Distance Education Centre Victoria
Flexible learning for all

Learning Program Design and Teacher Capacity

A Literature Review

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Literature Review: The Rationale

At the beginning of the 2018 school year it was acknowledged that the body of literature on online learning had expanded greatly since we, as a school, had last looked at it. In response to this and in the context of the quadrennial school review to be undertaken in the second half of the year a team, including the DECV's Digital Learning Leaders and leading teachers conducted a review of the known literature in order to reflect the challenges and opportunities presented by the evidence base. This is the result of our work.

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School Context

Enrolment profile

There are currently over 4,000 students enrolled at the DECV from P-12. The VCE subschool's 'school-based' students doing single subjects make up more than half of these, but the cohort growing at the fastest rate is enrolled under the 'social/emotional' category. These students have enrolled at DECV due to the place it occupies in the Victorian school system, as an 'alternative' to mainstream settings for students who are "finding school difficult" (DET website,

2013). Data from 2018 reflects there are significantly increasing numbers of students with special or complex learning needs enrolled at DECV.

Learning Environment: DECV Online

The Distance Education Centre of Victoria has been through a period of significant change in the last three years. The school has moved from a PDF based CMS using printed materials to almost exclusive online delivery via a Moodle based LMS called DECV Online. Curriculum in DECV Online includes rich representations of multimedia and learner-centred collaborative opportunities for students. A significant majority of the DECV's learning programs have been re-written for the new system.

A multimedia support team now works with course developers to create explicit video interactives that illustrate key skills and knowledge. The process of program development has been redefined, and is now based on Rapid Design principles, and consistent, staged development supported by editorial staff, image and video production specialists and a team focussed on user centred design.

The breadth of change required at DECV with the shift to a new platform was significant. Most importantly the DECV's 180 teachers had to learn how to build knowledge and develop curriculum within the new platform. A range of tools to support this process were established, including a dedicated Style Guide, tool guides and behavioural icon sets. These resources were employed alongside a newly developed pedagogical model.

Contents

Executive Summary

Offering a scan of the current literature, this report is structured around a thematic analysis of what is unknown and known in online learning F-12, and intended to directly inform school policy and direction. Recommendations in this report have been developed to guide a new strategic plan at DECV in 2018. Two broad thematic focal areas, Learning Program Design and Teacher Capacity were identified.

The Executive Summary draws together key findings and recommendations from the report.

1. Teacher Capacity and Training

Current research explored in this review suggests that online F-12 schools are likely to foster innovation. When teachers do not have the requisite skills and knowledge needed to teach effectively online, the extent of their ability to utilize technology to deliver and develop curriculum impacts directly on quality of learning for students.The DECV must pursue training that prepares teachers for the challenge of working in an inherently innovative working environment. Creative approaches to teaching and learning are required at DECV and adaptability and resilience are highly desirable traits. Studies in teacher training in online learning environments also show that the skills and behaviours needed are notably different to those of traditional classroom teachers.

Perceptions and beliefs are crucial considerations when looking at what might inhibit the adoption of these skills in online schools. While internal survey data indicates that staff provide confident support to each other, it also shows staff are less likely to look to outside supports or models. Pursuit of strengthened ties with external networks is therefore recommended to provide stronger student-focussed creative approaches, to consolidate and improve understandings, and encourage the mindsets that are desirable in online teachers.

We recommend the adoption of these key strategies from 2019 based on our findings:

1. A constructivist approach to staff learning opportunities, particularly structured around Action Research methodologies.

2. Use of the TPACK and SAMR models in staff development to better clarify individual need.

3. Stronger ties with other online school networks to broaden our opportunities for shared practice.

4. Education of staff around the known mindsets, qualities, adaptive traits and technical skills observed in the current literature critical to the success of teaching in an online school.
   a. Integration of these qualities into role descriptions, recruitment statements and consideration in professional learning materials.

5. Continued pursuit of PD providing more explicit skills based training specific to our platform.

6. A review of the structured support needed by new staff during induction, with a lengthened timeframe for training and capacity building.

2. Learning Program Design

Distance Education Centre Victoria has made important progress in developing the foundations for engaging virtual learning programs for F-12 students in the state of Victoria. When reviewing the research, the key factors that influence quality program design in online environments are increasingly clear.

Course materials should be presented in clear and concise manner and WCAG accessibility standards should be adopted. Navigation of the materials should be simple and intuitive. Learning programs must be compliant with the curriculum frameworks, differentiated to meet the needs of all learners and reflect the central tenants of the Universal Design for Learning principles;

(A) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and

(B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient.

(Higher Education Opportunity Act of 2008 (HEOA))

Based on the findings in this report, we recommend the adoption of the following strategies to improve Learning program design and delivery in 2019;

1. The iNACOL standards and Quality Assurance Framework should be mapped against Pedagogical Model. Explicit examples of best practise should be provided to teachers.

7. Student experience must be reviewed and refined to ensure that navigation is intuitive, communication is clear and that technical hurdles to accessing learning and assessment

are reduced.

    a. Establishment of a working party to facilitate and prioritise development findings from this review.

8. DECV Online should be developed to ensure it meets current WCAG 2.0 accessibility standards.

    a. Implement the recommendations of the Student Inclusion working party.

9. DECV Should provide further opportunities and support for teachers to utilize synchronous tools in learning programs at the DECV, for instruction, teacher and peer to peer contact & collaborative work.

    a. Implement the recommendations of the Online Classes working party.

10. DECV should expand the use of video feedback to improve the communication of this key area of learning.

11. Provide greater differentiation of learning pathways and materials in courses.

    a. Establish working party to develop and implement a course template that allows for greater differentiation.

12. Text should be reduced and the use of multimedia materials increased in all DECV courses.

13. Learning data should be made more readily available to teachers, students and supervisors. Provide interfaces that give clear, simple indications of learner progression and achievement to these groups.

14. Online courses should model 21st Century skills, and allow students to more effectively collaborate.

    a. Progressive adoption of the Google Suite as a collaborative platform.
    b. A greater focus in development and teaching teams on the structure and focus of collaborative approaches being employed
    c. Prioritise opportunities for virtual attendance streaming and closely review both the hardware and software employed, with a view to improving the quality of these types of classroom interactions.

3. Technical Development Priorities

15. Integration of the [Google Suite](#) of tools into existing learning programs.

    a. Establishment of a working party to more clearly define which aspects of the suite will be prioritised to best advantage the student experience.
    b. Development of a learning program for staff around use of the new range of resources available to them for communication and program design.

16. Data dashboard development for Teachers, Supervisors, Parents and Students in order to improve clarity around progress and achievement

17. The provision of sufficient internet capacity to better support the growth of video streaming, and virtual conferencing

18. A stronger focus on mobile as a platform priority

19. Adoption of WCAG standards

20. Development of the differentiation template

Review

Standards For Online Course Design

Current context

Learning program design at the DECV is currently guided by several key policy documents. The DECV [Pedagogical Model For Online Learning](#) , the [Education Departments Digital Quality Assurance Framework](#) and the [DECV Style Guide](#). These documents and policies are informed by recent educational research on F-12 Online Learning and the INACOL standards.

The 'DECV Pedagogical Model For Online Learning' is a key document for teaching and learning at the DECV. It outlines the essential areas for teachers to address in providing quality online learning for DECV students.

Considerable work has been done on providing standards and guiding documents for course development at the DECV. However, when reviewing courses at DECV, we find there are key elements identified in the DECV pedagogical model, Quality Assurance Framework and above literature that are not utilized or present in courses. Further training and development of staff to address this disconnect has been addressed in the Teacher Capacity and Training section of this paper.

Literature Review

Literature relating to 'best practice' online learning program design in F-12 contexts is limited (Barbour & Adelstein, 2017). As F-12 online learning has matured and evolved, best practice standards that include aspects of Learning Program Design have been produced such as the INACOL Standards For Quality Online Courses (iNACOL, 2011) & The 7 Principles of effective course design (Barbour & Adelstein, 2013b).

