



Pearson

Efficacy Reporting Framework

April 3 2018



Introduction

In 2013, Pearson made a commitment to efficacy: to identify the outcomes that matter most to students and educators, and to have a greater impact on improving them. Our aspiration is to put learners at the heart of the Pearson strategy; our goal, to help more learners, learn more. Part of our commitment was to publish research regarding the impact of the use of our products on outcomes, and to have the outcomes subject to independent audit. We call this efficacy reporting. There is no rulebook for how to do this, no model to follow. We've had to learn fast during this journey, we've sought guidance from others including external expertise, and we are now some, but not yet all of the way there.

The road taken and the milestone reached

In a first for the education sector, we have published audited efficacy reports on some of our most widely used products. Together, these products represent 18 million learners. We have used this document, the Pearson Efficacy Reporting Framework dated April 3 2018, consistently to prepare independently audited efficacy statements for the Pearson products we are reporting on.

We have sought to use the efficacy reporting process to amplify existing non-Pearson peer reviewed research about our products. We've also sought to foster innovation in efficacy research by conducting new research and placing value on a range of research methods — including implementation studies, correlational and causal designs — ensuring data is collected, analyzed and presented to agreed standards at the appropriate stages in each product's lifecycle. The research we have conducted for our audited efficacy reports, and the efficacy statements produced as a result, are designed based on international best practices such as those set out by the American Education Research Association and the What Works Clearinghouse. We have synthesized these into a set of standards we hold ourselves accountable for in our research and reporting. This document sets out those standards.

Furthermore, we adhere to the same peer-review processes as other high quality research in the education sector. Our work was independently reviewed and validated by SRI International, a well-known non-profit research center, and shared for discussion at research conferences organized by, among others, the American Education Research Association.

Our body of research contains evidence of statistically significant relationships between the use of our products and learner outcomes like student achievement. We want to be clear, though, that efficacy is not a quality a digital product can possess in and of itself. We recognize that implementation — the way a product is integrated into teaching and learning — also has a significant impact on the outcomes that can be achieved. Our reports do not yet capture the full range of intended product outcomes, nor the variety of different ways of implementing our products. What we do know is that the more we can engage with our customers about best practices that can support the integration of learning technologies into their teaching, the more likely they will be to achieve their desired outcomes.

We have commissioned PricewaterhouseCoopers LLP ('PwC') to audit the efficacy statements set out in our Research Reports. This is to demonstrate that the statements accurately reflect the research that has been carried out.

The journey ahead

Delivering on our reporting commitment has never been our ultimate goal; what matters most to us is helping more learners, learn more. Our aspiration is to explore what works, for whom, and why; and to encourage discussion about questions such as: What outcomes matter most to students? What should teaching and learning look like? What evidence should we apply to its design? And how should we evaluate impact?

We are excited to continue partnering with educators and others in the field in order to better understand how interactions between educators, students and learning technology can enhance outcomes. We have also been energized to see others in the education sector begin to focus on efficacy and research — though we recognize that their application in education is still nascent. In order to accelerate the emergence of its full potential we are already developing new ways of partnering with educators, researchers and institutions so we can advance this work together. In doing so, we will continue to advocate for the need to apply rigorous evidence to improve the outcomes of teaching and learning, while also seeking to ensure that evidence captures customers' experiences and is relevant and useful to educators in their practice.

Special thanks

We want to thank all the educators, students, research institutions and organizations we have collaborated with to date. We are spurred on by the growing number of opportunities for us to learn from others in the sector who are beginning to tackle the same challenges. If you are interested in partnering with us on future efficacy research, have feedback or suggestions for how we can improve, or want to discuss your approach to using or researching our products, we would love to hear from you at efficacy@pearson.com. If we, as a sector, tackle this together, we will help more learners learn more.



Kate Edwards

Senior Vice President,
Efficacy and Research, Pearson
April 3 2018

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About this document

This document explains how Pearson approaches efficacy reporting.

Part 1 explains what we hope to achieve by our efficacy reporting and how we have designed our process to achieve this. Anyone interested in evaluating our process and the rigor behind our findings should find this section useful.

Part 2 goes into detail about the activities we perform and the documentation we use at every stage of the efficacy reporting process. This section also includes the complete guidance we follow when preparing evidence-based efficacy statements, and a breakdown of the work carried out by our auditors. Anyone who is thinking of following a similar process to prepare their own efficacy reporting, or who is simply in search of more granular detail than we provide in Part 1, should find this section useful.

We refer to our approach to efficacy reporting — including the process, controls, documentation (such as our guidance on efficacy statement terminology by study design type), reviews and third-party audit — as the Pearson Efficacy Reporting Framework.

We are making the details of the Efficacy Reporting Framework public in the interests of transparency, and in the hope that sharing our approach will encourage others to replicate and build on what we have done.

Part 1: Overview of the Efficacy Reporting Framework

Background to efficacy reporting

Why we publish efficacy reporting

At Pearson, we recognize how important it is to understand the relationships between the use of our products and the outcomes that matter most to students and educators. We want to understand, not only what works, but also for whom and why.

We engage in research on our products to improve our understanding in this area. Our work on efficacy and research allows us to continuously improve our products so they can support delivery of better outcomes for more learners.

We have made a commitment to regularly publish the results of this research. Rigorous research and transparent reporting allow us to:

- Better understand and highlight relationships between the use of our existing products and the outcomes that matter most to students and educators
- Share the evidence underpinning the design and development of new and existing products
- Galvanize other learning companies to follow suit and measure their impact by the outcomes they deliver for learners

What efficacy reporting looks like

Key findings from Pearson's efficacy research are reported in the form of efficacy statements. These are statements summarizing the primary conclusions of a study, worded for ease of comprehension by customers.

