for Peer Review
  - reworking designs following Reviews, to stay within the budget.

Peer Review

- More work demanded than was warranted – hours spent justifying ‘every nut and bolt’
- Would prefer to have direct access to reviewers (meet face to face, not engage by phone / email)
  - provide clarity more quickly for all parties
  - resolve differences in interpretation
  - speed up design decisions and the Review processes.
The Design Guide

Was very useful but gave the impression that ‘more’ could be provided. In reality, many of the suggested enhancements would not fit within the budget (photos of large scale buildings and extensive landscaping should be replaced with more modest photos of what can actually be achieved).

Greenstar

- Attempting to comply with this part of the Brief was protracted and delayed the project.
- Not a good fit between the Greenstar expectations and the funding available. Greenstar is weighted to favour use of automated mechanical services.
- Designing sustainably is important, but spending money on expensive materials or systems just to achieve points, makes little sense.
- More emphasis should be given to creating an effective learning environment rather than achieving Greenstar ratings (use as a guide, rather than a measure).
- To stay within the budget, items that would have greatly improved the sustainability of the design and provided a better level of amenity, had to be deleted or downgraded
  - grey water recycling
  - thermal breaks to aluminium windows
  - mechanical services.

Acoustics

- Achieving the required sound rating between spaces whilst providing the visual and spatial links is difficult.
• (PS) The particular type of operable, stacker walls/doors chosen, were the only top hung glazed type available (no trip-hazard bottom track)
  – functionality is appreciated by the school but frustration with the operation and securing of the panels
  – cost $100k (makes the Design Brief budget allocation woefully inadequate).

Heating and ventilating
• (PS) The heating / ventilation performance requirements in the Brief were very specific and a Services Engineer had to be engaged. A complex, expensive, underfloor heating and heat recovery ventilation system was the result.

Glazing
• The shading coefficient and glazing performance required to meet the Brief, meant there were very few products available that met the criteria. Expensive and questionable as to whether it was warranted – verandahs and eaves achieve the same solar/glare control whilst allowing indoor/outdoor expansion of teaching spaces and providing weather protection to the facade and doors.

Information technology
• (PS) The desire (by the school, over and above the Brief) to have the Suite function interactively throughout, for data, multimedia and sound, has proven disappointing. A specialist designed the system, but an electrician interpreted the design and installed it. Mis-interpretation, limitations on cable length / data signal strength etc meant the installed solution is not as diversely flexible as intended. An alternative solution was unaffordable.
**Design team**

- We would repeat our work practice of engaging with all the stakeholders at an early stage (School, BOT, Ministry, QS, Engineers and Contractors (via GETS for an ROI).
- Meeting the requirements of the Brief demanded that we engage a multidisciplinary engineering practice. The proposal from our preferred consultants (invited for their skill, expertise and previous successful relationship) was rejected due to cost and budget limitations. Ended up with an alternative company who initially fitted our budget, but ultimately cost us more as a result of claims for changes to the scope of work.
- If the Brief wasn’t so demanding, would select a different team without the engineering encumbrances (overheads, high cost, delays in delivery etc), or maybe would have stuck with our initial choice, who had always performed well in the past.
- We would like to design another Suite – learnt a lot from this one, and although it is good, we could improve further in subsequent designs.

**The finished project**

- Some aspects haven’t been utilised as intended (Teacher’s work station occupying the cave space).
- The cave space was not as successful as I think the original concept envisaged. We were required to share 1 between 2 teaching spaces, which made them more open than ideal, and they were in my view a bit small, and would have been improved with more built in joinery – eg window seats and shelving. Again, a compromise made to reduce cost.
- The finished building provides a modern, flexible and healthy environment with good access to outdoor areas.

We would like to design another Suite – learnt a lot from this one
Executive Summary

This Report has been prepared by Davis Langdon to provide a high level review of five previously constructed Learning Suites to determine whether they provide an efficient and value for money solution to the Modern Learning Environment.

As detailed in the report, various analyses were undertaken based on information provided to us for the five Learning Suites. These included a review and comparison of the learning suite building materials, quantification of the main suite areas and components, a review of the project tender or budget values and a measure of each learning suites efficiency with respect to the ratio of learning / teaching space compared to the overall suite area.