The standards currently most commonly employed across Online learning platforms in F-12 institutions are the [iNACOL standards For quality Online Courses (v2)](#). These standards are produced and reviewed on an ongoing basis by the iNACOL organisation and a committee of experts with various backgrounds in the field of F-12 online learning, They focus on 5 key areas;

- Online course content
- Instructional design

- Technology

- Student assessment

- Course management

While there is critical discussion and academic work on the ongoing applicability of these standards (Adelstein, D., & Barbour, M. (2016), they have been widely adopted and inform program design and development in F-12 Virtual schools across Australia, the US and Canada.

Worthen & Patrick (2014) discuss the the governmental and structural barriers to the adoption of the iNACOL standards in F-12 Online and Blended Learning environments. Their evaluation produced a set of recommendations for policy makers designed to improve the quality of Online and Blended Learning education in US school districts. According to their report, improvement of Online learning materials and delivery methods (achievement of iNACOL standards) will occur when;

- Online and Blended Learning programs are funded to an adequate level to cover their running costs
- education departments ensure transparency and accountability for the quality of online learning providers
- institutions establish innovative teaching and learning environments & competency based teacher training and accreditation
- ensure the ethical collection and use of student data
- provide equity of access around broadband and the tools requires to study online
- ensure all digital, blended, and online learning is accessible to students with disabilities and incorporates the principles of UDL (Universal Design for Learning).

Worthen & Patrick (2014) argue that education departments have an essential role to play in creating the necessary conditions for Online and Blended Learning environment to succeed.

The concepts and standards underpinning UDL Universal Design for Learning are referred to consistently in literature relating to the iNACOL standards (Worthen & Patrick, 2014) and Online Learning environments (Rose, D. H., Meyer, A., Strangman, N., & Rappolt, G. (2002), Elias, T. (2010), CAST 2011, Gordon, David, A. Meyer, and D. H. Rose 2016). While the principals are not related specifically to this field (F-12) they can play a valuable role in the implementation and conceptualization of online learning programs. In particular, they emphasise the need for differentiation of both content delivery and teaching strategies and a strong focus on catering to all students present in a given classroom. UDL principles will be discussed further in the differentiation section of this paper.

Barbour & Adelstein (2017) provide a summary of recent research in F-12 online learning course design. Their paper compares the perspectives of experts in the field with findings from current literature, to comment on and qualify the *iNACOL National Standards for Quality Online*

Courses program design principles for F-12 course design. Overall, the study found a high level of support from experts for the INACOL framework in F-12 Online learning contexts.

Michael Barbour's research and writing offers some important insights into effective online education delivery. In his study of teacher and developer perceptions of effective web-based content for secondary students (2007), he concluded a high degree of structure and a greater level of interaction are essential in order to increase success in adolescent online cohorts. In a 2013 study Barbour and Adelstein looked at student and teacher perceptions of what works well in the online environment and defined seven principles for course design that can be applied to secondary students.

Recommendations

The body of literature in this area can inform development of DECV courses. Further work needs to be done with course developers to improving their understanding of best practise in online course development. Course design should be guided by the Pedagogical Model and explicit standards that illustrate 'best practice' in online course design

1. The iNACOL standards and Quality Assurance Framework should be mapped against Pedagogical Model, examples should be provided that clearly illustrate what best practise looks like.

2. The Development roadmap for DECV Online should be guided by the DECV pedagogical model and Quality Assurance Framework, while also containing scope for flexibility in response to unanticipated technological opportunities or challenges.

3. The DECV should advocate for better infrastructure and understanding of online learning and blended learning delivery methods in the Victorian education system.

2. Accessibility

Current context

The Disability Discrimination Act 1992 (DDA) makes it against the law to treat people unfairly because of a disability. The Disability Standards for Education 2005 provide further clarification and seek to ensure that students with disability can access and participate in education on the same basis as other students. All education providers must comply with the DDA and the Disability Standards for Education 2005. This includes their obligation to make reasonable adjustments to assist a student with disability.

The international standard that is used to make web content more accessible is the Web Content Accessibility Guidelines (WCAG) 2.0. Accessibility means that websites and, in DECV's context,

courses, are developed and designed so that people with disabilities can use them. This encompasses all disabilities that affect access to the internet, including auditory, cognitive, neurological, physical, speech and visual disabilities. All students should be able to perceive and navigate, as well as interact with and contribute to their learning programs.

Accessibility principles also apply to students without disabilities, for example:

- students using mobile phones, smart watches, smart TVs, and other devices with small screens, different input modes, etc.
- students with "temporary disabilities" such as a broken arm or lost glasses
- students with "situational limitations" such as in bright sunlight or in an environment where they cannot listen to audio
- students using a slow Internet connection, or who have limited or expensive bandwidth

The Department of Education is currently reviewing its online materials to ensure they comply with the Web Content Accessibility Guidelines 2.0 (Level AA). Courses at DECV have not yet been audited for full compliance with accessibility standards.

The following data provides an overview of students with disabilities at DECV who may experience challenges regarding full participation in their learning programs.

Medical information, parent report at enrolment, 29 March 2018			
Condition	**DECV-based**	**School-based**	**Total**
ASD	192	70	263
Deaf / Hearing impaired	22	18	40
Blind / visual impaired	47	50	97
Intellectual disability	27	5	32
Physical disability	60	15	75
Severe Behaviour disorder	54	7	61
Severe language disorder	20	2	22

Mental health condition	589	109	698
Other conditions	364	171	535

The categories are based on the Disability Standards for Education 2005. The category 'Other conditions' still requires further analysis in regard to how many students in this category are affected by accessibility issues. The 'Vulnerable Children's Working Party', which has recently been formed as part of the school review process, will further examine current practice within DECV's course development and delivery and develop strategies for the practical implementation of related accessibility standards at DECV.

Please also refer to the section 'Differentiation & Universal Design', which relates to accessibility as Universal Design for Learning is a widely used instructional design framework that promotes accessibility.

Literature Review

Literature on accessibility in F-12 contexts is limited and is largely about determining the accessibility of materials that are available from external vendors. In the US, materials used in F-12 online learning are largely (estimates suggest 85-90%) developed by external, for-profit vendors because schools and individual teachers do not have the time or resources for internal development (Smith, 2016). In tertiary settings, literature on accessibility is available that focuses on the development of course materials.

Rieber and Estes (2017), suggest addressing physical accessibility is relatively uncomplicated and inexpensive if considered from the beginning of a development cycle, whereas retrofitting can be complex, difficult and expensive. This partially contradicts Cifuentes et al. whose 2016 report reflected that creating video closed captioning is an expensive and time-consuming process. They recommend using either commercial or educational products that already have open or closed captioning. Their calculations of approximate time comparisons for different captioning methods are presented in the following table. According to Mark McSherry, Multimedia Leader at the DECV (2018), these times can be applied to course development in a F-12 context.

Caption method and approximate time

Method	Approximate time
Transcribe audio/video, generate captions with Camtasia, adjust captions manually	1 hr. of audio/video - 10 hrs. of work
Listen to audio/video, repeat into Dragon Naturally Speaking, generate captions with Camtasia, adjust captions manually	1 hr. audio/video - 8 hrs. of work
Upload video to YouTube, correct auto-transcript, upload edited transcript to YouTube to be automatically synced	1 hr. of audio/video - 5 hrs. of work

Adapted from "A Working Model for Complying with Accessibility Guidelines for Online Learning" by Cifuentes et al., 2016.