Each efficacy statement represents a finding from a specific research study, carried out in a specific context. The effects described in an efficacy statement are dependent on that context and cannot necessarily be generalized. For that reason, they should not be interpreted in isolation, but always within the context of the evidence that supports them and details regarding how, when, and where that evidence was collected.

To accommodate different readers' differing appetites for detail on our research, Pearson efficacy reporting consists of three layers. Each layer provides a different level of insight into the research supporting the efficacy statements relating to the use of the product.

- A product efficacy web page containing the main efficacy statements for research about the use of the product, information about the context in which they were generated, an overview of the research backing up the statements, and (where available) supporting customer and learner testimonials
- Research Report: a document that summarizes all the relevant efficacy research and audited efficacy statements related to the use of the product, based on one or more Technical Reports. Research Reports also include foundational research related to the design of the product, and information about the intended implementation model for the product
- Technical Report(s): detailed documents describing each piece of research into the use of the product, undertaken to meet the standards expected for publication in peer-reviewed academic journals

Auditing efficacy reports

It is vitally important that our customers know they can trust the statements we make about the use of our products.

We have appointed PricewaterhouseCoopers LLP (PwC) to provide limited assurance of the efficacy statements set out in our Research Reports. Each Research Report includes an audit opinion from PwC on the efficacy statements about the product. This is to demonstrate that the statements accurately reflect the research that has been carried out. As well as the efficacy statements themselves, PwC's audit involves evaluating the design and operation of the process we use to generate the statements.

The efficacy reporting process

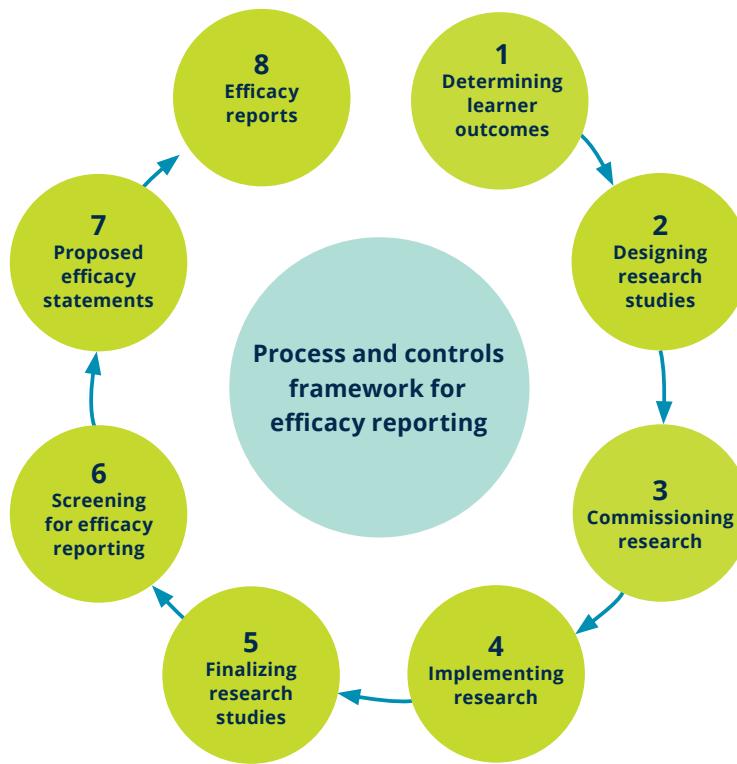
With input from the prominent academics who make up the Efficacy Academic Network, Pearson has developed an eight-stage process to prepare reporting on the efficacy of our products.

The process includes a set of controls to improve rigor and minimize the risk of inaccurately reporting on the efficacy of the use of our products. Each stage of the process also has a set of associated review documents, or checklists. These documents:

- Ensure that key activities are applied consistently across all products
- Form a record of the key activities completed
- Inform improvements to the product in the future

In addition to the audit from PwC, as another means of improving rigor, we submit our Technical Reports to academic peer review by trusted education research organizations.

Efficacy reporting process diagram



Stage 1: Determining learner outcomes

In partnership with our customers and learners, we determine what the product is aiming to achieve — its intended learner outcomes.

These act as benchmarks; from this point, the efficacy of the product is measured by its impact on these outcomes¹.

Stage 2: Designing research studies

We plan ways to investigate how the product can be used to affect the learner outcomes identified in stage 1 — including searching for existing peer-reviewed evidence, and planning new research studies.

This stage is to make sure our research is relevant to the outcomes that matter most to customers and learners.

Stage 3: Commissioning research studies

Our in-house researchers and/or third-party researchers are commissioned to carry out the research studies planned in stage 2.

This stage is to make sure we commission researchers whose capabilities and experience are appropriate for the design of the research studies.

Stage 4. Implementing research

The researcher(s) create data collection instruments that are consistent with the study plan(s).

Pearson ensures that the process of collecting and storing data meets all relevant/appropriate laws and regulations, and that student data is completely and accurately transferred into studies.

¹ Before a product launches, the learner outcomes guide research and development activities including foundational learning and data science research and efficacy trials. Because these steps are not subject to audit, they are not discussed here. Stages 2–8 of the efficacy reporting process come into play once the product is being used in the market.

Stage 5. Finalizing research studies

We review the quality of the research studies related to the product against the original research study design from stage 2. We assess whether the quality of the researchers' methodology, analysis of the data, and conclusions as presented in a Technical Report, are appropriate for the research study design.

This stage is to determine whether the research study can be used to create statements about the efficacy of the product.

Stage 6. Screening for efficacy reporting

We repeat our search for other existing research studies related to the product by third-party researchers, and assess whether they are relevant and robust enough to incorporate into our efficacy reporting.

