

Byte-sized edtech research



The Evidence-Informed Learning Technology Enterprise Framework

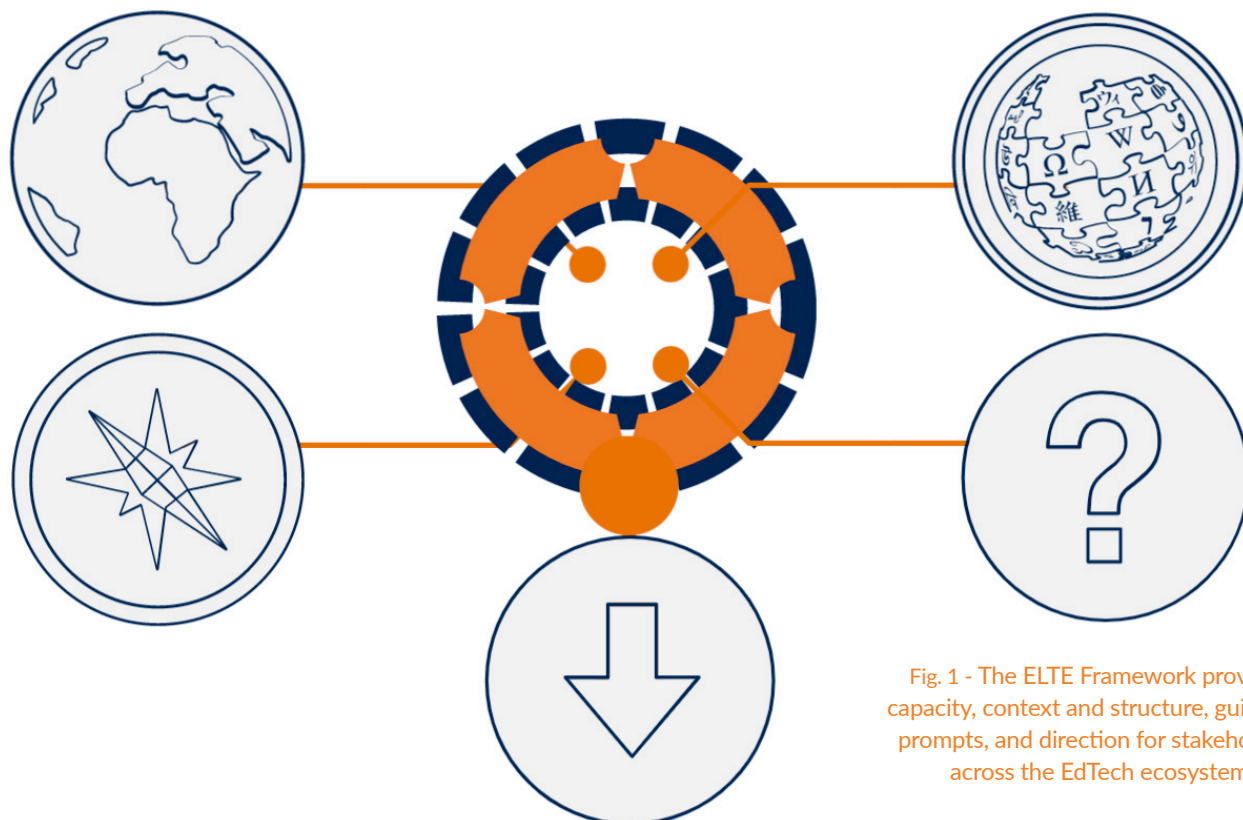


Fig. 1 - The ELTE Framework provides capacity, context and structure, guidance, prompts, and direction for stakeholders across the EdTech ecosystem