Accessibility in education is predominantly interpreted from a technical perspective. Rieber and Estes (2017) advocate to extend the meaning of accessibility to include intellectual and motivational accessibility. If it is true that accessibility barriers can be reduced or eliminated by improving the design of learning materials, challenges are presented for designers who must then consider how to make their designs more creative in order to address the needs of all learners. Alternative activities should be included in courses for students who cannot participate due to disability (Sokolik, 2018). For example, providing students who are vision impaired with an alternative to an image description task. This approach requires that teachers think about multiple modalities when designing and teaching courses.

Educators' lack of knowledge around developing accessible courses can lead to them feeling overwhelmed (Behling, 2017; Linder, Fontaine-Rainen & Behling, 2015). Teaching staff can come to the issue of accessibility with a negative mindset, due to fear that the requirements of ensuring accessibility will add to workload. In many online secondary contexts a shift in culture will be necessary to ensure accessibility is considered a core component of good pedagogy and not an 'add on' requirement. This could include changing from a reactive approach to a proactive use of Universal Design for Learning, which would provide teachers who feel overwhelmed clear steps to design an accessible course.

Linder et al. (2015) report that in many institutions too many departments and persons are involved in creating accessibility, resulting in unclear roles, policies and procedures. They therefore recommend identifying a designated person(s) to provide guidance and establish appropriate policies and procedures.

Recommendations

4. It is recommended that the DECV review and implement the Web Content Accessibility Guidelines 2.0 (at least Level AA) and add the category Mental Health Issues to the list of disabilities that need to be considered in regard to accessibility barriers. The WCAG 2.0 guidelines cover a wide range of issues but do not address all types, degrees, and combinations of disability. Mental Health Issues is currently the largest disability category at DECV.
5. New or re-accredited courses should be written in line with accessibility guidelines. Further investigation about which tasks teachers/maximum developers will be responsible for and which tasks will be completed by the IT support team should be prioritised to inform this process.
6. For existing courses not scheduled for maximum development modification on a case by case basis as required should occur as soon as possible. (Another option could be to retrofit courses using 7-10 core subjects or data disability categories to decide order of priority.
7. Materials from external providers, such as Mathletics and Style, should be audited for accessibility compliance.
8. Maximum course developers should be provided with training in accessibility principles. Information sessions should be scheduled for all staff to raise awareness and create a shared understanding of accessibility requirements.
9. To manage the process of implementing accessibility standards at DECV, a team or working party should be formed that includes representatives from course development, IT and Wellbeing.

3. Differentiation

Current context

Consideration of how learning materials can be differentiated is essential when designing learning programs in an online environment. In the past three years, the DECV has moved to phase out its paper-based materials and deliver content primarily online. This change has provided teachers with an opportunity to better differentiate the delivery of learning content through the use of video, audio and interactive visual resources. DECV has developed a multimedia unit to support teachers to create more video and interactive instruction. DECV Online now provides teachers with opportunities to provide more specific learning paths for different learners to support and extend students at different levels.

While a significant amount of work has been done, there is no systematic approach to differentiation and universal design for all courses at the DECV. As mentioned earlier, DECV Online is not compliant with current web accessibility standards and can provide challenges to

students with physical disabilities. A number of factors need to be considered and addressed to ensure DECV online can provide appropriately differentiated instruction for all students and adhere to the principles of Universal Design For Learning.

Literature Review

To date, Only a small amount of literature has been published on differentiation in F-12 Online contexts. Universal Design For Learning is a term that it often used when discussing differentiation in course design in online environments. A concise definition of this term has been provided by the U.S. Higher Education Opportunity Act of 2008, which stated:

> *The term UNIVERSAL DESIGN FOR LEARNING means a scientifically valid framework for guiding educational practice that:*
>
> *(A) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and*
>
> *(B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient.*
>
> *(Higher Education Opportunity Act of 2008 (HEOA)*

Universal Design For Learning principles are supported by a wealth of literature (Rose, D. H., Meyer, A., Strangman, N., & Rappolt, G. (2002), Elias, T. (2010), CAST 2011,) and provide clear guidance on how to better design learning programs for the variety of students that exist in any given classroom.

The literature suggests when UDL principles are applied students benefit. Higbee & Goff (2008). Beetham, H., & Sharpe, R. (2013) write that the principles of UDL remind us that learner difference in the classroom is the norm.They argue that consideration of UDL principles is essential when designing courses promoting 21st century learning. He (2014), discusses the use of UDL principles in preparing pre-service teachers for online instructional roles. Participation in online learning modules helped these teachers to recognise critical course design and delivery considerations regarding organization, instructor, and feedback, consistent with the guidelines of online teaching based on UDL principles.

Tanya Ellis (2010), writes about the application of Universal Design Principles (Goff & Higbee, 2008) in the Moodle Online learning platform. She defines a series of recommendations informed by universal instructional design (UID) principles appropriate to Distance Education settings. In relation to differentiating learning materials she makes the following suggestions;

- *Present content and accept assignments in multiple formats. Multimedia tools can be used to present content and assignments in multiple forms, providing the learner with flexibility and choice.*

- *Offer choice and additional information. Offering links to additional information and choices of assignments and topics of study allows learners to be more active participants in the process. It also allows them to meet course requirements in a way that is best suited to their individual abilities, disabilities, and needs.*

- *Incorporate assistive technologies. Although external assistive technologies can be used in conjunction with online course materials, these tools should be integrated into the LMS itself, according to the principles of UID*

- *Add captions, descriptors, and transcriptions. Video- and audio-conferencing can present a significant obstacle to accessibility.*

The Moodle environment and, more broadly, online learning platforms offer educators the ability to address UDL principles and present students with choice around instructional materials, additional information and resources. They also provide scope for more choice around the achievement of course criteria and tools for students with disabilities to engage with learning programs. In the conclusion to her paper, Elis observes that institutions should exploit these features and ensure that staff are trained to use online tools adequately in line with key principles of UDL.

Barbour highlights the importance of differentiating learning materials in his studies on teacher and student perceptions of effective online learning at F-12 (2007, 2013b). In a 2013 paper with Adelstein he notes " *Students wanted links, videos, and pictures. They wanted something beyond an experience of reading and they wanted to be able to visualize the phenomena being studied, and see how it worked. This preference for multimedia was not only to make learning more interesting but to make content more comprehensible by explaining content in different formats.* (p7)

The reduction of text and the use of a visual elements and multimedia appears to be a key theme across the literature on F-12 Online Learning. The development of different content pathways for cohorts of students e.g. 'below average' and 'above average' students is also a consistent theme (Barbour & Adelstein 2013b, iNACOL,)

In Adelstein & Barbour's (2017) paper, experts agree that resource materials could help with mastery. There was also agreement that the opportunity for higher-order thinking, differentiating, and active learning be taken into consideration when designing the course. Both Chen and Jang (2010) and Kim, Park, and Cozart (2014) report that motivation is an essential part of education, particularly in the online learning environment. As such, it was important that components that foster student satisfaction in autonomy and self-efficacy are incorporated into course design.

Flexible course design (Roblyer 2006), and individualized instruction (Archambault et al. 2010) are also deemed important.

Henderson & Phillips (2015) discuss the importance of differentiating delivery of feedback in undergraduate higher education. They highlight the power of video and audio feedback methods to improve communication in this important element of student learning.

Compared to written comments on assignments, students report that assessment feedback created using technologies can be:

• *More detailed*
• *Less ambiguous*
• *More individualised*
• *More satisfying*
• *Able to foster feelings of connectedness*

([Monash Digital Education research](#))

The reduction of text-based communication is a clear and consistent theme throughout literature on F-12 Online materials (Barbour & Adelstein 2013b, iNACOL,). Audio and video materials can be less ambiguous and provide more comprehensible instructions for students. Students also feel a stronger sense of 'connectedness' to their teacher when they can see and hear them (Henderson & Phillips 2015).