It has been concluded that, based on the reviews undertaken that the Freeville School in Christchurch provides the most economical solution, i.e. for the amount paid for the Suite, it provides the highest learning efficiency and therefore the best value for money solution out of the 5 Learning Suites analysed. It should be noted that our reviews do not consider or make comment on the functionality or overall design of the Learning Suites.

1.0 Introduction

1.1 Report Background

Davis Langdon were commissioned by the Ministry of Education (MOE) to undertake a high level review to consider appropriate means in which to advise MOE on whether five previously constructed Learning Suites provide a Value for Money solution to the Modern Learning Environment.

The Learning Suites to be reviewed are:
1. Freeville School, Christchurch;
2. Kilbirnie School, Wellington;
3. Arthur Miller School, Napier;
4. Adventure School, Porirua;

It should be noted that this is considered as only a guide to assist the MOE with determining whether the Learning Suites provide a Value for Money solution and does not consider or make comment on the functionality or overall design of the Suites.

1.2 Methodology

DL met with Les Clapcott of Clapcott Consultancy Ltd in April to discuss the requirements of this review and the final deliverables. DL then determined the methods and processes required in order to assist the MOE with an analysis that enables the review and determination of which Learning Suite provides the most efficient and economical solution to assist with the commissioning and construction of future Learning Suites.
The processes developed and undertaken are as follows:

• **Analysis of Learning Suite Elements:**
  From the information provided for each of the Learning Suites, the various building elements and materials were analysed and listed in a table for comparison. From this a ‘Base Line’ for each building element was determined and where a particular Suite differed from what was the norm, a positive or negative ‘Base Line Adjustment’ was made in order to balance that particular element to help ensure the Suites were on a like for like basis for further analysis.

• **Analysis of Learning Suite Areas:**
  Each of the Learning Suites were analysed and measured to determine their Gross Floor Areas (GFA), the Nett Usable Areas split into the different usable spaces within the Suites, the roof area and the external wall and window areas. Ratios of the various component areas were produced to help determine the level of Efficiency of the Suites and comparisons could be made between the five different Suites.

• **Review of Learning Suite Costs:**
  From the information provided, where possible a review of the Learning Suite Contract Value and overall Project Value was assessed against the Suite GFA to determine a $/m2 rate for comparison to determine whether the 5 Learning Suites where constructed at a similar rate and to help determine whether they provided a efficient and cost effective solution.

• **Analysis of Learning Suite Efficiency:**
  The 5 Learning Suites are all of differing designs and therefore the layouts and splits between functionable areas vary between them. As these are learning facilities, understanding what the overall area attributed to learning or teaching, is important in determining how efficient the Suites are. The more efficient or higher ratio of learning space in comparison to the project cost will identify how economical the design and Learning Suite is.

• **Comment on Whole Life Costing and Current Construction Costs:**
  As part of the identification and comparison of the building elements and materials used consideration of their respective life cycle costs was undertaken to determine whether over the life of the Suites, there would be any significant differences in their performance and maintenance costs. A high level review of the current nominated construction costs against those of the 5 Learning Suites was also completed.

1.3 **Limitations of this Report**

The analysis and findings detailed in this report have been based on the limited information provided to us for each of the Learning Suites. This information comprises generally of floor & roof plans, external elevations, and tender summary. In some cases a more detailed costing document and specification has been provided enabling a more in depth review of the various Learning Suite components.
2.0 Learning Suite Analysis Process

As detailed in Section 1.2 – Methodology, various aspects of the 5 Learning Suites were reviewed to help ascertain whether they have provided the end user with a ‘Value For Money’ solution to the modern teaching environment.

An analysis of the Learning Suite building components/elements was undertaken and the findings listed in a table to allow for direct comparisons to be made. The purpose of this process was to identify and understand how the Suites had been constructed and to determine whether the Suites being compared were on a like for like basis in terms of their construction quality, buildability and performance. (Refer to Appendix A for the Analysis Document).