- More than **1200** EdTech companies exist today in the UK alone (Clark-Wilson et al., 2021), coming from a wide range of backgrounds. In many cases, however, the **intention** and **vision** of the company are not matched by the **ability to develop products that are educationally sound**, causing entrepreneurs to make claims about the **potential of their learning technologies** that aren't backed by **empirical evidence**
- Meta-level investigations, such as Cox et al. (2003), confirm that **impact evaluations** for emerging EdTech companies, used to **standardise and scale** (Cukurova et al. 2018), are a **challenge** for the research community and the entrepreneurs themselves, as startups are in **constant flux**, and change is in their very nature. **Assessment** by stakeholders, such as policy-makers or investors, becomes very **difficult**
- Such is the pace and **unique context** of the development of EdTech, that in a report reviewing EdTech startups in the UK, only **39 of 150 innovations** were in use in their original form **3 years** after deployment (Luckin et al., 2012)
- The **research task** ahead of entrepreneurs is **immense** and would need to be matched by a **complementary research**

methodology and **robust set of methods** compatible with startups in the new decade. To that end, the **Evidence-informed Learning Technology Enterprise (ELTE) Framework** was developed, designed to better connect **academic research** to **EdTech enterprise**. The ELTE Framework provides:

- **EdTech companies** with a guide to help cultivate within their organisations the **necessary capacities** to ground products in sound evidence
- **Academics** with a **context and structure** in which they can explore the way their research might be used by a company to secure valuable impact
- **Investors** with **guidance** should they wish to investigate whether an EdTech innovation is worth **funding**
- **Policy-makers** with prompts to allow for **evidence-led decisions** that do not **stifle** entrepreneurship whilst protecting users from **false claims**
- **Learners** with the ability to investigate the **quality** of the products in the available market so that **evidence** leads the conversation

“When the user **does not understand** their own learning process and their own **strengths and challenges**, they depend on products being **tested** and feedback being **designed with their vulnerability in mind.**”

(Moeini, 2020)



01 How was the framework **developed**?

- It started with the goal of understanding how to **better support EdTech enterprises**. The pursuit of this goal produced the research question: ‘**what theoretical framework supports EdTech enterprises to build evidence-informed products and services?**’
- A design-based research methodology with **six cycles of research**, grouped into three phases, was planned, each with goals that evolved in an iterative way. There were **60+ participants**. The design-based research approach was chosen after a highly exploratory phase surveying **London’s EdTech ecosystem** prior to cycle 1
- Part 1 (cycles 1 and 2) focused on developing the **construct** in question (**a practical framework for building research-minded EdTech enterprises**) and it did this through a **participatory design process** with **key participants**
- Part 2 (cycles 3 and 4) focused on **evaluating** the construct with participants
- Part 3 (cycles 5 and 6) **validated the framework** with EdTech enterprises both from the UK’s ERDF part-funded **EDUCATE Programme** accelerator (2017-2019) and also the greater global EdTech ecosystem

02 What’s in the framework **exactly**?

- The ELTE framework contains:
 - Six **sub-constructs** indicating the **cultivation of the necessary capacities** for companies to build products grounded in sound evidence: **Leadership Vision, Learning Culture, Sense of Purpose, Teamwork, Research Know-How, and Action Orientation**
 - The **ELTE Survey** (Moeini, 2020, p231) outlining all facets of each sub-construct in the framework
 - The **ELTE Hierarchy Model**, introducing the **sub-construct dependencies**
- Methodological contributions, including the **ELTE Action Model** (Moeini, 2020, p168), an effective **boundary object** for researchers (when approaching EdTech enterprises) to understand how the ELTE framework has uniquely manifested within the **structures** of those organisations
- The **ELTE Hallmark Questions**, an **introductory tool** for researchers to give context to enterprises regarding the ELTE model prior to a **workshop, line of inquiry, or discussion** on the model’s particular **manifestation** in the context of an EdTech enterprise

03 What are **the limitations** of the framework?

- A theoretical **limitation** of the framework is that claims cannot be made until they are tested ‘**in the wild**’ (Hutchins, 1995). These are speculations based on the EDUCATE Programme accelerator mentors who did not have a view of what was happening ‘**on the ground**’ in the workplace and the varying prior experiences of working with EdTech SMEs
- Though phase 3 of the study underpinning the development of the framework focused on **perspectives** of **EDUCATE Programme enterprises**, as well as wider ecosystem stakeholders, a **larger sample** of EdTech stakeholders would need to be engaged **globally** to **validate** the survey part of the study involving quantitative methods
- Goldstar Education Ltd.** is continuing this research as of 2021 and beyond