This stage ensures we do not overlook relevant research studies that are published while our research is underway, so we can be sure we are reporting the full story about the product.

Stage 7: Proposed efficacy statements

We review the body of research assembled for the product — including research studies commissioned by Pearson (i.e., Technical Report/s) and those created by others — and use it to collate a series of efficacy statements.

Stage 8: Efficacy reports

We draft the efficacy web page and Research Report document for the product. We then assess whether they are aligned to the learner outcomes from stage 1, and whether the three layers of the efficacy report (efficacy web page, Research Report, and Technical Report/s) are consistent with each other.

Efficacy Academic Network

The Efficacy Academic Network was formed in 2015. Its remit is to bring academic and research expertise to bear on Pearson's efficacy reporting process. The network's contributions include both constructive comments on the efficacy reporting process, and advice about ways to make it even stronger.

The Efficacy Academic Network is made up of four leading academics from the US, UK, and Australia.

| Eva Baker | Philippa Cordingley | Chris Dede | Gordon Stanley |
|--|--|---|--|
| Distinguished Research Professor, University of California Founding Director, National Center for Research on Evaluation, Standards, and Student Testing (CRESST) | Chief Executive, Centre of the Use of Research and Evidence in Education (CUREE) Chair, Research Council for the National Foundation for Leadership | Timothy E. Wirth Professor in Learning Technologies, Harvard Graduate School of Education | Honorary Professor of Education, University of Sydney Emeritus Professor of Psychology, University of Melbourne |

Creating accurate efficacy statements

We need our customers to know they can trust what we tell them about our products. It is vitally important, therefore, that our efficacy statements accurately represent the evidence they are based on.

This means the wording of efficacy statements must be carefully considered to make sure it is aligned with the standard and design of the underlying research study. Table 1 summarizes the different types of research study design alongside examples of the type of efficacy statement each one can support.

Stage 7 of the efficacy reporting process involves assessing proposed efficacy statements to make sure they are worded in a way that accurately reflects the underlying research study. If the assessment reveals a mismatch between the research study design and the efficacy statement (e.g., a causal statement based on a survey or cohort analysis), then the statement will need to be rephrased or removed — otherwise the statement risks inappropriately reporting the impact of using the product.

Table 1: Summary of Pearson's guidance on efficacy statement terminology by study design type

| Research study design | Supports... | Illustrative examples |
|--|---|---|
| Survey | Descriptive statements | Around #% of students suggest the product helped them achieve their goal |
| Secondary analysis of administrative data | | #% of students indicate the product helps them improve their learning "significantly" or "very significantly" |
| Cohort analysis without controls for baseline factors or potential mediating/moderator variables | Relational statements: correlational, not predictive (i.e., where model fit indices cannot be reported) | Among students using the product, completion of homework was associated with higher final exam scores After controlling for other factors that may influence achievement, use of the product is related to a #% increase in students' course test scores |
| Cohort analysis (with or without controls for baseline factors or potential mediating/moderator variables) | Relational statements: correlational and predictive (i.e., where model fit indices can be reported) | Product homework scores are a significant predictor of final exam scores Completion of homework predicted #% of the variance in final exam scores |
| Quasi-experimental (via propensity score matching) | Comparative statements | Students using the product reported a better learning experience than students who did not use the product, when groups were matched on prior achievement and after adjusting for gender, age, and race/ethnicity |
| Randomized controlled trial | | Students using the product are #% more likely to progress to college level than students who did not use the product, when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |
| Randomized controlled trial | Causal statements | Students using the product earned significantly higher final exam scores than similar students using a competitor product |
| Propensity score matching | | Students using the product achieve #% higher on course tests compared to matched students who did not use the product |
| Instrumental variables | | |
| Regression discontinuity | | |
| Fuzzy regression discontinuity | | |

[Find more details of Pearson's guidance on efficacy statement terminology by study design type in Part 2 >](#)

Part 2: The efficacy reporting framework in detail

The efficacy reporting process: stage by stage

Stage 1: Determining learner outcomes

At stage 1, in partnership with customers and learners, Pearson determines what the product is aiming to achieve: its intended learner outcomes. Before a product launches, the learner outcomes guide research and development activities including foundational learning and data science research and efficacy trials. Because these steps are not subject to audit, they are not discussed here. Stages 2–8 of the efficacy reporting process come into play once the product is being used in the market.

Documentation used at stage 1

The stage 1 review document is designed to make sure the learner outcomes have been determined in an appropriate way, reviewed, and approved before Pearson starts designing research studies into the efficacy of the product.

