GLOBAL VICTORIA

EduGrowth

Global Victoria EdTech Innovation Alliance

Designing an EdTech Efficacy Research Report

March 2022

About EduGrowth

EduGrowth is Australia's education technology and innovation industry hub. Through connection and collaboration we accelerate Australia's EdTech ecosystem globally.

EduGrowth connects a community of education providers, industry participants and EdTech entrepreneurs committed to reimagining learning in the digital age. As education transitions to borderless digital delivery, EduGrowth's diverse ecosystem will impact the future of learning globally from Australia.

The programs focus on developing the entire education technology and innovation sector. There are a range of services supporting EdTech companies at each stage of their journey, whilst also connecting education providers and industry participants into the broader ecosystem.

About Global Victoria

Global Victoria is Victoria's gateway to global economies and communities. Global Victoria opens the world to Victorian businesses and welcomes the business world to Victoria.

Global Victoria builds the skills and knowledge of Victorian businesses to grow on the international stage, promoting the state's world-class industry capabilities to international audiences, and leading the nation as the best city in Australia to study in.

The organisation's network of over 20 offices located in key export markets connects Victorian businesses to the right opportunities and contacts, who, in a single conversation, can help to expand their horizons and make their global ambitions a reality.

About the researchers

Margaret Bearman is a Research Professor within the Centre for Research in Assessment and Digital Learning (CRADLE), Deakin University. She holds a first class honours degree in computer science and a PhD in medical education. Over the course of her career researching higher and clinical education, Margaret has written over 100 publications and regularly publishes in the highest ranked journals in her fields. Recognition for her work includes Program Innovation awards from the Australian Office of Learning and Teaching and Simulation Australasia. Margaret's interests include: assessment/feedback, digital education, and sociomateriality.

Michael Henderson is Professor of Digital Futures in the Faculty of Education at Monash University. He is a world expert in the field of digital education, in particular the effective use of technology in internet enabled teaching and learning. In 2020 Michael was identified by The Australian as the national Field Leader in Education research. Unique to his profile is that his research spans early childhood, schools, universities and professional learning contexts. Attracting over $3 million in research funding from the Australian Research Council and other philanthropic organisations and industry, his current research projects are generally aligned with three broad fields: assessment and feedback, risk (wellbeing and creativity), and effective teaching and learning with online technologies.

Phillip Dawson leads research into academic integrity at the Centre for Research in Assessment and Digital Learning (CRADLE), at Deakin University in Melbourne, Australia. He holds degrees in education, artificial intelligence and cybersecurity. Phill leads CRADLE's research agenda on academic integrity, with a focus on experimental studies and new technologies. Phill has published some of the first experimental studies on contract cheating detection and computer-based exam hacking. He is currently engaged in research on different approaches to detect and deter contract cheating, including assessment designs and technologies. He also has a keen interest in how academics make decisions in assessment design. He uses his background in assessment and cybersecurity to protect education from cheating. His work involves unorthodox methods like computer hacking and paying professional cheaters.

Letter to the Reader

To formally commence the Global Victoria EdTech Innovation Alliance, EduGrowth, with the support of Global Victoria, hosted an Innovation Workshop focused on the fundamentals of efficacy, evidence and interpretation. The workshop dove into these three critical elements as they are fundamental prerequisites to EdTech efficacy research, and directly inform the design of the Innovation Sprint testbed trials.

This whitepaper explores evidence, efficacy and interpretation, framed as provocations, by two expert researchers Professor Margaret Bearman, Deakin University, and Professor Michael Henderson, Monash University.

The recommendations outlined in this document are provided in the context of undertaking EdTech research, and offer a best-practice approach to gaining the data and insights required for attracting new education partners.

This whitepaper was developed to guide EdTech companies and education providers considering designing, or participating in, an EdTech testbed research trial. It should act as a reference tool for developing a successful solution for the Australian education market.

The Innovation Sprint teams, as part of the Global Victoria EdTech Innovation Alliance, have used this research approach in the design of their EdTech testbed research trials. We look forward to sharing the findings of the Innovation Sprints and the program as a whole, encouraging similar initiatives to occur in years to come, across Australia.

Consideration Questions

How do you observe and prove a product is ready for market?

