

ICEIE 2024

Methodology

<https://eduevidence.org/>

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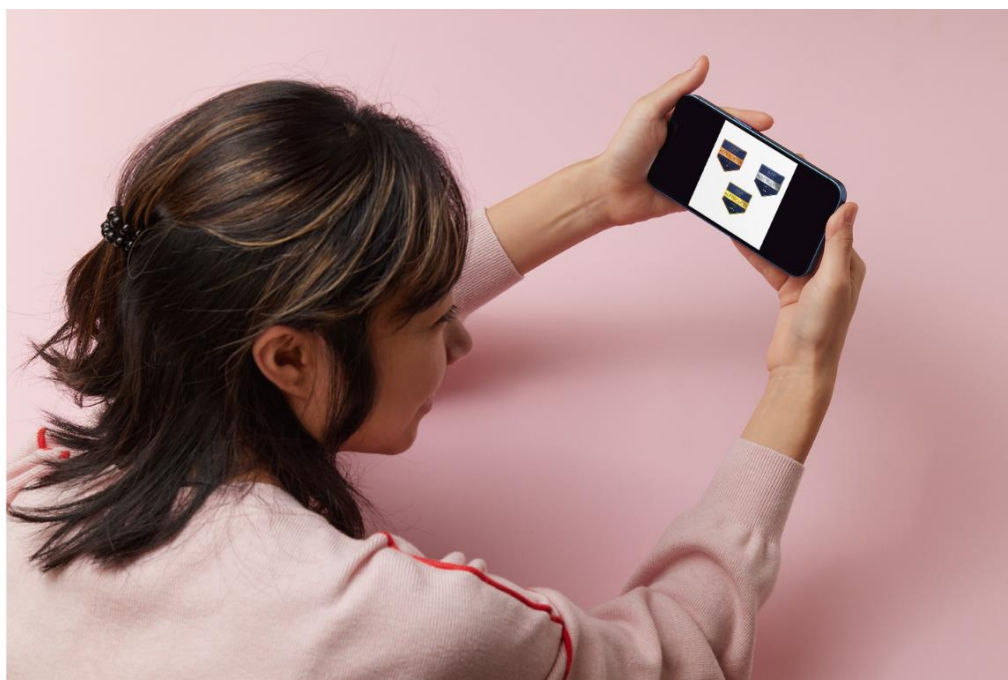
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Introduction

This guide describes the methodology for setting up the process, criteria and evaluation processes for the International Certification of Evidence of Impact in Education (ICEIE) with attention to the definition of evaluation criteria, setting up the process and organization and validation process.

Technology can support learning, but only under certain conditions. These conditions are easier to establish if there are clear, objectively identifiable, and verifiable quality parameters in place. Certifications can act as easy-to-identify indicators of quality at a glance. For certifications to assume this role, there needs to be a rigorous and consistent system in place to establish and support the development of quality that is to be certified.

Governments worldwide are questioning the justification for the use of technology. In instances where technology is deemed desirable, preferable, or necessary, a clear quality assurance system must be in place to ensure that technologies are selected based on valid criteria of their added value for students' education. This guide outlines the development of such a system and provides an example of the ICEIE as an illustration of such a system.



Definitions

EdTech: Educational technology, “EdTech”, are digital tools and resources that enhance teaching and learning processes. EdTech encompasses a wide range of technologies including software applications (apps), online platforms, digital books or activities.

This report focuses on EdTech for pre-K and K12, that is children aged between two to eighteen years old.

EdTech solution: Edtech exists in the form of tools or products, which when used in an optimal manner, can become solutions to address educational issues.

This report focuses on EdTech solutions that address educational issues

Research: Systematic investigation of a specific question or phenomenon, through qualitative, quantitative or mixed methods.

This report focuses on research conducted by international researchers representing multiple disciplines including education, curriculum studies, special education, sociology, psychology (cognitive psychology, neuropsychology), pediatrics, critical studies, linguistics and law.

Evidence: An objectively obtained proof point, as a result of a research process.

Impact: Influence of an EdTech product or process of its use on people or environments

Regulation, standards, indicators and frameworks

When setting up a system of quality assurance, there are several essential structure elements to structure the system that need to be in place. Understanding their different roles and distinctions is key for a well-functioning system.

Regulations relate to legal requirements set by national or international law. In the case of EdTech quality, there is the GDPR regulation in Europe regarding processing of data, which applies to EdTech. Regulations are outlined and enforced by governments and provide the rules that must be followed as a minimum quality condition or check.

Standards provide technical specifications and criteria for improving the quality of a given EdTech solution.

To establish EdTech quality standards, it is essential to have both a framework and indicators (or metrics) in place.

Framework serves as a comprehensive guiding structure, outlining key dimensions to concentrate on during evaluations.