04 What is the framework’s **potential**?

- EdTech entrepreneurship is **exploding**, given the **global need for digital learning solutions**, particularly resulting from the COVID-19 pandemic, which the ELTE construct is timely to support. The ELTE is a novel framework and has the potential to be of service in the development of numerous **learning tools**, globally
- For **users**, the framework’s potential is in the **maximising of impact** from their selected digital products. The ELTE Survey allows buyers to know what companies have a **higher education impact potential** and therefore which are worth **resource investment**, such as that of **time, money, and training**
- For **developers**, ELTE results can **guide their intervention’s development**, and educate them in what is required to be impactful enterprises in the EdTech ecosystem
- For **academics**, the **key components** for use in the framework include the **ELTE Hierarchy Model, the ELTE Hallmark Questions, and the ELTE Action Model**, which aid in the process of better connecting **academic research** to **EdTech enterprise**
- These ELTE constructs have instigated a line of research that can be built upon **beyond education**, in the fields of **management, leadership, entrepreneurship, social entrepreneurship, impact assessment, and organisational psychology**, for example
- The sub-constructs of the ELTE framework touch many **academic communities** and offer multiple opportunities for **future collaboration**

“Edtech research must not only answer the question of whether edtech **works**; it must also answer **in what context** a product or service does and does not work. Without this contextual information, **the research is not useful.**”

(Moeini, 2020)



ELTE Sub-Construct **Hierarchy Model**

- Research findings into the ELTE framework concluded 6 **sub-constructs** exist in the framework. The presence of these in a company indicates the **degree of cultivation** of the **necessary capacities** to build products **grounded in sound evidence**. They are:
 - Leadership Vision
 - Learning Culture
 - Sense of Purpose
 - Teamwork
 - Research Know-How
 - Action Orientation
- In the diagram opposite, you will see the order is reversed. It is best to visualise the dependencies of the sub-constructs as a kind of house, with the foundation, **Leadership Vision**, allowing everything else to be built on top

Roof: Action Orientation

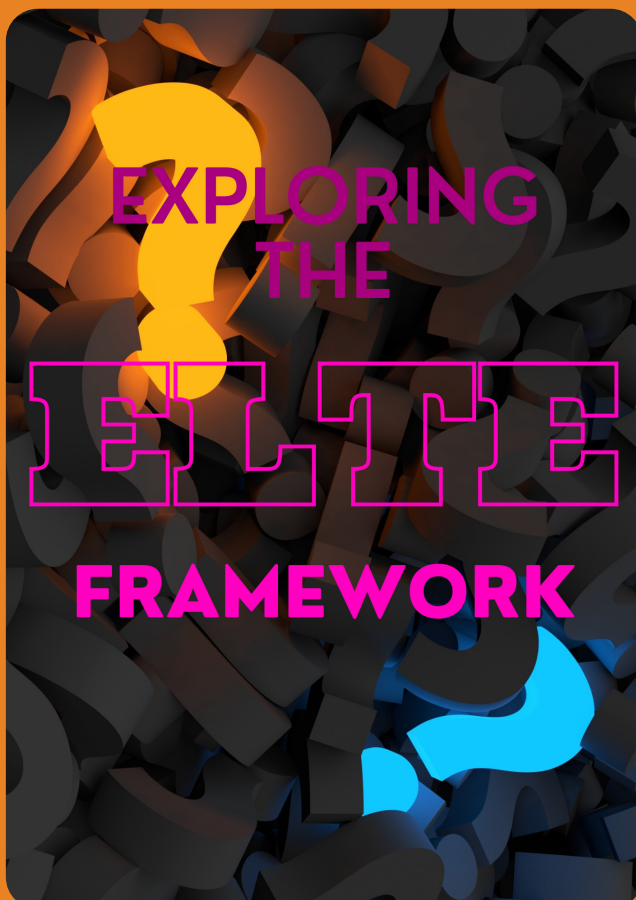
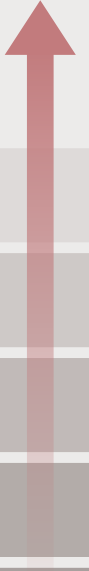
Building Block: Research Know-How