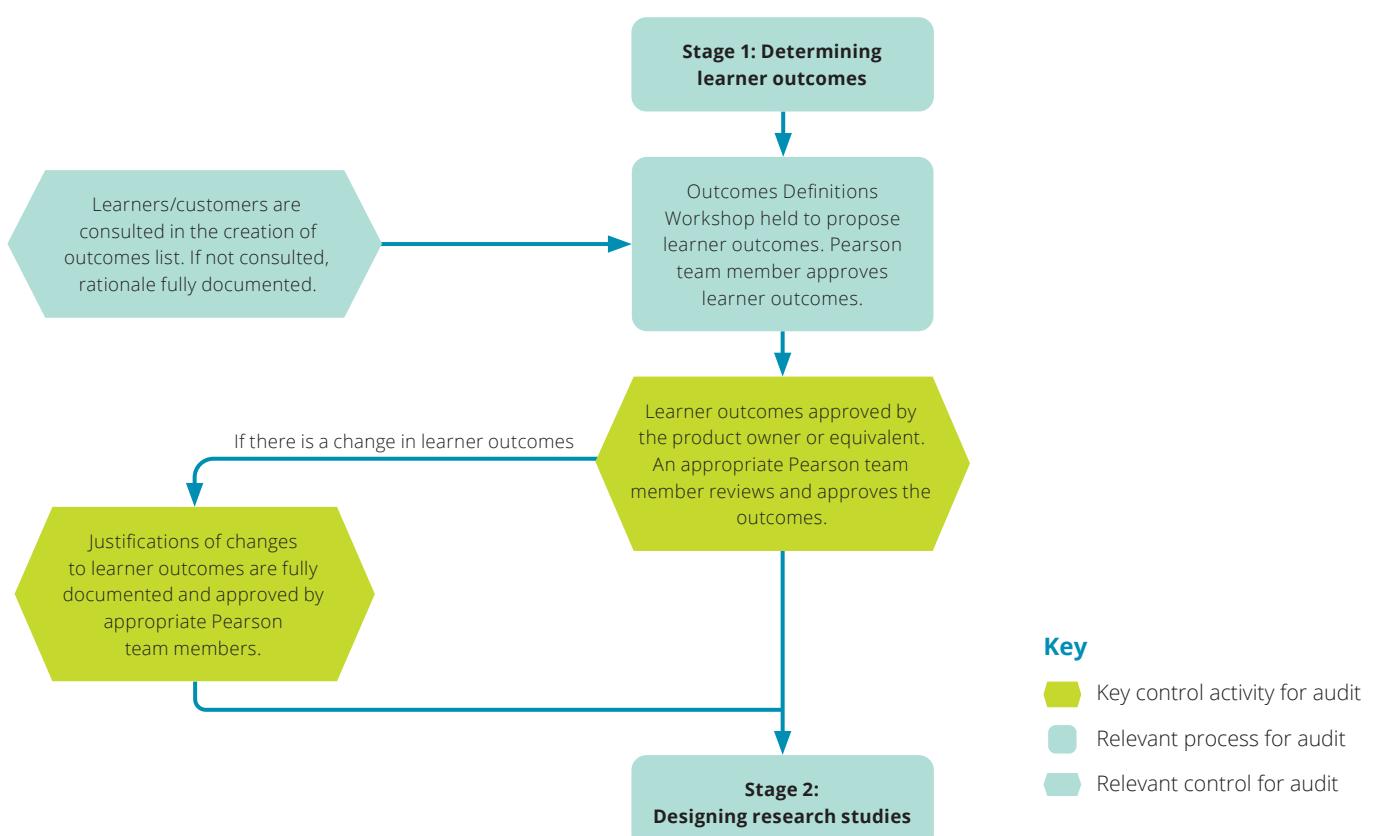
The document functions by:

- Recording all the learner outcomes identified for the product or prioritized for research
- Confirming each learner outcome has been approved by relevant parties
- Assessing whether the process used to identify learner outcomes is as expected
- Cataloging any changes made to the learner outcomes since they were approved, along with reasons for any changes

The person who reviews the document should not be the same person who completed it. This is to make sure it is completed appropriately and independently. Each reviewer's details are recorded in the document to preserve accountability.

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What's involved



Stage 2: Designing research studies

At stage 2, Pearson plans ways to investigate how the product can be used to affect the learner outcomes identified in stage 1 — including searching for existing peer-reviewed evidence, and planning new research studies.

This stage involves creating:

- An overall evidence plan that shows how the research studies will address the learner outcomes
- Individual research study plans that show how each research study will achieve the desired quality, including how the researcher(s) will collect the necessary data

Documentation used at stage 2

The stage 2 review document is designed to make sure that:

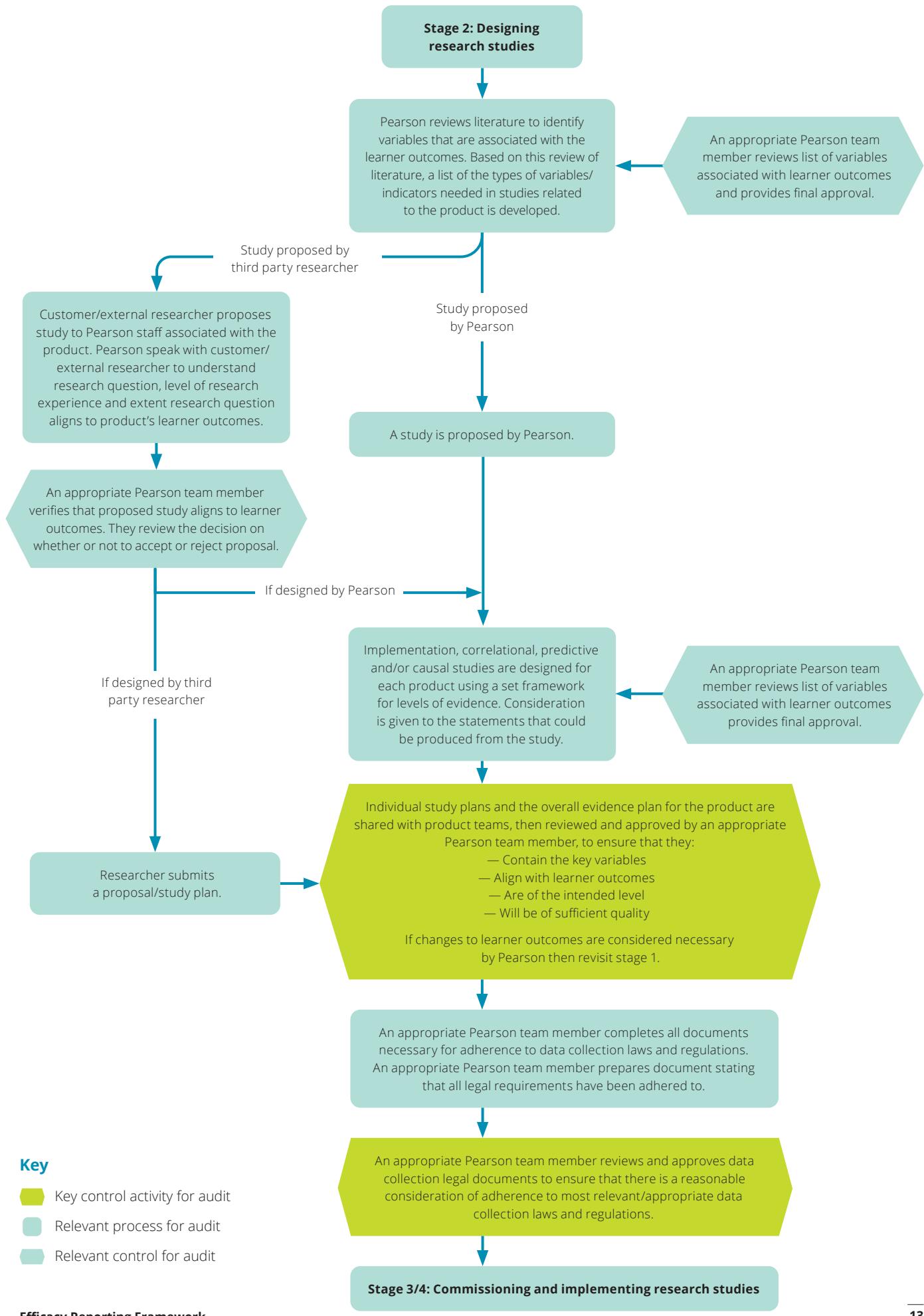
- The planned research studies are designed appropriately for the learner outcomes they are meant to measure
- The design of the planned research studies is of an acceptable standard
- The proposed data collection methods are appropriate for the research studies, and comply with all relevant laws and regulations