Recommendations

While a lot of work has already been completed in this area, the DECV's delivery of feedback and content is still heavily text-based. Further work is required with teachers in order to;

10. Expand the use of video feedback and video communication (synchronous and asynchronous).

11. Identify 'text heavy' courses and provide development and technical support for a reduction of text and increased used of multimedia elements.

12. Provide greater differentiation in in the pathways for learning in courses. Create a working party to develop and implement a template that supports this aspect of course writing.
13. Provide richer multimedia content delivery in courses.

14. Review student user experience of DECV online. Ensure the navigation is intuitive and simple and that technical hurdles to accessing learning are reduced.

4. Synchronous Lessons & Contact

Current context

The use of synchronous online tools has increased at the DECV in the past three years. Adobe Connect is used across a majority of subjects to deliver weekly tutorial style classes where teachers discuss the week's learning program, run activities to further enhance understanding and answer questions from students. Other uses for synchronous sessions include; group work using the Adobe breakout room feature, Maths skills sessions, one-on-one and small group meetings for advice and help.

Currently, teachers are not mandated to conduct online lessons & students are not required to attend. Attendance of synchronous sessions can vary significantly. When lessons are mandated in a particular subject, attendance can be up to three quarters of the class. When lessons are presented as supplementary attendance can drop to lower than a quarter of students. Attendance rates vary according to year level and cohort (e.g. school-based students). Teachers define synchronous classes and sessions to be highly valuable, however a significant number of teachers give feedback that it can be hard to get students to attend sessions in large numbers and that time spent on preparation is therefore sometimes wasted.

Literature Review

The literature regarding the use of synchronous communication tools in F-12 online environments is limited. In Martin, Ahlgrim & Budhrani's (2017) recent meta-analyses of Synchronous online learning, they summarise the current literature and provide a base for further research. They identify that synchronous technologies are currently most employed in English/foreign language courses due to the requirement for oral and listening tasks. Synchronous technologies are seen to add a 'human' or real-life experience to online learning (2017). International educational organisations identify the importance of developing students 21st century skills through the use of online synchronous tools for collaboration, creativity, communication and research (Bower 2011).

Literature on synchronous instruction indicates this modality has a positive impact on online student learning because of its similarity to in interactions found in face-to-face instruction such as text messaging, chat, and real-time audio or video conferencing (Murphy and Laferriére 2007; Park and Bonk 2007; Teng, Chen, and Leo 2012). Online synchronous discussion builds a sense of social presence and a heightened sense of involvement and participation while providing immediate, ongoing feedback for students (Chen et al. 2005). Ideally, online courses

should include both asynchronous and synchronous learning opportunities, depending on the instructional goals of the course (Lowenthal, Dunlap, & Snelson, C. 2017).

The literature indicates that teachers often respond well to synchronise opportunities for instruction as it fits with their traditional skill set, e.g. 'lecturing' to students with the use of a whiteboard (Michael K Barbour, 2012). This can be positive, however it also represents a potential impediment to teachers using technology in line with 21st Century Skills and engaging an adolescent cohort.

Lowenthal et al (2017) suggest that practical changes to the provision of synchronous online lessons could result in significant improvements in student participation. The paper discusses improvements made to 'Virtual Office Hours', a type of unstructured, optional synchronous session offered within a fully online course at an American university. The course was predominantly asynchronous and offered the synchronous sessions four times a semester. Changes made to the sessions saw an improvement from 10% of students attending at least one session per semester to approximately 50% doing so. Changes made included:

- Scheduling sessions at times when the maximum number of students were available.
- Providing incentives for students to attend, with attendance contributing towards course participation requirements.
- Giving sessions a clear purpose beyond open-ended Q&A sessions. Students indicated a preference for some level of structured teacher instruction relevant to the course.
- Embedding references to the sessions within the asynchronous course, providing (Google) calendar invitations and reminders in the lead up to sessions.
- Involving students who could not attend sessions, by allowing them to send questions to be addressed in the session, and subsequently to provide a recording of the session.

Students were surveyed about why they attended the synchronous sessions. Learning the content rated highly, however the number one reason students gave as motivation was getting to know their instructor better, followed by getting to know fellow students.

Recommendations

The literature indicates that synchronous contact and instruction has positive impacts on learning in an online environment. The DECV should investigate further how these tools can be used more effectively in courses.

15. Provide further opportunities and support for teachers to utilize synchronous tools in learning programs at the decv, for instruction, teacher and peer to peer contact & Collaborative work.
16. Synchronous tools should be utilized to help develop 21st century skills for learning in DECV students.

17. We recommend to implement practical strategies, such as those outlined above by Lowenthal, to increase participation and student experience.

Further recommendations have been outlined in the final report of the 'Online Lesson Working Party'.

5. Collaboration

Current context

Online learning or e-learning isn't about digital technologies any more than classroom teaching is about blackboards. E-learning should be about creating and deploying technology systems that enable constructive human interaction and support the improvement of all teaching and learning. (Voogt, 2008)

Collaboration is defined as an integral skill for learners in the Victorian and Australian curriculum frameworks. The DECV is responsible for ensuring all students have access the same opportunity to develop skills and knowledge, and to apply them with peers in meaningful contexts, as they might in traditional school settings. Key to this is providing students with the opportunity to build social connections and collaboratively share and build knowledge.

Literature Review

To date, only a small amount of literature has been published on student collaboration in the online learning environment. Availability of F-12 literature is particularly problematic and we therefore need to cast a wide net when discussing available evidence.

Engagement between learners has always been a central feature of the learning process. Vygotsky (1978) observed clear benefits to students of working with their peers, going so far as to observe that collaborative learning is a crucial part of learning, and helps ensure 'quality in associated teaching and learning processes'.

The International Association for F-12 Online Learning (iNACOL) explicitly recommend collaborative learning as a standard for online courses of quality (2011). Ferdig, Cavanaugh, DiPietro, Black, and Dawson (2009) note that student collaboration is considered as a principle feature of online programs, and inclusion of collaborative opportunities as best practice for programs at F-12.

There is also strong evidence to suggest that cooperative learning promotes positive interdependence (Bernard 2009). Collaborative work improves peer relations, self-esteem, and develops the skills related to perspective development (Slavin 1980). Loveless (2002) observes that communication and evaluation through group interactions often offers increased

opportunities for imaginative role-play, problem-solving, collaboration and new perceptions of place.

Students working independently often do not have the opportunity to refine or deepen their ideas through exposure to the ideas of fellow students. Presenting and defending an idea in particular, according to Johnson and Johnson (1999b), is crucial to strengthening critical thinking and clearer communication.

It is necessary therefore, if opportunities for deep, meaningful learning are to take place, that attention be paid to structuring a range of quality interactions between students and their teachers. DECV programs must, in design and facilitation of learning environments, increase the opportunity for richness of these interactions, rather than simply increasing the quantity of interactions. (Madland and Richards, 2016).

In this part of the report, we will look at design implications and challenges of 'structuring learning activities so that dyads or small groups of students [can] work together in order to achieve a stated goal ...' (Johnson & Johnson, 1999a; Slavin, 1980; Slavin, 2011).

6. Collaboration Design

Literature Review

Johnson & Johnson (1991) have amongst the most commonly referenced guidelines for cooperative learning. Their research supports student to student interaction as a key opportunity within distance learning programs (Johnson & Johnson, 1999a; Johnson & Johnson, 2002; Slavin, 1980; Slavin, 2011) and recommends a strong emphasis on deep interaction with content.

Social interdependence theory (eg Johnson and Johnson 2008; Slavin 1994) approaches encourage the need for:

- Shared goals
- Shared spaces for interaction
- Opportunities to set boundaries to help students develop individual and group identities

These approaches can be challenging to implement as LMS platforms are typically hierarchical and teacher-centered.

Some distance settings have have sought out tools that utilise 'flat' team hierarchies in their design. To address this, Bjorn (2017) recommends a broader use of third party products in order to provide more opportunities for hierarchies that better support collaboration, and broaden the reach of corralled learning platforms.