Indicators refer to quantitative or qualitative measures employed to assess different aspects of an EdTech product or the process of its use in education.

Minimal standards and quality indicators

We aimed to develop a system applicable across various political systems and national governments' stances on evaluating and enforcing technology risks. These perspectives often contrast, with China favoring a government-centric approach, the US emphasizing industry-owned data, and the EU adopting a human-centric approach to technology regulation. Our criteria are based on a literature review of desirable attributes for educational value, measured objectively and remaining apolitical.

The Artificial Intelligence Act adopted in March 2024 by the European Parliament is aligned with the broader understanding of technology risks, positioned at four levels of risk, creating a risk-based regulatory approach for the use of AI. This system involves four risk assessments to ensure that technology aligns with human rights and poses minimal or no harm to users: minimal risk, limited risk, high risk and unacceptable risk. Our system begins with products classified as minimal or no risk, meaning they are considered to pose minimal or no harm to users. For example, assessing an EdTech's efficacy should only commence when it is unequivocally demonstrated that it poses no harm. We thus focus on quality criteria for solutions that comply with the laws of the countries where they are deployed. Simply put, we do not focus on managing or mapping risks but evaluating positive impacts.

The 5Es Framework

The 5Es framework was developed to provide a common language among the various stakeholders involved in edtech use, development and evaluation and a common understanding of the types of evidence aspects in edtech field that need to be considered when evaluating edtech technologies. Although every stakeholder group brings their own understanding of evidence and impact, a common framework can align different perspectives along multiple dimensions that jointly constitute impact.

The dimensions in the 5Es framework are Efficacy, Effectiveness, Ethics, Equity and Environmental impact. Table 1 specifies the core questions underpinning each dimension, including the key measurement approach. Note that the indicators-related questions are phrased as to indicate a spectrum so that the answers can be weighted according to three levels.

Table 1: The 5 Es framework

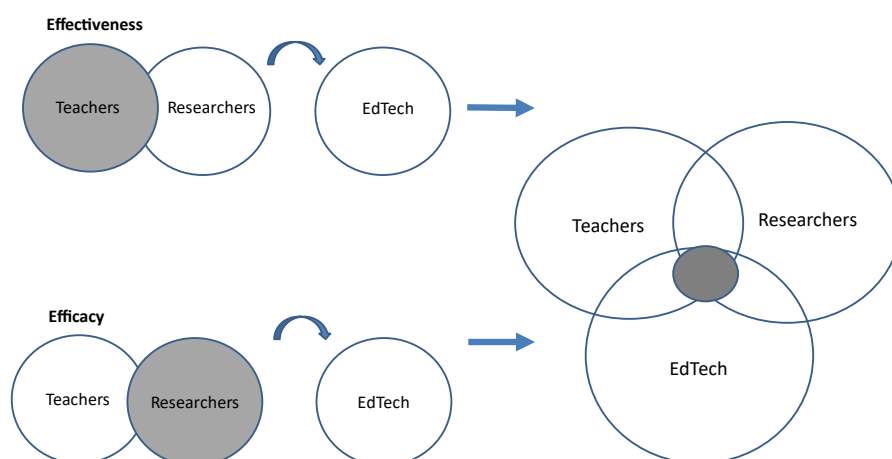
Dimension and guiding question	Indicators-related questions	Impact measurement
Efficacy Does the EdTech solution work?	What is the EdTech solution's impact on learning, social, and economic outcomes?	Impact is measured through controlled studies led by researchers, typically with quantitative studies with a randomised controlled trial considered the gold standard.
Effectiveness Could the EdTech solution work?	To what extent does the EdTech solution address pedagogical, cost and contextual issues?	Impact is measured through participatory or co-design studies, with attention to the contextual fit of implementation and cost-effective replicability across diverse contexts.
Equity Who does the EdTech solution work for?	How much does the EdTech solution focus on marginalized communities, promote equal rights and social justice?	Impact is measured through a human-rights perspective, with attention to equitable use across vulnerable and historically underrepresented groups.
Ethics How does the EdTech solution work?	Does the EdTech's approach to engaging with data, users, and communities within the ecosystem adhere to ethical standards?	Impact is measured through regulatory inspections and audits with attention to data use and ownership, including AI processes.
Environment Is the EdTech solution sustainable?	To what extent does the EdTech organisation evidence its care for the local and wider environment?	Impact is measured through the EdTech's organisation's commitment to, and taking responsibility of, eco-friendly design and practices.

The sustainable development goals (SDGs) can be mapped on all five dimensions of the 5Es framework as outlined in Figure 1.



Efficacy and effectiveness

The 5Es framework considers the perspectives and evaluations of both teachers and researchers regarding the impact of an EdTech solution. This encompasses impact studies solely conducted by researchers, where teachers play a more passive role (efficacy studies), as well as co-design and teacher-led action research studies, where teachers take a leading role (effectiveness studies). For simplicity, these two dimensions are indicated separately in the framework under efficacy and effectiveness dimensions, as illustrated in Figure 1.