In addition to the analysis of the building components, the Gross Floor Area (GFA) and the Net Usable Areas were identified from the drawings provided. The Net Usable areas were split down into the learning studio/teaching area, shared space, ancillary/storage (including toilets & amenities) & basement/storage (where applicable). Roof areas were also measured and split down into their various functional elements, e.g. main roof, skylights, canopies etc. The external walls for each suite were quantified along with the external windows & doors.

As part of identifying the various areas of the Learning Suites as noted above, their respective ratios were also determined. This was done to enable a comparison across the 5 suites and to get an indication of the efficiency of the suites in terms of their percentage (%) of learning studio/shared space over the GFA and Net Usable area. Understanding these efficiency ratings would help to determine whether a particular suite, for its $/m2, was providing an efficient learning/teaching space and therefore a value for money solution to the Modern Learning Environment.

DL were provided with either a Tender Summary or Budget for each Learning Suite. This enabled the identification of the Construction Value (including Contingency), and to calculate the suite $/m2 based on the GFA and Net Usable areas determined earlier in the process. Undertaking this process provided an indication of how the 5 suites compared financially in relation to their size. In some instances the Overall Project Budget & Final Account values could be identified, which allowed further understanding of the associated Suite costs.

As a result of undertaking the various analysis steps explained above, a detailed review of the Learning Suite components and financial characteristics could be completed. It was identified that generally the 5 Suites were constructed in a similar fashion, using comparable materials and services/systems. As part of the methodology to help identify which Learning Suite provided the best solution, an exercise was carried out where a ‘Base Line’ (BL) for each building element was identified with it generally being the component(s) that reoccurred the most across the 5 Suites. In order to ensure a like for like comparison, as part of the analysis process, where differences to the BL were identified an ‘adjustment’ was made to that particular item to either increase or decrease the project costs and $/m2. The adjustments were based on our best assessment of that particular building element that differed. At the conclusion of this process, we were able to identify the adjusted project cost based on comparable building components and site conditions to further assist with identifying the most economical building.
3.0 Findings & Conclusion

Following the review and analysis of the 5 selected Learning Suites, it was determined that generally they were all designed and constructed following similar design criteria with respect to the materials and plant / services used. In isolated instances there were differences identified, for example, types of external cladding used, internal doors / operable walls, heating systems and fire protection.

The Construction $/m² all varied across the Learning Suites, three of them are comparable, Freeville School, Kilbirnie School & Arthur Miller School, whilst the remaining two, Adventure School & Pongakawa School sit in the upper range of the comparison. The Base Line adjustment process was undertaken to even out the Suites to provide a like for like comparison to help determine, based on their usable spaces, which Suite provided the end user with the most efficient and economical building. Upon completion of this adjustment process, it was identified that four of the five suites’ $/m² reduced whilst that of Adventure School increased.

Reviewing the various ratios, in particular that of the learning studios & shared spaces, provided an indication on what level of teaching efficiency the Suite was providing to the end user. Freeville School, Arthur Miller School and Pongakawa School provide the highest efficiency ratings in comparison to Kilbirnie School & Adventure School.

In order to determine which Learning Suite provided the best efficiency and ultimately economical solution, both the original NET $/m² and the adjusted $/m² were calculated against the efficiency ratio of the overall Learning & shared spaces. Although in both instances Arthur Miller School provided the lowest $/m² overall, when calculated against it’s net ratio, it didn’t provide the most economical solution. Freeville School with a learning studio & teaching space efficiency ratio of 94% when calculated against its $/m² provided the most economical solution, ie for the amount paid for the Suite, it provides the highest learning efficiency and therefore the best value for money solution out of the 5 Learning Suites analysed. This is on the basis of the Learning Suites being analysed in their original state and that of the Base Line adjustment.

When considering the life cycle costs of the Suites and their particular building materials and elements, as mentioned above, generally all five Suites were constructed in a similar way using comparable materials. There are subtle differences to cladding materials, electrical, heating and fire protection systems used, but these do not provide a significant change to the overall Suite design and one that would determine that one Learning Suite has a better life cycle cost comparison to the others.