Building Block: Teamwork

Building Block: Sense of Purpose

Building Block: Learning Culture

Foundation: Leadership Vision



ELTE Sub-Construct **Hallmark Questions**

- The complexity of the sub-constructs in the framework can be daunting, especially when **explaining or exploring them** for the first time with a wider network of **stakeholders**
- Hallmark Questions** have therefore been created to help broach each sub-construct more **casually**. These were initially presented to a group of entrepreneurs, students, investors and policy-makers at the European Educational Technology Network (EETN) summit in Finland, February 2020
- If academics in particular have **limited time** to engage with Small-to-Medium Enterprises, **the single most effective question** that was shown to provide a quick evaluation of whether or not an EdTech company was an ELTE, was suggested through discussion with participants in the initial 2 cycles of the research into the framework. The question is: **what research have you done?**
 - Sub-construct 6, **Action Orientation**, validates some evidence of the previous five sub-constructs and indeed is **incumbent** on an evidence-informed enterprise
- In the following section, we will look at each sub-construct in depth, its **definition** and **implications**, the **existing literature** behind it, and its associated **Hallmark Questions**

“Founders’ **influence** in EdTech startups seems to be **substantial** – if EdTech leadership does not have a **research background**, or participate in a **Research Training Programme**, it seems unlikely that the enterprise as a whole will maintain a research mindset **long term**.”

(Moeini, 2020)



The Framework

Sub-Construct 1: Leadership Vision

Definition

- The role of **leadership** in an ELTE is to set the **Sense of Purpose**, and ensure that the conditions in the enterprise are in place to **enable** that purpose to come to **fruition**
- Conditions include:
 - **Setting the vision** for research
 - **Devising and overseeing a concrete plan** to allow it to happen
- **Making sure the right teams are in place** or that there are people to **set up** the teams
- **Communicating research goals and results** to permeate appropriately
- **Prioritising research**
- **Removing obstacles** so that it all happens, ensuring **continuity** of the ELTE status

Implications

- The existence of this sub-construct implies that ‘leadership vision’ is a **requirement** for an evidence-led learning technology enterprise, and that this vision must therefore encompass **all of the other sub-constructs** that form the ELTE Framework. Leadership Vision implies the following:
 1. As illustrated in the ELTE Hierarchy Model, **Leadership Vision is the foundation of all other sub-constructs**. ELTEs are hyper-dependent on leadership having **mastery** of the facets of this sub-construct as outlined in the ELTE Survey
 2. **Enterprises who do not have leadership representation** in a research methods training programme, such as the EDUCATE Accelerator Programme, **will be expected to struggle** to maintain ELTE status **continuity** beyond the tenure of the employee at the organisation
 3. **When leadership is not involved in research strategy, the enterprise is expected to have less comprehensive research plans** that do not permeate the overall **needs** of the organisation

Existing Literature and Supporting Research

- A comprehensive literature review of success factors integral to the survival of technology startups concludes how **critically important** human capital leadership is and the teams that are established (Santisteban & Mauricio, 2017; Zaech & Baldegger, 2017)
- Smith and Petersen (as cited in Legrand et al., forthcoming) proposed that **the mindset of education entrepreneurs can be characterised by four attributes**:
 - **Visionary thinking**, which is in line with the data from the ELTE framework and the need for the **establishment and communication** of the **Sense of Purpose** by leadership
 - **Belief in the possibility of change despite obstacles**, which is characterised by the Sense of Purpose as the organisation’s **raison d’être**
 - **Results and impact orientation**, which is in line with **Research Know-How** and **Action Orientation**, as ELTEs want to capture **high-quality evidence** and pivot business practice accordingly
 - **The drive to build organisations to actualise their vision**, which is characterised by the existence of the enterprise as a whole and its **purpose**

Hallmark Questions: Leadership Vision

1. Does leadership have a vision for how research fits into their **greater organisational goals**?
2. Does the research vision match the **vision of the enterprise**?
3. Does leadership make the research vision **explicit**?