What are the necessary elements to consider in product development, particularly for the education sector?

This whitepaper explores three key topics to help an EdTech company answer these consideration questions: evidence, efficacy and interpretation. In providing this overview of the fundamentals of EdTech efficacy research, EdTech companies will be better positioned to launch, engage and sign education customers and grow their business.

Introduction

Building an EdTech business takes time, and for a myriad of factors, it can be challenging to make it to that next stage of growth. For many Australian EdTech companies, finding customers remains their biggest challenge, as well as expanding internationally, finding talent, finding investment, and dealing with regulation and government.

Data and insights from efficacy research have important roles to play for EdTech companies seeking to attract education customers. It enables solutions to be tested in real academic environments, proving the value of the solution with evidence of effectiveness. It offers EdTech companies a better understanding of education setting and their use of technology, and provides the opportunity to gain valuable insights on how to sell to schools and education providers.

For education providers, efficacy research builds evidence to inform decision making. It supports decision-makers to choose, use and implement EdTech more effectively and if participating in a trial, offers the ability to move from trial to adoption of new technologies and solutions as they are proven.

This whitepaper is intended to bridge the knowledge gap for those seeking to develop or participate in an EdTech research testbed trial, or just to better understand, from an academic perspective, how to approach EdTech efficacy research.

5 Key Research Reminders

Be critical of the evidence itself — don't jump to conclusions too quickly.

Sometimes, what you find may be too good to be true. It's important to take a step back and analyse the evidence you have before you. Is the evidence reliable? Would you get the same results again and again?

Whether the learner likes the solution is not proof that the solution is effective.

Likeability can help your EdTech solution become more successful, but you still need the foundation of learner impact and alignment with curriculum. While there are standardised expectations of learner comprehension level, each education institution has a set of varying needs to teach their students.

Quantitative isn't always better than qualitative — it depends on what you're observing.

What does your solution seek to achieve with learners and/or educators? Evidence may not be straightforward, and requires some consideration on what outcomes you're looking for and how to measure and find those outcomes.

Each data point needs context to understand it.

Context is key — data can never be understood on its own. Observe the contributing factors that may have made your solution successful or unsuccessful, and carefully consider the learner outcomes as a result of using your solution.

Have multiple people and perspectives review the data.

We, as individuals, can be stuck in our own interpretations of the information available to us, based on our own personal knowledge. Invite others on your team or a paid analyst to review the data that you have. You never know: there may be a pattern or learning in the midst that will change the way you view your solution.

The Global Victoria EdTech Innovation Alliance

The Global Victoria EdTech Innovation Alliance (the Alliance), delivered by EduGrowth, is a program designed to support collaboration between Victorian EdTech companies, education providers, researchers, and international organisations.

The Alliance facilitates Innovation Sprints: individual pilot projects of Australian EdTech solutions being tested for efficacy in Victorian and international education settings over a 26-week period.

Each Innovation Sprint, with the support of an independent Victorian research partner, designs the pilot program with consideration for the education or learning environment, EdTech implementation and onboarding, evidence and data collection, success metrics, and interpretation of results.

At the conclusion of each Innovation Sprint, the EdTech solution will receive an evaluation report from the Victorian research partner. They will also participate in an Innovation Symposium to showcase the pilot in a case study format.

Deakin University and Monash University are the appointed research partners. They will provide guidance and mentoring for Innovation Sprint teams to accurately measure the impact of their EdTech solutions.

Innovation Workshop

The Innovation Workshop explored the topics of education innovation and learner efficacy delivered by two distinguished EdTech researchers: Professor Margaret Bearman of Deakin University and Professor Michael Henderson of Monash University. Workshop attendees included Victorian educators, EdTech entrepreneurs and other industry participants contributing to the broader education technology ecosystem.

The speakers set out to explain the nuances of EdTech evidence, efficacy and interpretation.

Highlights

The provocations, led by the researchers, included valuable insights on each of the three topics. Below are the highlights from the sessions, and questions for EdTech companies to consider during each stage.

Evidence

> Evidence is about building a compelling case.

The three stages to observe in evidence are **effects**, **outcomes** and **impact**.

Effects are the changes.

Outcomes are the specific and measurable effects. They tell us if the changes have occurred.