A high level review of the Learning Suite construction costs was also undertaken and compared to those currently used by the MOE. The published 2011/2012 MOE Construction Rates have an average GFA $/m² for a new School building of $2,100/m². The lowest Learning Suite construction cost reviewed is $2,360/m², the highest being $3,280/m² with an average of $2,750/m². There is a notable difference between the rates and this triggers the following discussion points;

1. is the published MOE rates sufficient to cover the actual construction costs of a new school building. It is the view of DL that in the current market, these rates may prove to be insufficient enough to cover the likely costs of building a new teaching facility. And;

2. given the MOE rate, does the Learning Suite concept, at a higher $/m² rate, provide a value for money solution to the modern learning and teaching environment. This is a question that the MOE needs to review and conclude on in conjunction with a separate review of the overall design, functionality and usability of the Learning Suites.
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Prakash Nair & Randall Fielding

Linking Pedagogy and Space
Dr Kenn Fisher
Appendix 1: Floor plans

date drawn: 11/05/2012

ADVENTURE SCHOOL

date drawn: 11/05/2012

ARTHUR MILLER SCHOOL
Appendix 2: Project details

Arthur Miller School
Personnel interviewed
• Principal
• 3 Teaching Staff
Spaces provided
• 3 Studios + 2 @ 1:15
Students
• Number: 100 approx
• Age group: Yr 1–5
Consultants
• Project Manager: Judd Dougan Team Architecture
• Architects: Judd Dougan Team Architecture
  Paul Dougan: paul@jdta.co.nz

Kilbirnie School
Personnel interviewed
• Principal
• Deputy Principal
• 3 Teaching Staff
Spaces provided
• 3 Studios + 1:18
Students
• Number: 90 approx
• Age group: Yr 1/2
Consultants
• Project Manager: Monstra QS Consultants Ltd
  David Monastra:
mqsc@xtra.co.nz
• Architect: Don Jamieson Architecture
  Don Jamieson:
don@donjamieson.co.nz

Adventure School
Personnel interviewed
• Principal
• Project Manager
• 3 Teaching Staff
Spaces provided
• 3 Studios + 1:15
Students
• Number: 100 approx
• Age group: Yr 7 / 8
  New entrants
Consultants
• Project Manager: Dimensions
• Architects: Dimensions
  Michael Carter:
michael@dimensions.co.nz

Freeville School
Personnel interviewed
• Principal
• Deputy Principal
• 3 Teaching Staff
Spaces provided
• 4 Studios
Students
• Number: 88 approx
• Age group: Yr 7 / 8
  New entrants
Consultants
• Project Manager: Sinclair and Johnson
  John Sinclair:
  john@sincjohn.co.nz
• Architect: Ross McGuire Architects
  Ross McGuire:
  rossm@rmarchitects.co.nz

Pongakawa School
Personnel Interviewed
• Principal
• Chairperson BoT
• 3 Teaching Staff
Spaces provided
• 2 Studios + 1:15
Students
• Number: 85 approx
• Age group: Yr 7 / 8
Consultants
• Project Manager: Dimensions
• Architects: Dimensions
  Michael Carter:
michael@dimensions.co.nz
Appendix 3: Planning and technical brief, for future learning suite projects

An analysis of the ‘positive and negative’ features of the 5 Learning Suites suggests that the following notes be read in conjunction with the Learning Studio Design Guide.

Learning studio

- The pilot schools are Decile 4–10 with students of average build. Schools question whether the recommended size for the Studios will be adequate in communities where students are bigger.

- Provide a furniture layout for each space showing
  - the required number of desks / tables, (with allowance for the size of the student)
  - workstation for the Teacher
    - Provision to secure personal items, laptop etc (may be in Teacher Workroom if provided)
  - position of Whiteboard, Interactive Whiteboard/data projector
    - Plan where laptop (for use with data projectors / Interactive Whiteboards) is to be located
  - resource storage for classroom specific items
  - IT delivery and any desk requirements for computers, printers etc.

- Visibility
  - Glazed, open environment is encouraged.
  - Balance the need for
    - walls for display / acoustic purposes (polyester-backed fabric acoustic pinboard – extensive requirement in primary schools)
    - ability to observe activities taking place in adjacent spaces.

- Spatial features enjoyed by younger students
  - Low ceilings.
  - Changes in floor level.
  - Bay windows (height appropriate seating).