The document functions by:

- Requiring the researcher to determine how data will be gathered and analyzed to support the proposed learner outcomes, so the research design will be of an acceptable standard
- Assessing whether the proposed learner outcomes are aligned with the learner outcomes defined for the product in stage 1
- Recording consideration of contracts and data use agreements, such as limitations to the researcher's access to personally identifiable information (PII), or an agreement from the customer/institution granting permission to report the results of a study publicly

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Stages 3 and 4: Commissioning and implementing research studies

At stage 3, Pearson researcher(s) and/or third party researcher(s) are commissioned to carry out the research studies planned in stage 2.

At stage 4, the researcher(s) conduct the research as planned, including creating tools or instruments to collect the necessary data (such as surveys). If the data being used is not publicly available, Pearson makes sure the process for collecting and storing new data complies with all the relevant laws and regulations, and that the data is transferred into the research studies accurately and in full.

The emphasis at these stages is on making sure the research studies are carried out to the standard defined in stage 2, so the evidence they produce and the conclusions they draw about learner outcomes will be robust.

Documentation used at stages 3 and 4

Stages 3 and 4 share a single review document. The stage 3 and 4 review document is designed to make sure that:

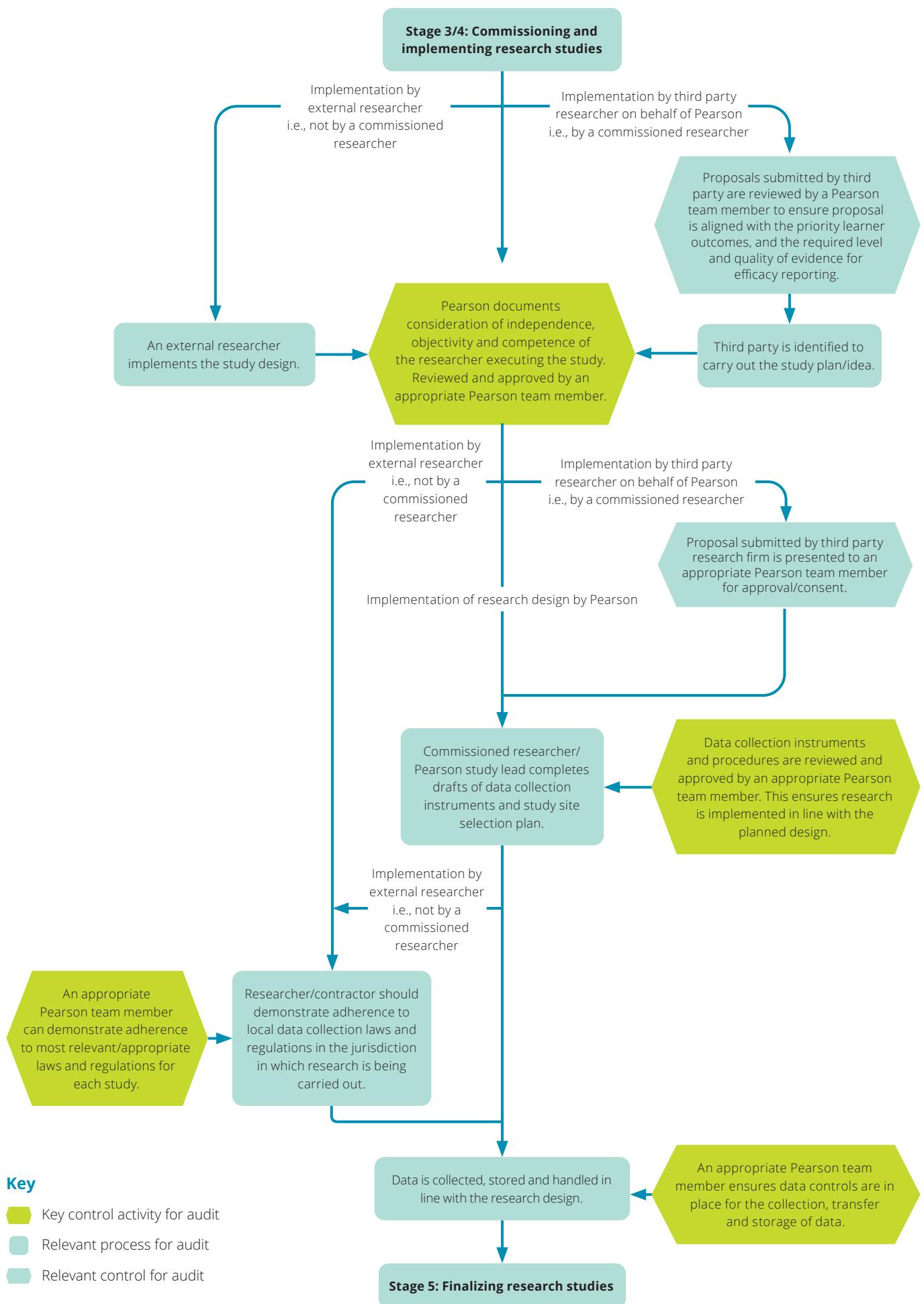
- The researchers have the appropriate capabilities and experience
- The research is implemented in line with the planned design
- The research adheres to relevant data collection laws and regulations
- Data will be collected reliably and correctly