Impact tells the story, focusing on the long-term results or changes. They can be difficult to measure. Impact is tied to the experiences of people.

If we aren't careful about what we're measuring or why we're measuring it, this can have a negative impact on teaching and learning. It's for this reason it is important to be critical of evidence itself. Be careful of jumping to conclusions or of correlations.

Consider the nature of the evidence — in relation to both validity and reliability. It's important to check if it is reliable, and whether you will get the same results if tested subsequent times. In a different context with different variables, the results can change. Validity, in contrast, is asking if the phenomenon measures or reports on what it claims.

Quantitative isn't always better than qualitative — it depends on what you're observing.

Some questions to consider are:

- What effects are expected/desired?
- What are the possible undesired effects?
- What are your objectives?
- What effects will help you demonstrate progress in your objectives?
- What are your impact goals?
- What are observable patterns? And which are measurable?

Efficacy

> If any of the variables are zero, then the efficacy goes to zero. All are required to make a product efficacious.

Efficacy = P(rocess) x I(ntended outcome) x A(cceptability) x F(easability)

Process

Outcomes are not the only measure of success. Rapid prototyping, for example, is a process-based evaluation that informs design. It not only informs what you did, but is a marker of what you will be doing. Consider how your product draws upon learning theory, aligns with good educational practices, and ensures it is ethical to use for both learners and teachers.

Intended Outcomes

Qualitative data can reveal contradictions. Intended outcomes are easy to write, but can be difficult to achieve in regards to measurement.

Acceptability

Whether users enjoy engaging with a product is not the same as if the product is effective for learning and teaching outcomes. However, the degree to which a student likes a solution is important. It can act as a gatekeeper to other departments or other schools. For example, if a service nudged a learner each time an assessment came up, they might find this irritating. Despite the nudges potentially having a positive impact on whether they turned in the assignment in on time, it does not gain the desired acceptability.

Feasibility

This takes into account the cost, resources and timing of an intervention. If a solution is too expensive, it must be noted whether it is educator cost or student cost.

Types of evaluation to understand:

Once you have evidence, it's time to evaluate the efficacy:

- Research evaluation is a key part of evaluating the efficacy of a product or solution. Research evaluation describes how the project has been implemented, usually in relation to the intended process and expected milestones, effects or activities. This is what you deal with along the way.
- Outcome evaluation tells us what kind of change has occurred, typically in the target population in reference to the stated objectives.
- Impact evaluation paints a picture as to how a program might have affected participants' lives on a broader scale.

Interpretation

> Any form of efficacy or any form of evidence is about working with people. What's feasible to one person isn't to another, and what is acceptable to one person isn't acceptable to another. There can be subjectivity to this.

Generally speaking, a data point does not speak for itself. Likewise, almost any piece of information needs to be understood in its context. We know intuitively that things can work differently in different places, used by different people. This is why we can't cling too closely to any numerical formulas about evaluating evidence or efficacy.

Even the very basics of quantitative data require some degree of interpretation. As EdTech is in the business involving people, interpretation can be hard.

Having more people in the room to look at that data can be most helpful. We, as individuals, can be stuck in our own interpretations of the information available to us, based on our own personal knowledge.

What to consider when interrogating the data:

- Would certain types of users benefit from this solution over others?
- Do varying circumstances change the learner impact?
- Does the context radically change the way you think about the data?

Benefits of following researcher recommendations

Education requires rigorous pedagogical consideration in the design of EdTech products. When developing a solution for learners and educators, it is important to stay relevant to the current needs of schools and institutions. Pedagogy, curriculums, and year-level expectations evolve and change over time, making the end-user feedback or co-design element of EdTech critical to success.

With the researcher insights in mind, here are the key benefits of a research-informed approach to EdTech product development:

- Exhibit best practice for product-market fit
- Increased understanding of current education settings and their needs
- Demonstrates value of the solution
- Incorporate end-user feedback into product design
- Product credibility
- Evidence to administrators and educators of solution efficacy

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The Global Victoria EdTech Innovation Alliance forms an integral part of the Victorian Government's $33.4 million International Education Short-Term Recovery Plan. This plan aims to support the short-term economic recovery of the international education sector, and to continue to support international students, in response to the COVID-19 pandemic.