"Technology products are **dynamic**, and, in particular, **emerging technology products pivot at a fast pace**; however, **research is generally slow and measured**. Research must fit into the world of technology if it is to work for entrepreneurs of emerging EdTech companies."

(Moeini, 2020)



The Framework

Sub-Construct 2: Learning Culture

Definition

- Learning culture is a similar construct to Dweck's (2013) **growth mindset**; however, it operates on the enterprise level
- **When an enterprise has the culture that it must remain open-minded, and keep learning in the EdTech industry, and employees are open to this, there is a Learning Culture**
- There is a Learning Culture when **companies have an attitude towards learning, and this permeates each perspective they have**
- For example, research is not something you do once, and understand what your customer needs and if your product 'works', **it is something you do constantly**
- This sub-construct is about genuinely wanting to understand; **it is about proactively seeking knowledge that will help the enterprise get closer to achieving its purpose**. Whilst, for instance, the EDUCATE Accelerator Programme in the UK provided a framework on which companies could build research proficiency; some companies were more effective due to the Learning Culture that they possessed, and the growth mindsets their companies brought to the accelerator programme

Implications

- This sub-construct implies that a **clear and strong Learning Culture must exist for a learning technology enterprise to be evidence-led and that it must permeate all levels of the business**
- Learning Culture implies the following:
 1. **The primary goal of the leadership of an ELTE is to establish and maintain a Learning Culture in their organisation**, as outlined in the ELTE Survey (not discussed here)
 2. **Without a clear vision and set of goals, this sub-construct could result in less efficient workplaces that have more questions than answers**. Leadership Vision is required to balance this culture with **concrete goals**
 3. **The establishment of a Learning Culture must be differentiated from the establishment of a research culture**. Both are important but distinct in an ELTE

Existing Literature and Supporting Research

- D. Anderson and L.A. Anderson (2002, p. 98) explain that 'culture is to organisations as mindset is to individuals'. They suggest that **culture could be viewed as the collection of individual people's mindsets that merge into a set of shared agreements representing the values, operating principles, and stories, of an organisation. Culture drives what is acceptable within, and for, the organisation and is initially forged by the organisation's founders**
- 'Culture forms whether we want it to or not. The only variable is what it forms into' (p. 98)
- In the field of organization development, we talk of 'indicators of culture' such as: **Leadership style; Communication patterns; Decision-making styles; Use of information** (p. 98)
- In a systemic review of the body of work exploring the correlation between leadership and Learning Culture, research found that **leadership is key to establishing an organisation that is constantly learning** (Xie, 2019) and confirms the contention that this type of **transformational leadership skill can be taught** in order to **establish and maintain** a learning organisation
- A growing body of literature is looking at learning organisations and interventions that will aid the development of a growth mindset for team members, giving a **competitive edge for human resource development** (Han & Stieha, 2020) which should be further researched to test applications in the context of the ELTE. It should be noted that much of this research is at the intersection of leadership, teamwork and growth mindset

Hallmark Questions: Learning Culture

1. Is the enterprise always **learning**?
2. Is there a culture of **openness to knowledge**?
3. Are there systems in place to **share knowledge inside the enterprise**?