The document functions by:

- Requiring Pearson to assess the researchers' experience and capabilities, and to consider whether they are appropriate given the design and quality of the planned research
- Assessing researchers' competence, independence, and objectivity to mitigate lack of understanding, bias, or conflicts of interest
- Considering whether the instruments used in the research study are specifically and appropriately designed to capture data related to the variables outlined in the research study proposal
- Requiring the validity and reliability of the instruments to be verified before data collection begins
- Recording consideration of contracts and data use agreements, such as limitations to the researcher's access to personally identifiable information (PII), or an agreement from the customer/institution granting permission to report the results of a research study publicly
- Recording the sources of the data used in the research study and the controls covering the collection, transfer and storage of data — including who is granted edit access to the data and whether this is appropriate

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Key

- Key control activity for audit
- Relevant process for audit
- Relevant control for audit

Stage 5: Finalizing research studies

At stage 5, Pearson reviews the quality of the research studies related to the product against the original research study design from stage 2. This stage involves assessing whether the quality of the researchers' methodology, analysis of the data, and conclusions are appropriate for the research study design, and ultimately whether the research study can be used to create any efficacy statements.

Documentation used at stage 5

The stage 5 review document is designed to make sure:

- The finalized research studies are of sufficient quality to fulfil the research design
- The analysis includes all relevant and applicable data
- The analysis and conclusions each research study draws from its findings are appropriate to the research study design

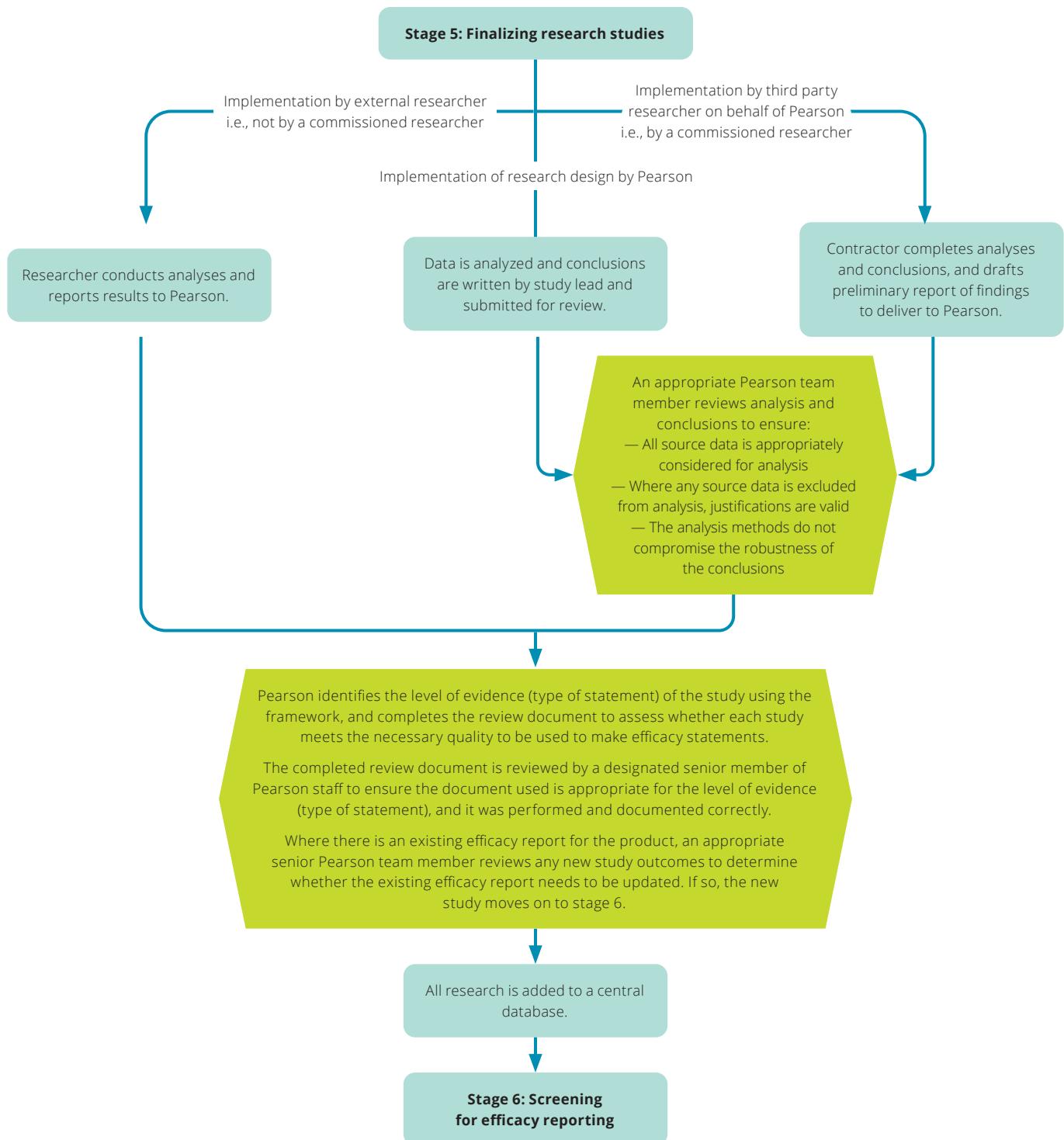
The document functions by:

- Determining whether the Technical Report provides a clear statement of the purpose and scope of the research study, inclusive of research questions
- Assessing the quality of the research based on accepted standards, such as the American Educational Research Association
- Assessing whether the research study design described in the Technical Report is different from what was proposed in stage 2 (and if it is different, whether the reasoning for this is explained)
- Recording the data collection instruments used, how data was gathered, by whom, when, and for what purpose — that is, whether the data is appropriately complete
- Assessing whether the Technical Report provides enough information to determine why the specific research study design was chosen, and whether it will appropriately address the learner outcomes and research questions the research study means to address
- Making sure the statistical analyses used are described within the research and peer-reviewed for appropriateness and completeness
- Checking that any efficacy statements are worded appropriately according to Pearson's guidance on efficacy statement terminology by study design type, and whether the result of this check means the relevant Research Report and the product's efficacy web page (if they already exist) need to be updated

A senior reviewer must consider any additional studies and decide whether the additional findings require Pearson to update the efficacy reports for the product. If an update is required, the research study should immediately go through stage 6 of the efficacy reporting process.

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Key

- Yellow hexagon: Key control activity for audit
- Light blue square: Relevant process for audit
- Light green square: Relevant control for audit

Stage 6: Screening for efficacy reporting

At stage 6, Pearson searches again for other existing research studies related to the product by external researchers. This stage is designed to make sure the efficacy report represents the full story about the product. Research studies that feature Pearson products should not be disqualified from the company's efficacy reporting just because they were not commissioned by Pearson.

However, this stage does still involve assessing any research studies discovered through the search to see whether they are relevant and robust enough to incorporate into the efficacy report.

Documentation used at stage 6

The stage 6 review document is designed to:

- Assess existing research studies' relevance to the learner outcomes for the product
- Assess the design and quality of existing research studies

It comes into play both when efficacy reporting for a product is first being created, and whenever a relevant new research study is published or discovered. A research study is considered relevant if it:

- Reports on the intended learner outcomes for the product
- Uses recent data, i.e., under five years old

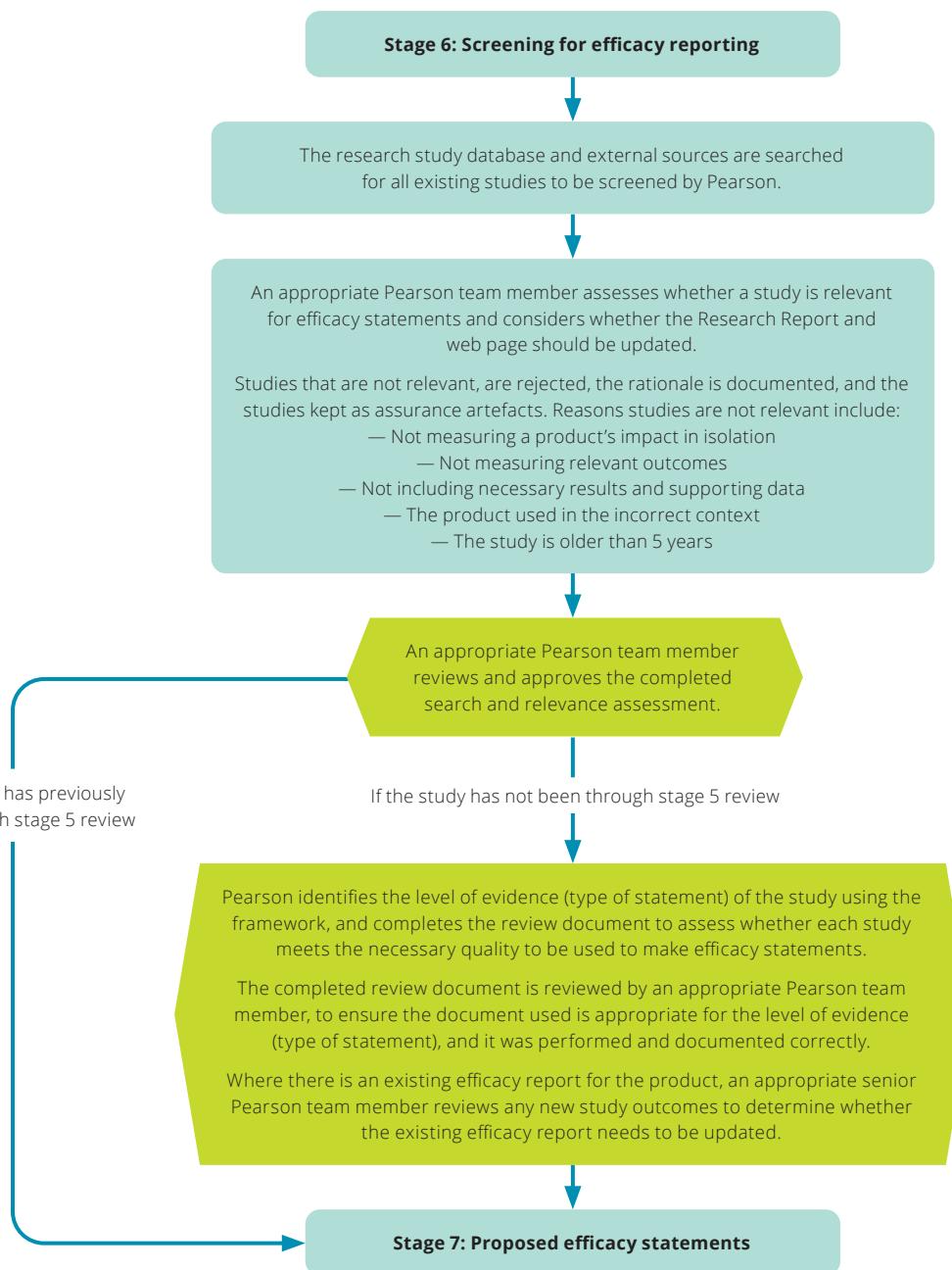
If an existing research study is found to be relevant, the stage 5 review document should be completed to assess whether it is of sufficient quality to be used to make efficacy statements.