The framework aligns with established research definitions of efficacy and effectiveness, as summarised by Singal et al.'s (2014) definition. Here, efficacy corresponds to products evaluated under controlled conditions by researchers, while effectiveness involves assessments by teachers in real-world settings, reflecting less stringent but ecologically valid conditions. This efficacy-effectiveness seeks to acknowledge the diverse perspectives on quality assurance and evaluations of educational technology, prevalent internationally among stakeholders engaged in EdTech assessments.

Impact measurement

To determine meaningful impact, it is vital to consider not only the quality of products but also a careful consideration of the learning process and the individuals involved, particularly during the implementation of technology in various learning environments such as classrooms and homes. Assessing the overall impact of an EdTech solution therefore requires evaluating its suitability across all stages of maturity, including design, implementation, and replication, especially as it scales. These guiding principles were integrated into ICEIE indicators, emphasizing the importance of achieving balance across the individual dimensions of impact. Given that impact is multidimensional, the overall impact is determined by the cumulative score across these individual dimensions.

Three levels: Gold, Silver and Bronze

To decide whether a company's evidence portfolio qualifies for lower or higher levels, the key question is how the evaluation procedure was completed. If it was completed by only reviewing the product, it is at lower levels while actual testing of the product is at higher levels.

Moreover, the level of impact varies across different levels based on the strength of the evidence or the rigor of measurements utilized to acquire the evidence. This rigor is assessed differently depending on the specific dimension of impact. For instance, in efficacy, factors such as validity, reliability, and statistical parameters are employed, whereas in areas like equity, emphasis is placed on the actions of the EdTech organization in not only acknowledging an equity issue but actively incorporating and implementing equitable strategies into its products, accompanied by tangible evidence of these efforts.

The screenshot shows a web interface with three filter buttons at the top: 'Status', 'Country', and 'Total score (0-15)'. Below these is a 'Product search' input field. A table lists products with columns for Company, Product, Efficacy, Effectiveness, Ethics, Equity, Environment, Status, and Country. The 'Efficacy' column shows ratings of Gold, Silver, and Bronze. Red annotations highlight the 'Total score (0-15)' filter and the 'Efficacy' column, with text explaining that the score aggregates ratings across five dimensions and that the efficacy levels are based on the weight of evidence.

Company	Product	Efficacy	Effectiveness	Ethics	Equity	Environment	Status	Country
Age of Learning	My Math Academy	Gold	Not validated	Not validated	Not validated	Not validated	Certified by ICEIE	USA
Kahoot!	Kahoot!	Gold	Silver	Not validated	Not validated	Not validated	Certified by ICEIE	Norway
Reading Horizons	Reading Horizons Discovery	Not validated	Silver	Not validated	Not validated	Not validated	Certified by ICEIE	USA
Complori	Complori	Bronze	Not validated	Not validated	Not validated	Not validated	Certified by ICEIE	Germany

The evaluation procedure

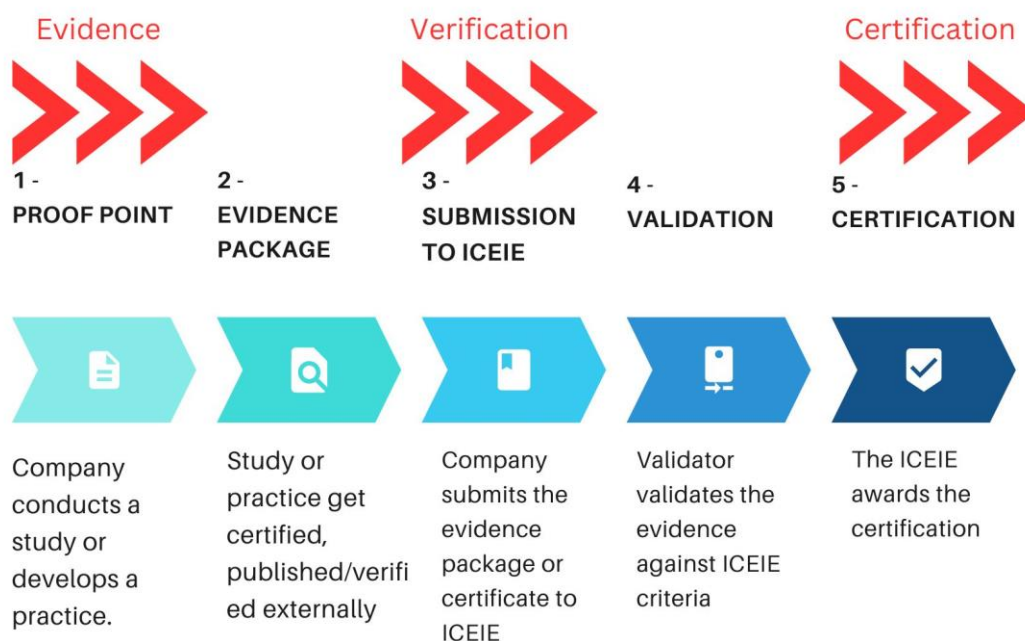
For evaluating the evidence of impact in the five categories, ICEIE employs a two-step process: the organization seeking certification submits evidence, which is then reviewed by the ICEIE team to ensure its compliance with the criteria of being independently produced of the organization. This evidence typically comes in the form of research studies, research reports, or certifications for completed research studies.