Learning program designs that support more personal accountability also encourage higher quality student to student and student to teacher interactions(Bernard et al. 2009). Program developers should work toward structures that employ purposeful group work. Designs, for example, that enhance teacher presence have been shown to elicit far higher levels of student satisfaction and emotional connectedness in online communities (Jäminki 2008; Shea et al. 2005; Swan et al. 2009).

There are five key characteristics that emerge from the literature on learning activities and online cooperative learning:

> Positive Interdependence
> Accountability for the group, and the individual
> Encouraged opportunities for interaction
> Social skills appropriate to support the interaction
> Purposeful development of group processing skills

In particular, students should have a 'unique and necessary role' in group activities. (Johnson & Johnson, 1999a; Johnson, Johnson, T, & Holubec, 1994; Johnson, Johnson, & Stanne, 2000).

Care should be taken in the over use of quizzes and multiple choice tests or exams that do not allow students to display a range of ability or apply new knowledge in meaningful ways. Ron Oliver identifies (2004) collaborative projects and portfolios as key opportunities to strengthen assessment approaches. Oliver observes that the students' involvement in learning significantly deepens when working with others, and is shallower when programs rely too heavily on automated assessment and reflection tasks. A balance between the two is encouraged.

There is a growing body of research into the use of tools to support online group work (Dron, 2007; Mason & Rennie, 2008; Olson & Olson, 2008; Wang, 2010). Notably, some tools are more useful in the design of specific outcomes in collaborative work. For example, forums can play a key role in the development of work within teams, (McConnell, 2006; Kear, 2011), while synchronous opportunities can be more effectively employed for decision making (Finkelstein, 2006; de Freitas & Neumann, 2009).

Programs designed to offer and encourage students to provide each other with support can result in stronger outcomes (Garrett Dikkers, Whiteside, & Lewis, 2013; Oliver, Osborne, & Brady, 2009). These opportunities strengthen ties between students, and can be further encouraged where they present opportunities to link students up with 'virtual buddies' (Lewis, ?). Students who are able to positively impact on peer learning through motivation, instruction or collaboration influenced the social presence and 'befriending behaviours' of peers in Borup's (2014) research.

These strategies can be particularly important in settings like those at the DECV, where students considered 'at risk' are represented in large numbers Archambault et al. (2010). Borup's work (2014) also shows us that where these collaborations occur, content knowledge is increased, and engagement with programs and collaborative learning is notably improved.

When designing collaborative activities, clear communication around assessment is also important, both in at the start of the activity, during and at the end of the assigned activity or challenge. (Payne 2006 and Huang 2002).

Lon and Meglich (2013) recommend four key elements to encourage the success of online collaborative approaches:

1. Allowing students time to experiment without penalties
2. Allowing time to demonstrate the tools students will use to communicate
3. Longer time frames for projects
4. Guidance around ways in which teams can strengthen communication online.

Lon and Meglich also found that often teachers can have misplaced assumptions about the level of preparedness to collaborate. Often, students were assumed to be prepared for meaningful collaboration in online programs, however skills in both cooperative approaches and in the tools employed were required. These authors suggest skills and resources should be be explicitly taught to ensure all students are able to participate in collaboration.

Students motivating their peers is an important feature of successfully designed programs. Borup (2014) observes that it is 'difficult to overemphasize the importance of motivation' between students in F-12 learning environments. Wiener (2003) argues that it is the 'key ingredient''.

Long and Meglich (2013) also identify the clear benefits in training students in the challenges of collaboration online. These skills coupled with the development of empathy are encouraged by as key components of developing successful online collaborative groups.

Increasing opportunities for social connectedness is a key consideration in the development of collaborative opportunities in online settings. Kuh (2003) supports this as a key feature of knowledge retention. Through stronger connections, student interdependence is also strengthened (Johnson & Johnson, 1999a; Johnson & Johnson, 2002;), particularly where interactions are designed around a deep connection with the program content.

Program designs that incorporate purposefully timed interactions are also identified by Slavin (2011) as key to successful outcomes. Slavin (2011) asserts that the achievement of the group is dependent on contribution from all members. When students are interdependent, they are more motivated for personal and social reasons, and there is stronger social cohesion. Thus

programs must be created with strong student interdependence in mind as this will promote stronger motivation and social cohesion and offer the opportunity for deeper learning.

7. Collaboration Challenges

Literature Review

When exploring the reasons for further developing collaborative opportunities at DECV, it is also important to reflect on where online communities are challenged in distance settings at F-12.

Factors that can obstruct the success of collaborative approaches in online learning are complex and dependent on the broad array of structures and contexts. (Fang & Chiu, 2010; Farooq et al., 2007; Ke & Hoadley, 2009; Schlager, Fusco, & Schank, 2002).

Learning online can be isolating for students, as they are often obstructed by the need to both learn content and learn how to learn online (lowes & Lin 2015). There is a human element in online collaboration that is lost, and challenging to facilitate. The nod of assent when students agree, the lack of a shared routine and the time sensitive nature of online communication can be difficult to overcome. Doubt surrounds expectations and trust in work on collaborative tasks is difficult to establish. Well considered, well structured cooperative learning opportunities support far stronger student outcomes by increasing motivation, social cohesion, helping students to meet challenge and allow them to elaborate on their learning.

A lack of meaningful interaction in online programs has been shown to leave students feeling isolated and unmotivated (Palloff & Pratt 2007). A lack of clear teacher direction is also a key consideration in the research for communication and collaboration not succeeding Borup et al., 2014; Garrison et al., 2000).

One key barrier identified by the literature is a lack of trust amongst students. In fact a growing number of studies pose that trust is 'fertile ground' for knowledge sharing. Much like interdependence and motivation, where trust exists in programs, the opportunity for shared reciprocity and further trust become possible (Bryk & Schneider, 2002; Levin & Cross, 2004; Usoro et al., 2007 and Tomasello 2009).

The establishment of trust is undermined significantly by the simple physiological mechanics of connection that are often absent when collaborating in distance settings. As Riding (2002) and Young (2008) observe, it can be difficult to replicate facial expression, verbal and non-verbal cues when connecting online.

Collaboration can be difficult when asynchronous approaches are too significantly represented. Tunison and Noonan (2001) observe that students can become frustrated by using discussion boards, due to the pace of the exchange, and a lack of apparent urgency and synergy. As

Lowes (2014) puts it "The well-known affordances of online learning—having the time to reflect before 'talking' (i.e., posting)—are therefore counterbalanced by the constraints of time and distance".

Another obstruction apparent in online learning platforms like Moodle, that is clearly present in alternatives such as Blackboard and WebCT is the fact that platform activity types are compartmentalized, and designed principally to support content oriented approaches. (Oliver 2004). Oliver observes that 'the overall architecture [of these systems] is very much designed around the conventional forms of teaching and learning previously used commonly in paper based distance education programs.'

The fact that online programs are often predetermined ahead of the school year also plays a part in student disengagement and reduces the likelihood of connecting with peers. This is due to the fact that students can feel less ownership over the design, assessment and evaluation of their learning and thus less responsibility for their own learning journey (Holmes 2012).

A lack of clarity around assessments can also play major role in the success or failure of student interactions in collaborative tasks. What and how they learn is very dependent for example on how students believe they may be assessed (Biggs, 1999). A lack of diversity can also play a part in reducing the richness of online collaboration (van Knippenberg and Schippers 2007). Collaborative efforts are often best achieved where groups represent diverse perspectives, genders and backgrounds (Curseu and Pluut 2013).

Another key concern reflected by the literature, is when student interactions were low, or when their sense of identity was impeded in online spaces through a lack of support and scaffolding, isolation, a sense of loss and frustration were often the outcome. Garrison et al., 2000 and Weiner 2003).