- Coats / Bags / Shoes
  - Adequate provision for every student’s coat, bag (and shoes if appropriate)
    - easily accessible at peak periods
    - if inside (odours from wet apparel, lunches etc)
      - adjacent to entry doors
      - durable wall surfaces
    - if outside
      - vandalism (after-hours)
      - security of personal items (during school hours)
      - protection from rain, sun (overheating food items).

Shared learning area

- Mix of carpet and homogenous flooring for wet area activities (and storage for associated resources)
  - drinking fountains/water bottle filling/sink
  - food-based activities/microwave/oven/hob.

- Mobile furniture to maximise flexible use of the space.

- Position of Whiteboard, Interactive Whiteboard/data projector
  - laptop location (for use with data projectors/interactive boards).

- Multi-media provision (wet lunch-time entertainment etc – refer Information Technology below).

- Access to toilets (if provided).

- Can function as a ‘stage’ for presentations to an outdoor audience (consider lighting and audio provisions) by considering the way it opens to the exterior.
Outdoor learning area

- Easily accessed and supervised from learning studios.
- Protection from wind, rain, direct sun.
- Sufficient seating for every student (class and lunch activities).
- May be possible to design in a way that allows it to function as an area for parents to wait when collecting pupils (as opposed to them entering the building).

Storage of resources

- Significant requirement particularly for junior classes.
- Centralised so that resources can be shared (reduces number of sets of items required).
- Shelving height adjustable.

Withdrawal area

- Glazed, open environment.
- Independent access will provide opportunities for its use by others in the school.

Teacher workroom

- Glazed, open environment.
- Workspace and personal storage for each teacher.
- Storage of specific resources.

Toilets

- Wall hung urinal for boys (electronic flushing control).
- Electric hand drying (at appropriate height – junior students may avoid ‘vigorous, noisy units’).
- Warm water only to basins (one tap).
- Push-button time-control taps (easy-to-operate type for junior students).

Information Technology

- Hardwired and wireless connectivity.
- Ensure patch panels have capacity to liven all data outlets.
- IT Store
  - secure storage of laptops (and PCs if on trolleys)
  - simultaneous charging of all stored laptops
  - network hardware location (patch panel etc)
  - heat pump temperature control.
- Consider linking all data projectors so that activities can take place in all areas simultaneously.
- Height adjustable Interactive Whiteboard (if different age groups likely to use the facilities).
- Avoid locating outlets in areas of walls where other fittings are likely to be positioned.

Audio visual

- Consider
  - audio messaging throughout all areas
  - presentations to an audience in any ‘stage’ area (refer shared learning area above)
  - AV provisions in shared learning area for special events / lunch activities on wet days etc (Video / Satellite-dish-connected TV).

Building envelope

Consider ‘whole of life’ costs when selecting materials

- Roofs
  - use pre-painted metal wherever possible
  - ensure construction does not allow rain noise to intrude into occupied areas.
- Cladding
  - select products with high impact resistance at Ground floor level.
Internal environment

• Walls
  Teaching spaces
  – impact / mark resistant surfaces below 2m
  – polyester-backed fabric acoustic pinboard
    o extensive requirement for primary schools
    o protect external corners from damage.
  Ablutions and Wet areas
  – products with prefinished surfaces.

• Ceilings
  – Acoustic systems that allow access
    (for cabling adjustments etc).

• Floors:
  – Water / soil removal at main entries.
  – Adequate sheet flooring for wet area
    activities (Art / food-based / sinks / drinking
    fountains) coved at perimeter.
  – Consider comfort (junior students) stain
    resistance, appearance retention (wool,
    polyester, polypropylene and needle-punch).
  – Consider the cost / benefits aspects of tiles
    versus broadloom.
  – Avoid painted or varnished skirtings
    (cove floor covering into aluminium
    J mould).

• Acoustics
  – Good acoustics require quiet equipment
    (ie mechanical ventilation).
  – Provide roof construction that inhibits
    rain noise.

• Furniture and joinery
  – Height appropriate for age group of students.
  – Maximising the flexible use of the shared
    learning area requires major furniture items
    to be on castors.