Subsequently, this evidence is forwarded to a validator, who is independent of both ICEIE and the provider of the evidence supplied by the Edtech organization. The validator assesses the evidence according to the validation criteria. The process is captured in Figure 3 for a visual simplification.

Certificates

Certificates are publicly available documents that include the following information: the name of the organization, the certified product, the category of certification (one of the five Es), the level of certification (Gold, Silver, Bronze), the name of the research partner or organization that produced the evidence, the name of the validator, a brief description of the submitted evidence, a concise statement from the validator (a shortened version of the statement submitted to ICEIE), and the year of the certificate. Additionally, the certificate features the company's logo and the ICEIE badge.

The ICEIE certification is valid for two years and companies can apply for re-certification with a new certificate and updated badge then.



Criteria

For companies holding existing certifications, ICEIE applies equivalence criteria based on current standards and certifications, as consolidated by the research group WIKIT. Formed in Stavanger, Norway in 2022 under the International Centre for EdTech Impact, WIKIT was tasked with developing and implementing internationally agreed criteria and indicators for evaluating, monitoring, and managing educational technologies for children

(<https://edtechimpactproject.no/>). Synthesizing available literature in a series of reports, the WiKIT Research Group developed the evaluation criteria for EdTech quality according to the five dimensions of impact (the 5Es of efficacy, effectiveness, ethics, equity and environment).

The ICEIE criteria were developed to include national standards such as ESSA Tiers IV-I in the USA, Tulna standards in India or AERO in Australia for example, and the rubrics of a range of pedagogical certifications related to EdTech (eg ISTE, EdTech Impact, Education Alliance Finland). In addition, the ICEIE criteria include cost-effectiveness criteria of World Bank/UNESCO Smart Buys and combine certifications and evaluation criteria relevant to ethical and environmental considerations (as per national standards and regulations set by ISO and European Commission, for example) and equity (as per guidance from Digital Promise and other educational organizations).

The criteria are overseen by an academic advisory board composed of: Professor Natalia I. Kucirkova (Chair and director of the International Centre for EdTech Impact); Professor Alison Clark-Wilson (University College London, UK), Richard Holeyton (Stanford University, USA), Lin Dan (Hong Kong University, China), Per Henning Uppstad (University of Stavanger, Norway) and Antonie Chigeda (University of Malawi, Malawi).

The ICEIE evaluation criteria are freely available from the ICEIE website as a downloadable file under “Criteria”. The detailed validation package with individual indicators in each category is available upon request for qualified research teams who act as validators for the ICEIE process.

The criteria for a validator include being a research organization with qualified researchers, holding a minimum of a PhD, who are familiar with ICEIE criteria and officially trained in the studies or aspects relevant to their evaluations. Note that validators are not authorized to issue any certifications (other than the ICEIE certifications) to ensure independence of validators and research partners in the certification procedure.

Evaluation of products, processes and organisations

The framework and indicators are designed to encompass evaluations of not only the products themselves but also the processes involved in using them and the individuals utilizing them, as well as the EdTech organization behind the products. These aspects are profiled differently depending on the dimension of evaluation. The catalog and certificate include the name of the organization and the product under evaluation. The system allows for an organization to have

multiple studies evaluated for a single product, and as a result, the provider can receive several ICEIE certificates reflecting the outcomes of different studies. Typically, providers opt to select the highest scoring study for their certification.

List of certified products

First fifty certified companies are also listed with their certificates on the main ICEIE website. The Global EdTech Evidence list is publicly accessible through a [linked database](#) and undergoes continuous updates. This database offers sorting options, allowing users to organize companies by their country of main headquarters/operations, the level of evidence according to the categories of the 5Es, whether the company has been validated, evaluated, or certified in a particular category (marked as N/A if neither), and the total score for the current level of evidence by the company.

The scoring system operates on a scale from 0 to 15, with Level 1 certifications corresponding to 1 point, Level 2 to 2 points, and Level 3 to 3 points. These points are allocated across the five categories, resulting in a maximum total score of 15 per product listed in the global database. The total score constitutes the ultimate educational impact level of an organization certified by ICEIE.

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