Clarity of role also plays a part in collaboration not succeeding, as students do not always understand why online group work is important (Roberts & McInnerney, 2007), and can find the prospect of engaging in group oriented tasks daunting. Negative perspectives can be driven by the challenges of communicating effectively where inadequate structures are in place. Dealing with the perception of absent group members is also a critical concern for some students, particularly where assessment is concerned. (Ozturk & Hodgson, 2017).

There is also an anticipation amongst many distance learners that work should be completed independently, and that control over schedules and communication with peers will be beyond their control. This in turn, can result in resistance toward engagement. (Herrington, Reeves, & Oliver, 2010 and Smith et al., 2011).

As previously stated, trust and interdependence in particular are common themes in the literature. As Wenger et al. (2009) asserts, "learning together depends on the quality of relationships of trust and mutual engagement that members develop with each other".

Finally, it is worth considering that the prevalence of online collaboration in academic and employment settings is rising dramatically (Morrison 2013). In order to prepare students adequately for these settings, and to ensure work readiness at the conclusion of studies, students need opportunities to learn to collaborate effectively in F-12 settings (Bonk 2005).

8. Data

Current context

The use of data is an important for leadership, teachers and support staff at the DECV. Data informs the practise of teachers in better catering courses to the DECV cohort. Data is used at a leadership level to inform the development of school wide programs and the development of digital infrastructure. The availability and veracity of data at DECV is a common source of frustration. Staff provide feedback that they would like data on students to be more readily available and simpler to read. Parents and students also express a need for better data relating to progression through learning programs and the attainment of learning milestones and goals.

DECV collects and ultises data from a range of different platforms including, Accelerus, DECV Online, VASS, THE DECV Database, Ondemand Literacy and Numeracy assessments, Mathletics & Stile. The range of platforms and data collected indicates the challenges that the organisation faces in working toward a uniform platform and delivery method useful to all parties.

Literature Review

The online space has changed the nature of how data is collected. By sheer volume alone, these datasets have exhausted human ability and simple software tools in capturing, storing, managing, and analysing this information (Manyika et al. 2011). All schools have felt the impact, but it is with those who use Learning Management Systems (LMS) that the change has become overwhelming (Ferguson, 2012). With 'each day, their systems amass ever-increasing amounts of interaction data, personal data, systems information and academic information' (Mazza and Milani, 2004; Romero et al., 2008). Although these LMS's come equipped with some forms of extraction and visualisation, these inbuilt functions are often basic and do not serve the purposes of educators teaching in these environments (Dawson 2009, Ferguson 2012). Furthermore, 'significant amounts of learner activity take place externally and so records are distributed across a variety of different sites with different standards, owners and levels of access' (Ferguson 2012). However, sophisticated analytics can substantially 'improve decision making, minimize risks, and unearth valuable insights that would otherwise remain hidden' (Manyika et al. 2011).

The use of data has become a central role in teacher practice (Griffin and Care 2014, Knapp et al. 2006). Educators must be able to use data systematically to ask questions and obtain insights about student progress (Goss and Hunter 2015). It informs teacher practice, allows for the monitoring of student progress, and tailoring of instruction to meet the needs of each student (Hamilton et al. 2009). This requires that teachers require capacity building to be able to read and interpret data. Furthermore, the system must provide clear visual cues for teachers to identify student needs (Ferguson 2012, Dringus and Ellis 2005). Additionally, other information may be necessary to allow teachers to see a more holistic picture of a student (Blikstein, 2011). The information provided by a dashboard must also be available to students and supervisors. Teaching students to analyse their own performance through automated and human feedback is necessary to improving the learning environment (Hamilton et al. 2009). Tools must be clear and easy to use, including training students to use the system (Hamilton et al. 2009).

Recommendations

18. Make learning data more readily available to teachers, students and supervisors. Provide interfaces that give clear, simple indications of progression and achievement to these groups.
19. Establish a broader review to more clearly determine more comprehensively the best practice in capture and delivery of online data to inform student outcomes and school planning initiatives

9. Teacher Capacity and Training

Literature Review - Teaching Online

When presented with the opportunity to teach in an online school, many teachers discover that their classroom skills are in fact not transferable, and they can be '… unprepared to deal with the demands placed upon them because they do not understand the unique communication and pedagogical demands of teaching in an online environment' (Davis et al., 2007). Wood (2005) goes further, stating simply that 'a good classroom teacher is not necessarily a good online teacher'.

Barbour reports that 'within the field of F-12 online learning there has been almost universal agreement that the practice of teaching in an online environment is different and requires a different set of skills than teaching in a traditional face-to-face environment.' Lowes (2005), further supports this position, noting that 'different strategies' are needed when teaching in an online classroom.

A proficiency with technology, an understanding of the curriculum and strong communication and organisational skills are suggested by Barbour and fellow researchers (2014) as the

principle initial skills and behaviours needed by online teachers. Barbour also notes an enthusiasm for online learning as the method of delivery is a necessity, given the challenging transition many teachers experience in the move from face-to-face settings.

Teachers in online environments necessarily have a different skill set, with qualities that often set them apart from traditional teachers. This is, in part, due to the expectations of their audience, who, accustomed to web-based online environments expect an increasingly sophisticated experience. (Barbour, Adelstein, Morrison, 2014).

Teaching in an online school also challenges us with different roles and obligations, and we must also navigate in a teaching space that experiences 'a continual development of new pedagogies' (Baran et al. 2011).

This paper seeks to clarify the roles and skills needed by teachers in an online school, and to identify those ways in which the literature identifies as our best opportunities for further development.

Literature Review - Roles and Skills

Teaching in an online school requires a paradigm shift for teachers in terms of perceptions of time and space, course design, and student engagement (Easton 2003). The roles and skills we are familiar with 'simply may not be necessary to be effective in the online space' (Barbour 2012) and we must therefore more clearly identify the features of an successful online teacher.

Researchers have determined that online teachers must 'adapt to new roles', for creating effective and meaningful learning experiences (Coppola et al., 2002; McShane, 2004). Baran et al. (2011) summarizes the new roles of online teachers in six broad categories: professional, pedagogical, social, evaluator, administrator, technologist, advisor, and researcher. At the DECV, we can draw these roles under our broader internal responsibilities:

Teacher	Course Dev	LAD
Professional Pedagogical Evaluator Social Administrator Technologist Advisor Researcher	Professional Pedagogical Evaluator Administrator Technologist Researcher	Professional Evaluator Social Administrator Advisor

The literature also identifies that a deeper understanding of and broadening in the use of the teaching platform employed within the school is critical to the success of the online teacher.

Online teaching in fact requires 'the development of its own pedagogies' (Kreber & Kanuka, 2006; Laat, Lally, Lipponen, & Simons, 2007; Natriello, 2005), as a consequence of its distinctive setting and the unique demands upon educators. Mishra and Koehler (2006) concluded that these new skills could not be separated into what technology can do, and knowledge of teaching, and support a more integrated 'multidimensional teacher knowledge'. It is also clear from recent research, that "a failure of educational institutions to support teachers in using instructional technology results in the limiting of a students' ability to learn with the technology" (as cited in Murdock, 2006, p. 76).

As teachers skills are enhanced, and more is accomplished within the online environment, still broader needs are demanded (Barbour, Adelstein, Morrison, 2014). This cycle leads inevitably to further specialisation.

Barbour however, does make one observation that provides us with a point of inspiration to pursue the attainment of the unique skills and personal qualities necessary. He asserts that virtual education in F-12, distance education environments is one of the most likely spaces in the education arena to foster innovation.

What then are the skills and qualities necessary to pursue powerful teaching and learning in our unique environment? How can we work toward recognizing them when the literature is still emergent and our own teaching space so unique?

