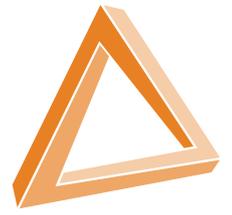


# Evidence-Based EdTech Diagnostic



## EDUCATE Programme: Research Materials



## Research Quality Indicators: Preparing for High Quality Research

To find out how you can benefit from examining your EdTech through a 'research and evidence mindset', contact our Accelerator Team at [hello@educateventures.com](mailto:hello@educateventures.com)

### Judging the Quality of Research Indicators

#### Theoretical Context

- Two well-known schools of thought underpin different types of research, their methodologies, and usefulness - 'positivist' and 'post-positivist' (also known as constructivist)
- The **positivist perspective** seeks universal truths or realities that are considered to be 'out there' as a law of nature just waiting to be found. Early scientific research adopted this approach, which led to the discovery of gravity, electricity, microwaves, etc.
- The **Post-positivist (constructivist) perspective** considers a reality that is mediated by human subjectivity and constructed within the context of culture, social perceptions, and social norms

- In applied research, we are not committed to one perspective. We use the entire scope of research methods and apply different approaches depending on what we are trying to learn, and whether our research question is concerned with evidence of something that has happened or with people's perceptions and experiences. To conceive a holistic picture, often both perspectives are needed
- In the **EDUCATE Programme**, we will focus on using both positivist and post-positivist criteria to judge the quality of evidence. Depending on the purpose of your research you should employ the most appropriate criteria for your research and evaluation
- It is important for you to be familiar with these criteria for two reasons:
  1. You should consider them while you are setting up your research or trial design
  2. You should use them while engaging with research evidence provided by others, so you can judge its quality

# Application to EdTech Research

Adapted from: Indicators of 'Good' Research Evidence, (o'Leary, 2004)

- At EDUCATE, we propose using the best of both worlds and combining positivist and constructivist approaches to best suit your own contexts as EdTech developers conducting or consuming research
- **Reduce bias by incorporating more objective measures**
- Positivist perspectives emphasize the **objectivity** of data
- While true objectivity is arguably impossible to reach, some types of data are less subjective than others
- Try to incorporate **performance** evidence with **perception** evidence:
  - Address how people perceive the **change** in themselves or in others
  - Assess the **actual change in knowledge, behaviours, and skills**, by comparing **observable behaviour** of the same people at different stages of engaging with your product or service

## Example

- An EdTech is aimed at increasing the workforce readiness of international university graduates by enhancing their soft skills
- The researchers included two measurement tools:
  1. A survey to assess how the participants perceive the change in their confidence, collaboration skills and time-management skills
  2. A performance assessment tool for programme mentors, to support creating a pre-participation and post-participation evaluation of the participants' confidence, collaboration and time-management skills

## Expert's Tip!

- **Outputs** should always be observable. Make sure your outputs are well-defined and you have a clear perception of how to monitor them. **Outcomes** should include at least an observable component. Your claims will be much more convincing if you can demonstrate visible change



## Neutrality

**Try to remain neutral and open-minded to enable unanticipated insight**

- The post-positivist perspective does not presume objectivity. Instead, it promotes an approach of **neutrality**. Try remaining neutral, non-judgmental, and open to learn things you have not anticipated or even things that contradict your assumptions and premises - often this is for your own good as both a researcher and an EdTech

developer. Make sure your research design, at least in the initial stages, includes some form of open-ended questions, or you will be limiting yourself to feedback on issues you have anticipated in advance

- Keeping an **open mind** and welcoming the findings with neutrality is a strength. Use **awareness** as a means of managing your own expectations and hopes towards what you might find out



# Pointers for Increasing Objectivity and Reducing Bias in Data Collection

## Observations

- Define specific rubrics of data that you want to collect. If you want to learn of both “what happened” in terms of the actions people performed and what the social-emotional settings were, consider having two different people observing, each focused on a different aspect. Keep in mind that in the case of online platforms and apps, a lot of data is collected at the backend level – consider this as an “observation” of how people interacted with your product

## Interviews

- Make sure interviews are at least semi-structured, and the interviewers are following a set protocol

## Surveys

- Make sure questions are as unambiguous as possible, cover all relevant possibilities and leave room for ‘other’ if needed

## Are the Findings Telling us Something about the World?

### On reliability, validity, dependability, and authenticity

- Researchers are always concerned with the ability to “say something about the world” based on the research they conducted
- Do our findings represent a phenomenon in “real life”?
- Does what we were able to measure reflect that quality or property that we claim to have measured?
- Does our interpretation of the findings over-generalize?
- Are we capturing all aspects of the phenomenon?
- Are we mixing up between different things?
- All of these are questions of **validity**, and they should always be in the background when we either design research, interpret our findings or consume research conducted by others and interpretations by others. In short, validity indicates that the methods used warrant the conclusions reached
- The **reliability** of the research measures, procedures, and instruments is a component of the validity of the research. Unreliable tools or procedures can produce different results despite no change in the real state. Such differences could result from either systematic bias or random errors, and they have to be recognized to be treated
- Reliability imposes a constraint on validity - to put simply, if the tools for collecting the data are not reliable, then the research cannot be valid. Researchers have methods for assessing reliability, such as comparing the responses of several different and independent judges, assessing the internal consistency within a research instrument and more. Testing the instrument’s reliability is part of a validation process