“There are no laws regulating the testing of educational technologies at the moment, and over-regulation runs the risk of stifling entrepreneurship. This gap in regulators’ knowledge needs to be addressed, not only to enable regulators to better understand the sector, but also so the market can build more useful products for users.”
(Moeini, 2020)



The Framework

Sub-Construct 3: Sense of Purpose

Definition

- This sub-construct is the **core mission** of the enterprise. The mission should answer the fundamental question: ‘what education problem are you trying to solve?’
- The implications of having a **strong Sense of Purpose** were suggested in the above themes as: a **clear understanding** of where the company is going, an **easing of the tensions** between the resource trade-offs of research and business goals, a **drive to collect evidence**, and a supportive business

Implications

- This sub-construct implies that a **clear and strong Sense of Purpose must exist** for a learning technology enterprise to be evidence-led and that **it must permeate all levels** of the business
- Sense of Purpose implies the following:
 - All members of the enterprise should be clear on its Sense of Purpose. **If team members cannot answer the question:** ‘what education problem are we solving?’ the enterprise is **unlikely to meet the criteria** of an ELTE
 - Leadership must play a **large role** in establishing the raison d’être of the enterprise and **communicating its mission** throughout the enterprise
 - A research strategy is incumbent upon ELTEs so they may yield evidence that ensures the enterprise has **achieved its purpose**

Existing Literature and Supporting Research

- Drucker (1973) explained ‘Only a clear definition of the mission and purpose of the organization makes possible **clear and realistic business objectives**’ (p. 59)
- Management literature in mission statements generally agrees that a mission should be clear both **inside and outside of an organisation**, and this clarity is the **catalyst** for a heightened Sense of Purpose in the organisation, which in turn is **necessary for clarifying business strategy**, and is widely accepted in literature as the first step of **strategic planning** (David, 1989; Strong, 1997)
- In the social enterprise literature, Legrand et al. (forthcoming) mentioned a spectrum that exists between the balance, on one hand, of **social benefit over shareholder wealth** (Phillips, Lee, Ghobadian, O’Regan, & James, 2015; Rey-Martí, Ribeiro-Soriano, & Palacios-Marqués, 2016) and, on the other hand, in a **more balanced double bottom line where both are valued equally**
- In either case, as social enterprises (which many EdTech companies define themselves as) measure their success to varying amounts by the **social benefit**, it is therefore **necessary for them to have a clearly laid out mission** that drives the Sense of Purpose in the organisation

Hallmark Questions: Sense of Purpose

- Why is the enterprise doing **research**?
- Why is this **particular product being built** by the enterprise?
- What is the **vision** and **mission** of the enterprise? Is it clear how **research** fits into it?



"Developers and users do not speak the same language; they need a common language and understanding to enable more productive co-design."
(Moeini, 2020)



The Framework

Sub-Construct 4: Teamwork

Definition

- ELTEs understand that research is a team activity. Participants in the study of the framework challenged the notion that an **isolated** researcher or research team can be tasked to complete research activities for, or on

behalf of, the EdTech organisation, and suggested that **successful planning, deployment and use of research activities** can only be done through a **collaborative effort** with representatives of **various parts of the enterprise**, in order to consider all relevant **contexts and goals**

Implications

- This sub-construct implies that Teamwork **must exist** for a learning technology enterprise to be evidence-informed and that **lack of capacity is no excuse for lack of teamwork**, as it is possible for external collaborators to be engaged in a variety of ways

Existing Literature and Supporting Research

- Research into the strategic assembly of teams (McEwan, Ruissen, Eys, Zumbo, & Beauchamp, 2017) suggests interventions such as **training** can improve teamwork in an EdTech enterprise, **grounding it in a shared depth of knowledge**
- The Team Mindset Lab at Boise University, led by Han, focusses on how to understand how team mindsets (**thoughts, beliefs and expectations**) might improve **enterprise performance**

Hallmark Questions: Teamwork

1. Are research initiatives done in **teams**?
2. Does the research team have a connection to **other teams in the enterprise**?
3. What **systems** are in place for individuals to work together on **research initiatives**?



“Technology products are **dynamic**, and, in particular, **emerging technology products pivot at a fast pace**; however, **research is generally slow and measured**. **Research must fit into the world of technology** if it is to work for entrepreneurs of emerging EdTech companies.”