The National Education Technology Standards (NETS) for teachers reinforce the advice from a range of bodies such as the Partnership for 21st Century Skills recognize that new skills are needed to strengthen the use of technology in teaching and learning. iNACOL, an internationally recognised body that pursues excellence in online and blended environments originally determined in 2011, the mindsets, technical skills and personal qualities necessary in teachers in online environments. They remain one of the most recognised sets of standards online schools can pursue in efforts toward teacher development.

Literature Review - Qualities and skills

These teacher qualities have been divided into four broad frameworks.

> **Mindsets** – core beliefs that guide thinking, behaviors and actions that align with educational change.
> **Qualities** – patterns of behavior that encourage the shift to new ways of teaching, and that support those pedagogies.
> **Adaptive** – collaboration and problem solving skills, an ability to work well in teams, and to employ mastery through modelling, coaching and reflection

Technical – core skills that are domain-specific.

Some of the skills and mindsets educators need in virtual teaching environments are the same as those required for effective 'traditional' instruction. However, the pace of technological change, the need for teachers to integrate new approaches, and the opportunity to more deeply differentiate to myriad student learning profiles is significantly higher in blended environments (iNACOL 2011, 2008).

In order to further support the adoption and value of these skills and mindsets at the DECV, they have also been further categorized against our school values.

(R) Respect
(E) Empathy
(C) Collaboration
(G) Growth

Mindsets

Vision, Adaptation and Change

- An ability to adapt online materials in response to students' needs and progress, and rely on real-time data and interaction with and feedback from students. **(E)**
- Displays personal learning development for themselves and others. **(G)**
- Has an entrepreneurial spirit, and possess creativity, imagination, and drive. **(G)**
- Embraces change, uncertainty and ambiguity as part of improving teaching and learning practices. **(G)**
- Models and encourages others to be independent and self-directed learners. **(G)** **(C)**
- Engages with the broader digital learning community, supporting initiatives and participating in global initiatives in online learning. **(G) (C)**

Qualities

- Shows grit, engaging in deliberate practice and persevere toward ambitious, long-term educational and professional goals. **(G)**
- Maintains and models persistence, confidence, and optimism to resolve issues. **(G) (C)**
- Shows transparency, openly and frequently sharing successes, failures, and challenges, objectively exploring results (both positive and negative), and helping others to do the same. **(R) (C) (G)**

- Works collaboratively, balancing individual initiatives with teamwork to accomplish organizational objectives. **(C)**
- Proactively seeks to learn from and with other experts in the field. **(C) (G)**

Adaptive

- Reflects on practice, continuously take note of what is or is not working (via student-level data, technology applications, pedagogical strategies, leading teacher / TLC feedback, etc) and identify a plan of action. **(G)**
- Collaboratively, transparently, and proactively seeks out feedback from students, parents, and colleagues to continuously improve instruction and teaching practices. **(C)**
- Engages in problem solving through continuous planning, designing, testing, evaluation, and recalibration of teaching methods. **(G)**
- Uses technology creatively and purposefully to work effectively and efficiently. **(G)**
- Communicates effectively, connecting learners to sources of information beyond the classroom teacher and textbook. **(R) (C)**
- Keeps communication open, and takes advantage of all channels open to them: Phone, DECV Online messages, email, online classes, 'open hour' availability. **(R) (C)**
- Communicates authentically, with a consistent message, empowering the school community employing positive language. **(R) (C)**
- Can articulate the role a virtual teacher plays within the DECV, and within our education system. **(C)**
- Builds strong relationships through student visits, seminars, incursions and excursions, home visits etc. **(C)**

Student Wellbeing

- Understands the way students make connections online, and is able to support the development of effective collaborative groups through this understanding. **(E) (C)**
- Is prepared with flexible approaches to support diverse students with specific social, emotional and medical needs. **(E)**
- Builds strong relationships with parents and other stakeholders involved in the students learning experience. **(E) (C)**
- Guides parents and supervisors with role specific advice that enables them to better support students in their academic development. **(E) (C)**

Technical Skills

Data Practices

- Uses qualitative and quantitative data to understand individual skills, gaps, strengths, weaknesses, interests, and the aspirations of each student, and uses that information to personalize learning experiences. **(G)**
- Continually assesses student progress against clearly defined standards, goals, and outcomes to identify specific topics in which each student needs additional support to achieve mastery of a concept or skill. **(G)**
- Uses data from multiple sources, including the DECV Database, DECV Online reports, observational data from Adobe Connect classes in a complementary way to inform and adjust individual student instruction and groupings. **(G) (C)**
- Creates ways to move ownership and analysis of data to students to promote independent learning. **(G)**
- Continually evaluates technologies, tools, and instructional strategies to ensure their effectiveness. **(G)**
- Is able to differentiate through a use of digital tools that support students with a range of abilities and differing needs. **(G) (E)**
- Selects and organises digital content and tools that support different pedagogical approaches.

Instructional Strategies

- Provides resources for students to learn content and enable them to work independently and/or in cooperative groups. **(G) (C)**
- Provides resources for students to create evidence of their knowledge in a variety of formats to demonstrate mastery. **(G)**
- Creates customized learning pathways with students, where learning goals and objectives are linked to explicit and diverse learning experiences, matched to the individual student's learning performance level and preferences. **(G)**
- Tailors content and instructional strategies to individual learning goals, needs, and interests. **(G)**
- Creates pedagogical approaches and learning experiences that promote content-based problem solving and online collaboration. **(G)**
- Develops and delivers valid and reliable assessments, projects, and assignments that meet standards-based criteria and assess learning progress by measuring student achievement of learning goals. **(G)**
- An understanding of gaming concepts and how they can be accommodated within online learning pedagogies. **(G)**

- An understanding of the ways in which mobile learning can be best leveraged to support student learning. **(G)**
- Is able to guide students in metacognitive awareness of which digital tools should be correctly selected to support achievement and the development of academic skills. **(G)**

Management of Online Learning Experiences

- Understands and manages the online components of online lesson planning and organization. **(G)**
- Provides balanced opportunities for students to participate in asynchronous and synchronous spaces, regardless of the course structure they are presented with. **(C)**
- Develops, practices, models, and embodies respectful behaviors in both face-to-face and online learning environments. **(E) (C)**
- Demonstrates technical troubleshooting skills. E.g., coping with Adobe Connect connection failures, hardware errors, headset glitches etc.
- Has an understanding of how to approach the synchronous and asynchronous development of online and offline audiences, where meaningful exchange and engagement between these different 'worlds' is achieved. **(G) (C)**

10. Skills and Knowledge Adoption

Literature Review

While the literature supports the benefits of our pursuit of the attainment of these skills at DECV, the factors that may influence staff adoption of them also require explanation.

The literature recognises the principle known extrinsic barriers to adoption are the availability of resources, time, access and the degree of technical support. These are the key influencers on the ability of staff to attain the skills required to teach effectively online (Prestridge, S. 2012).

At the DECV, we have responded to these key extrinsic factors in a number of specific ways:

- DLL provision of regular internal PD
- DLL provision of a comprehensive portal of self paced programs specific to areas of key skill attainment - available at any time. Includes digital badges awarded as recognition of completion.
- DLL provision of whole staff development opportunities to encourage shared practice.
- DLL provision of a detailed staff survey based on the skills detailed above to more accurately identify barriers to attainment.

- DLL provision of general support periods twice a week to ensure access and technical support are available at a point of need.
- Weekly DECVOnline Team meetings where extrinsic barriers are met and resolved as they emerge.
- Technical Team reports on the emergence of extrinsic barriers through Service Desk reports.

Even with the increase in availability, training, and support, diffusion of new technologies remains slow (Ertmer, 1999; Perrotta, 2013; Su, 2009). This lack of uptake directs the search towards internal second-order barriers, which are classified as intrinsic forces that impact on technology use (Ertmer & Ottenbreit-Leftwich, 2010; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

Equally challenging however are the beliefs and perceptions of the influence of technology on a teacher's pedagogy that may inhibit adoption. In particular, this can be observed where teachers have some understanding of the technology they need to employ or already employing, but may not value it in their practice.