### Expert's Tip!

- **Existing validated instruments can be found for many of the constructs that you might want to measure when conducting research for an EdTech. Do not unnecessarily invent the wheel – try to find existing instruments that apply to your context**
- Another aspect of validity is reproducibility: can and will the same findings emerge if we were to conduct the research again? Findings that appear to be more or less constant point to a phenomenon that is robust, which means it is consistent and persistent. If studies yield different results each time, then either the research design is flawed, or the observed effect might have been incidental
- Research should be auditable. When describing your own research, make sure the context, the methodology, and the procedures you used are clear and elaborate enough for anyone who might want to try to reproduce them in the future. This is true even for inner-company communications, to preserve organizational knowledge. Outside readers who want to assess the quality of your research may also require that you elaborate on these

### Expert's Tip!

- **When presenting findings from your research to stakeholders, start by explaining in detail how you obtained them. Understanding the process makes the conclusions so much more convincing!**



# Acknowledging the Limitations of Validity

- In any social context, complete reliability is near impossible to reach. Post-positivist approaches would claim that because everything is context-dependent, true reliability is non-existent
- These approaches suggest **dependability** as the appropriate criterion for assessing research quality – Were the methodologies used described in sufficient detail? Were they developed in a manner that is consistent, logical, systematic, well-documented, and designed to account for research subjectivities?
- Like validity, **authenticity** is also concerned with truth value but allows for an expansion of the conventional conception of singular truths. Authenticity indicates that rigor and reflexive practice have assured that conclusions are justified, credible, and trustworthy
- In the context of EdTech development, this is especially relevant in earlier, explorative phases when obtaining substantial amounts of data is too difficult and you need to rely on limited data. You should attempt to make a convincing point by explaining why and how the limited data have captured the essence of the answer(s) to the questions you are investigating

## Expert's Tip!

- **A consistent logic model that includes examining assumptions is a very effective way to design research that will have external validity, or in other words, be perceived as valid. Invest in your logic model. It may sometimes feel tedious, but it is always worthwhile**

# The Bigger Story

- Research is really about extracting a piece of some real-world happenings, taking a careful look at it with various tools and then reaching a conclusion that should go beyond that specific piece. The way we can go beyond our findings depends on our research question, on our research design, and on the type of data we have collected
- Quantitative data is usually used to answer questions about frequency or prevalence, probability, correlations, differences between people and between groups and more. The ability to base broader conclusions on findings from a sample, or a limited amount of data, is called **generalisability**, and it is based on statistical methods
- Statistical generalisability requires several conditions, mainly that there is enough data and that it is representative of the population to which the generalization applies, in relation to the variable observed. For instance, evidence from a small number of sample schools can provide indications for the effectiveness of an EdTech product, but this can only work if the diversity of these schools is representable of that of the product's target population
- Qualitative data, on the other hand, is usually based on much smaller samples. Its purpose is to answer qualitative questions, about people's subjective experiences or about the impact of contexts. Qualitative findings are usually not statistically generalizable. A high-quality analysis of qualitative data, however, can lead to conclusions that are transferrable. Rather than make 'claims' about populations, **transferability** highlights insights that are likely to be applicable in different settings or across populations

## Expert's Tip!

- **To create good samples and produce appropriate generalisations, you should be aware of the composition of your target population. Use the "target population" rubric of your logic model to describe groups or types of users that might interact differently with your product or may reach different outcomes**



# Evidence in EdTech

To find out how you can benefit from examining your EdTech through a 'research and evidence mindset', contact our Accelerator Team at [hello@educateventures.com](mailto:hello@educateventures.com)

- Evidence of the **impact** of EdTech on teaching and learning is often at the forefront of **demands**, particularly from those who dictate the **funding** available to pay for technology within education. As has been shown in numerous **meta-level investigations**, (see for instance Cox et al., 2003), evaluation of the impact is a **challenge**. This is magnified when evaluating **emerging innovative technologies**
- **Pedagogical change** is at the core of these technologies, both because their design evolves over **time**, but also, arguably, their *raison d'être* is to **transform the learners' experience** (Cukurova & Luckin, 2018)
- The increased challenge is at least partially due to the **unwritten expectation** that, in traditional impact evaluations, evidence regarding the impact of an intervention is considered as a **shield against change**. The generation of **scientifically robust evidence** can be used by stakeholders, such as policymakers, for an educational intervention's **standardisation** and **scaling**

- **Change** is the essence of emerging technologies, though. Three years after an original report reviewing emerging technology innovations in education (Luckin et al., 2012), there was evidence that only **39 of the 150 innovations** (26%) were still in active use. Therefore, in the context of emerging technologies, more **value** is to be found in the careful consideration of different **types** and **sources** of evidence that are appropriate to the **current state of the technology** as well as in the use of **robust research methods** to generate **new evidence**
- This requires an **evidence-informed decision-making process** for the **design and use of EdTech**, rather than only considering evidence as the **outcome of the evaluation**
- Taking into account the peculiarities of the **local context**, the accumulated experience and judgment of **educators**, and the perspectives and values of **users**, and combining these three with the fourth source, **the best available research evidence**, can provide a more productive way forward in the attempt to bring evidence into **educational practice**

- Excerpt from '[Evidence & the Golden Triangle of EdTech, \(EDUCATE, 2021\)](#)' by Professors Cukurova, Luckin, Clark-Wilson

## Who can help me?

*We are specialists in educational research and evidence-based technological development for schools and education and training businesses*

The EDUCATE Programme promotes **excellence** in the EdTech community by providing **training** and **mentoring** to support and promote the use of **evidence-informed EdTech**. Our research-focussed programme, based on the **Golden Triangle**, bridges the gaps between **EdTech designers** and **developers, researchers in education and EdTech**, and **users**, to ensure that EdTech products live up to their **promises**.

To find out how you can benefit from examining your school or business through a 'research and evidence mindset', and focussing on '**what works**', contact the **Accelerator Team** at EDUCATE Ventures Research today:

[hello@educateventures.com](mailto:hello@educateventures.com)

Thanks for reading!

- The EDUCATE Ventures Research Team  
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