(Moeini, 2020)



The Framework

Sub-Construct 5: Research Know-How

Definition

- Research Know-How is the **mastery of educational research methods within the EdTech context**
- The EDUCATE Programme, launched at UCL's Institute of Education in 2017, developed **the first research training programme** to teach EdTech research mastery to startups

- Research Know-How is **specific to the start-up context**. This sub-construct is about understanding the **research methods** that make sense within the pattern of the EdTech business, and the education research methodologies that will **yield the right evidence**

Implications

- This sub-construct implies that Research Know-How must exist for a learning technology enterprise to be **evidence-informed** and that it **must permeate all levels of the business**
- Research Know-How proposes the following:
 - A Research Training Programme can be further developed to **optimise content based on the goals of the learner**
 - The study behind the ELTE Framework suggested that

there should be a **separate research management stream** in the EDUCATE Accelerator Programme, producing more support around **leadership** to develop **research mastery**

- At least one member of the enterprise needs to have **research mastery** and **leadership** needs to have enough Research Know-How to **hire the right people**, for instance, researchers with educational Research Know-How
- Leadership must **maintain oversight** of the research strategy, and have **realistic expectations** of the research process

Existing Literature and Supporting Research

- This is an emerging area in research; EDUCATE is the first accelerator programme to support EdTech SMEs to develop the domain of Research Know-How
- A review of literature presented by Zhao et al. (2008) concluded that **most evaluations ask the same question** – ‘Does it work?’ – without sufficiently looking at **contextual considerations that result in a larger variety of outcomes**
- The correct question takes the **implementation process and the context** into account: ‘Does it work? If so, how, where, for whom, for how long and why?’ Zhao et al. (2008) concluded that studies show that ‘**appropriate**

technology uses are associated with conditions for technology uses’

- Evaluations must not underestimate the importance of these conditions** and the role of contextual considerations in the efficacy and impact of technology implementations
- Cukurova and Luckin (2018) warned against encouraging educational technology stakeholders towards large-scale evaluations without **considering the valuable and timely indicators of impact** that other methods can yield
- Research quality considerations include **data accuracy** (validity), **precision**, **completeness** and **consistency**, and

Hallmark Questions: Research Know-How

- Does the enterprise have the **knowledge/expertise** to design **appropriate research initiatives** to assess the **efficacy and impact of their products**?
- Is there an awareness of the appropriateness of

different research methods?

- Is there an understanding of what **sound evidence** is, and how it should be **generated and used**?

“At the heart of this research was the question, ‘does the EdTech work?’ And if so, when, where, how, why and for whom? To answer these questions, it is important for the developer of the EdTech to be committed to finding the evidence... and for them to be open to learning the correct way to conduct research.”
(Moeini, 2020)



The Framework

Sub-Construct 6: Action Orientation

Definition

- This sub-construct is concerned with the ability of the enterprise to **act on its research vision**
- Action Orientation can be broken down into two components, the first of which is:
 1. Conducting the research
 2. Implementing **changes** based on **evidence yielded from research**

- ELTEs conduct research in order to act on **findings** – they expect to pivot **constantly**. Based on the learnings from the previous sub-constructs, leadership must have built in **flexible processes** to accommodate such changes
- ELTEs must **maintain** their dynamism as they pivot their products and their business, based on evidence yielded from research

Implications

- Research findings concluded that Action Orientation is **the most important sub-construct** to assess whether an enterprise is an ELTE, as it is **proof** of a research mindset
- An Action Orientation **must exist** for a learning technology enterprise to be evidence-informed as the construct implies that the enterprise not only **conducted research** but also **pivoted their product and organisation** according to findings

- Action Orientation implies the following:
 1. **The single most important question** to ask an EdTech SME to gauge their research mindedness is, ‘**What research have you done?**’, as without action, **efforts in all other sub-constructs are rendered unsuccessful**
 2. **Sustained Action Orientation is proof that all other sub-constructs are working in unison and is the greatest indicator of an ELTE**. The ELTE Hierarchy Model shows that Action Orientation is dependent on the support of **all other sub-constructs**

Hallmark Questions: Action Orientation

1. Was the research plan **acted upon**?
2. Is the **evidence** that is generated **acted upon**?
3. How do you balance **business goals** with **educational goals** when **implementing findings**?