Doors

• Be conscious of
  – opening back over adjacent sashes
  – acoustic seals to key doors
  – good vision at appropriate height to users
  – hold open devices for important doors
    (Fire design may restrict options).

• Junior students have difficulty with
  – opening doors into prevailing wind
  – heavy timber doors
  – doors with closers
  – small ‘snibs’ fitted on door locks
  – adult height handles.

• Avoid
  – bi-folding interior doors with locking pins
    that can damage flooring if not properly
    retracted when being moved
  – key locks fitted behind long pull handles.

Operable walls

• Often expensive, heavy and awkward
  and may not be regularly used
  – a hinged leaf is useful for easier access
    when ‘wall’ is in place.

• Single glazed (hush-glass) 3 Panel Sliders
  between spaces
  – light, easy to operate, cost competitive
  – reasonably effective acoustically if fitted
    with seals.

Windows

• Avoid
  – Glare onto important surfaces
    (whiteboards etc).
  – Problem Solar gain.
  – Linking windows with shaft and lever
    gear that makes fitting curtains difficult.
  – Sashes that project at a height that could
    be hazardous.
  – Sashes that open behind doors.
  – Glass with surface coatings that require
    careful cleaning.

• Electric operators
  – Fit to high level sashes.
  – Ensure windows can be seen (so opening/
    closing can be monitored).

• Sliding sashes
  – Fit robust hardware (perhaps with a separate
    pull handle).

Skylights

• Electric controls for opening, operation
  of blinds.

• Rain sensors (if opening type).

Ventilation and
Temperature Control

Fresh Air

• CO₂ sensors
  – ideally linked to electrically operated
    window controls or, if not
  – Should be fitted with an audible signal
  – avoid locating on areas of walls where
    other fittings are likely to be positioned.
• If fresh air is delivered mechanically
  – consider systems that recover heat from exhaust air
  – good room acoustics mean that noise from mechanical systems needs to be minimised.

Heating
Consider the ‘whole-of-life’ cost implications when considering the heating type

• Heat pumps
  – will provide summer cooling in addition to winter heating
  – are popular and easy to use but operate most effectively when windows and doors are closed (adequate fresh air must be provided)
  – if fresh air is delivered mechanically, consideration could be given to linking heat pump operation to window/door micro-switches to prevent the system operating when these are open.

• DVS transfer system
  – Suitable for small spaces.
  – Provide grille for exhaust air to allow effective circulation (acoustics may be compromised).

• Underfloor heating
  – Consider operating costs.
  – Slow response (heating up/cooling down/implication for night meetings).
  – Pleasant for floor-based activities (Junior students).
  – Consider heat pump as the energy source.
  – In-floor reticulation may place restrictions on fixing items to slab.

Lighting
Determine whether subsidies are available for the supply and installation of energy efficient interior and exterior fittings and control systems (ie Energy Efficiency and Conservation Authority – EECA).

• Provide sensors with built-in photocells
  – to prevent fittings operating when there is adequate natural light
  – to provide automated dimming in key areas (determined by amount of natural light entering the space).

• Provide
  – PIR (Passive Infra-red) motion sensors in rooms (with more than one sensor in bigger areas so movement is detected when there are few occupants)
  – microwave sensors for corridor lighting
  – PIR for exterior lights.

• Avoid
  – locating switches in areas of walls where shelving or other fittings are likely to be positioned
  – locating critical switches where students can alter settings.

Security
• Fire
  Try to avoid breaking the Suite into separate Fire or Smoke-stop cells
  – fire compartments / smoke stop requirements may prevent
    ○ fitting hold-open devices to doors
    ○ fitting acoustic seals to doors.

• Intruder
  – Consider cabling for security cameras.

Project completion
At completion of the project, provide the school with

• Instructions (in summary form so key information is evident) for the use of all equipment items
  – heat pumps
  – security systems
    ○ Fire detection system and control panel
    ○ Intruder detection.
  – Any other specialist installations.

• Hard copy of As-built underground services including
  – sewer
  – water
  – stormwater
  – IT
  – fire
  – electrical.

• Plans showing any concealed cabling that has been provided for connecting fittings at later date.
Shared area uncluttered and well used