We also know that teachers are likely to plan and implement practices with technologies that reflect their beliefs about teaching and learning (Drenoyianni & Selwood, 1998). Prestridge, S. (2012) observes that teachers beliefs about the role of ICT as a teaching tool are also based heavily on the level of their confidence and competence in employing digital tools.

Additionally, as technology is used by practitioners they undergo 'pedagogical evolution' resulting in shifts of practice, thinking, and beliefs (Tondeur et al., 2017). As teachers use technology they make judgements about its impact on student learning. Through this evaluation, teachers over time will gradually challenge and shift their beliefs about technology integration (Ertmer & Ottenbreit-Leftwich, 2010).

Teachers in online schools are often encouraged in the pursuit of improving online skills by the lack of face-to-face opportunities with students. A desire to uncover a greater range of creative ways to "reach and elevate" students (Davis et al., 2007) is often the result.

However according to the DECV Staff survey (2018), staff believe that while they are able to provide a safe and motivating space in which students can learn, they are not always able to provide creative approaches in online environments. This lack of confidence in their ability to meet the needs of students can also result in a lack of self efficacy, and lower use of digital tools as a consequence.

Contributing to this is the belief held by almost half of DECV teachers (Staff Survey 2018) that their programs require only minor adjustment to respond to student need. In other words, teachers are not necessarily inclined to see their program as one they either can or should adapt in any significant way for their students. If we are to better develop teachers skills, they

must view their programs as a more malleable construct, one which they might adapt in creative ways to suit current student need. One way in which to both encourage staff to consider more creative responses and to develop a stronger appreciation for program modification to meet student need, is to adopt more constructivist approach.

The relationship between constructivist approaches, and the likelihood of staff more readily adopting a broader range of approaches with technology into their teaching practice is seen in the literature as highly influential (Becker, 2000; Ertmer et al., 2007; Jonassen, 2006; Scrimshaw, 2004). Teacher beliefs about the nature of the subject they are teaching and its suitability for these types of approaches can also greatly influence adoption.

We can provide greater clarity for teachers on how to consider their understandings of pedagogy, technology and content using TPACK. This is particularly critical in ensuring that teachers have not only a knowledge of the technology they are employing but how it fits with their pedagogical practice. The TPACK model supports teachers by more clearly illustrating where the intersection of Technology, Pedagogy and Content knowledge occurs, Mishra and Koehler (2006, 2009). It is increasing encouraged as a standard essential for teacher education. The model provides a method of conveying to teachers where their belief may be adversely influencing their adoption or more flexible and creative approaches to teaching with technology.

TPACK is a crucial tool in teacher reflections in online schools, particularly as technology is always in a state of flux, and as a consequence teachers will never have complete knowledge of the tools available (Ertmer & Ottenbreit-Leftwich, 2010). The tool presents the opportunity for teachers to self reflect, and consider the constant negotiation between the practitioner, context, and internal and external processes (Orlikowski, 2008).

Teachers are constantly forced into a position where they must begin again, with newly integrated tools, reconsidering their pedagogy and their considerations on the delivery of content afresh. (Phillips, 2016 and Ertmer & Ottenbreit-Leftwich, 2010).

Phillips (2016) suggests that the context makes technology integration temporary, situated, unique, and adapted to a space and time. What further muddies the waters is the lack of prior pedagogical knowledge about the usage of these technologies (Li & Choi, 2014). It is difficult to form well founded judgements, a key component in practitioner expertise, when little is known to inform these actions (Hargreaves & Fullan, 2012). What results is hesitance to adopt innovations as the change happens constantly with little warning (Straub, 2009)

The SAMR model, developed by Dr Ruben Puentedura also provides us with a clear structure that illustrates the advantage of adoption of new teaching practices. SAMR allows teachers to better understand the depth of their adoption of technology, and how this may be influencing student outcomes.

11. Networks

Literature Review

As the DECV continues to make strides toward more complex forms of teaching and learning online, and as our use of the platform we employ becomes more sophisticated we will need support. While we have made significant progress, we must continue to look at where other equivalent providers are finding success, and share our own. Adopting stronger ties with other online school networks is strongly recommended.

According to the DECV Staff Survey Report in 2017 and 2018 however, almost half of DECV staff rarely seek advice from teaching and learning networks online (Q37, 2018 DLL SS Report). Of those staff that do identify that they regularly seeking support or advice from outside networks, a small majority are in VCE, with no primary staff and few 7-10 staff identifying as having any external support networks they turn to regularly online (Q37, 2018 DLL SS Report).

There exists overwhelmingly strong collegiate support at DECV, with 96% of staff feeling confident to either support a colleague in resolving a problem, or knowing where to seek out the right support for them should they be asked (Q14,15, 2018 DLL SS Report). 83% of staff feel they are able to turn to their colleagues for support when encountering a problem with an increase of almost 10% in the number feel they are able to resolve a problem quickly in this way.

The notion of broadening this network of support to other providers does seem therefore, to be something staff could readily accommodate. Certainly as we endeavour to further raise the staff skill base in teaching and learning online, the need for further examples of what success can look like, and broader support networks to show us and aid us when challenged will be needed.

12. Exploration as Adoption and Action Research

Literature Review

As mentioned, a concern identified in the Staff Survey in 2018, has been the lack of confidence in taking a creative approach to problems encountered by staff. One approach raised in the literature in relation to a more comprehensive adoption of ICT in teaching and learning is the presence of opportunities for creative exploration or opportunities to participate in new creative approaches to teaching and learning with technology.

Loveless, Burton, and Turvey (2006, p. 10) observe that where 'play is a starting point' and teachers are 'giv[en] permission to try things out', compromise and improvisation in responding to student needs are enhanced. Teachers that became facilitators of creative thinking, rather

than as instructors of ICT functions' were more likely to find adoption more easily. These approaches are perhaps, mostly likely seen in the employment of constructivist approaches to teaching and learning.

To better support skill development, Dawson, Fichtmann, Wolkenhauer and Krell (2013) determined an approach for teachers that somewhat mirrors the constructivist exploration employed with students. They recommend that the opportunity for reflection be provided, and recommend action research as a significant opportunity for providing this. Engagement in inquiry allows virtual teachers to explore the function of the school, the specialisations that exist and the relationships between them.

There are five crucial steps in any inquiry process: (1) learning what inquiry is (2) determine a personal understanding of the exploration, (3) determining a plan (4) collating and reviewing the data, and (5) sharing what is now understood at the end of the process (Dana and Yendol-Hoppey 2008). The personal growth, learning and positive change the research (Dawson & Dana, 2013) outlines as a result of this process, includes: shared practice with colleagues, personal growth, broader institutional understandings of both the process and teaching and learning and reflection on individual practice.

Aligned with the PLT process, a formal adoption of a more constructivist approach to encourage greater focus on the adoption of exploration needed for the adoption of the skills and mindsets needed in our online teachers is strongly recommended.

13.   Impact

Where we lack data, we are inclined to adopt anecdotal experience and inclinations to guide our teaching and learning. It is critical that any adoption of an action research methodology is driven by measuring impact of each change. Unless you can quantify the impact you are having, unless you can understand the influence of creative approaches their value is significantly reduced and successes less likely to be replicated.

Recommendation

20. With this in mind, an enhanced understanding in the use of data in online teaching is the final recommendation in this report.

- An understanding of the current data picture at a whole school, sub school, learning area and subject level.
- An understanding of the impact of specific teaching and learning approaches in synchronous and asynchronous spaces through data.
- An understanding of the patterns of behaviour likely to indicate success in an online program.

- An understanding of the student journey, through behavioural flow data and other key data pictures.

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