The stage 6 review document functions by:

- Identifying relevant articles and research studies published in academic literature
- Confirming whether the design and quality of the relevant research studies have been properly assessed (i.e., whether they have been through stage 5 of the efficacy reporting process)
- Assessing whether research studies that are relevant, but which have not been included in the efficacy reporting before this stage, affect or contradict efficacy statements Pearson is making about the product

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Key

- Key control activity for audit
- Relevant process for audit
- Relevant control for audit

Stage 7: Proposed efficacy statements

At stage 7, Pearson reviews the body of research assembled for the product and uses it to collate a series of efficacy statements. The body of research includes studies commissioned by Pearson, emerging from stage 5, and externally conducted studies, emerging from stage 6.

The efficacy statements are then assessed to make sure they accurately represent the research studies. This involves:

- Checking that any figures appearing in an efficacy statement are consistent with the relevant research study
- Checking that the language used in each efficacy statement is appropriate to the design and quality of the relevant research study, as determined at stage 5 or 6

For more detail about how the design and quality of a research study affects the language used in efficacy statements, see the section on [efficacy statement terminology by study design type](#).

Documentation used at stage 7

The stage 7 review document is designed to make sure that any proposed efficacy statements:

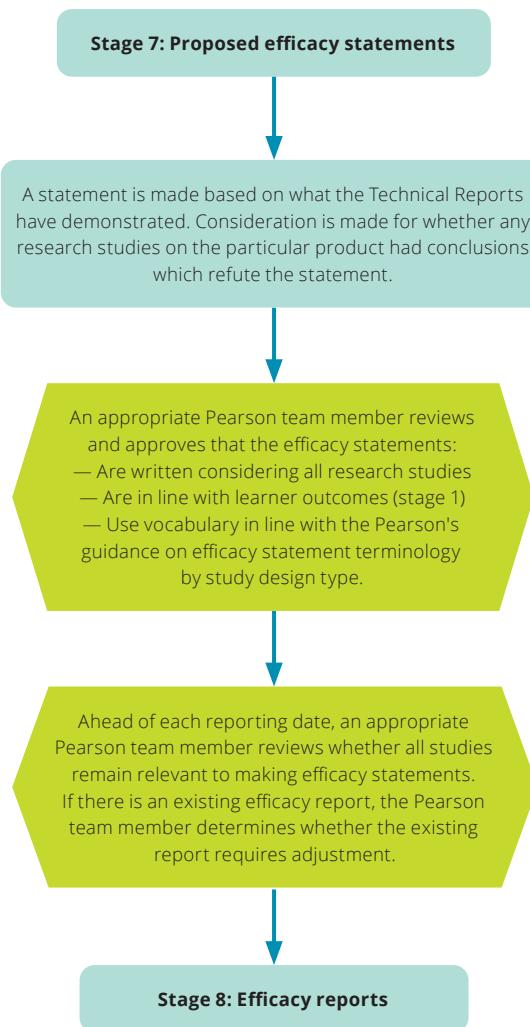
- Accurately reflect the design and quality of the research findings they are based on
- Adhere to Pearson's guidance on efficacy statement terminology by study design type

The document functions by:

- Confirming that the wording of each efficacy statement has been reviewed and found to accurately reflect the design and quality of the relevant research study, as assessed at stages 5 and 6
- Assessing whether the wording of each efficacy statement is consistent with Pearson's guidance on efficacy statement terminology by study design type
- Recording the relevant senior vice president's judgment as to whether the research studies that support the efficacy statements remain relevant (in terms of age, geography, version of product, etc.) and whether any existing efficacy statements require adjustment as a result

The person who reviews the document should not be the same person who completed it. This is to make sure it is completed appropriately and independently. Each reviewer's details are recorded in the document to preserve accountability.

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Key

- Key control activity for audit
- Relevant process for audit
- Relevant control for audit

Stage 8: Efficacy reports

At stage 8, Pearson drafts the product's efficacy web page and Research Report for publication on its website.

Once the product's efficacy web page and Research Report are drafted, Pearson assesses whether they are aligned to the learner outcomes from stage 1, and whether the three layers of efficacy reporting (efficacy web page, Research Report, and Technical Report/s) are consistent with each other.

Documentation used at stage 8

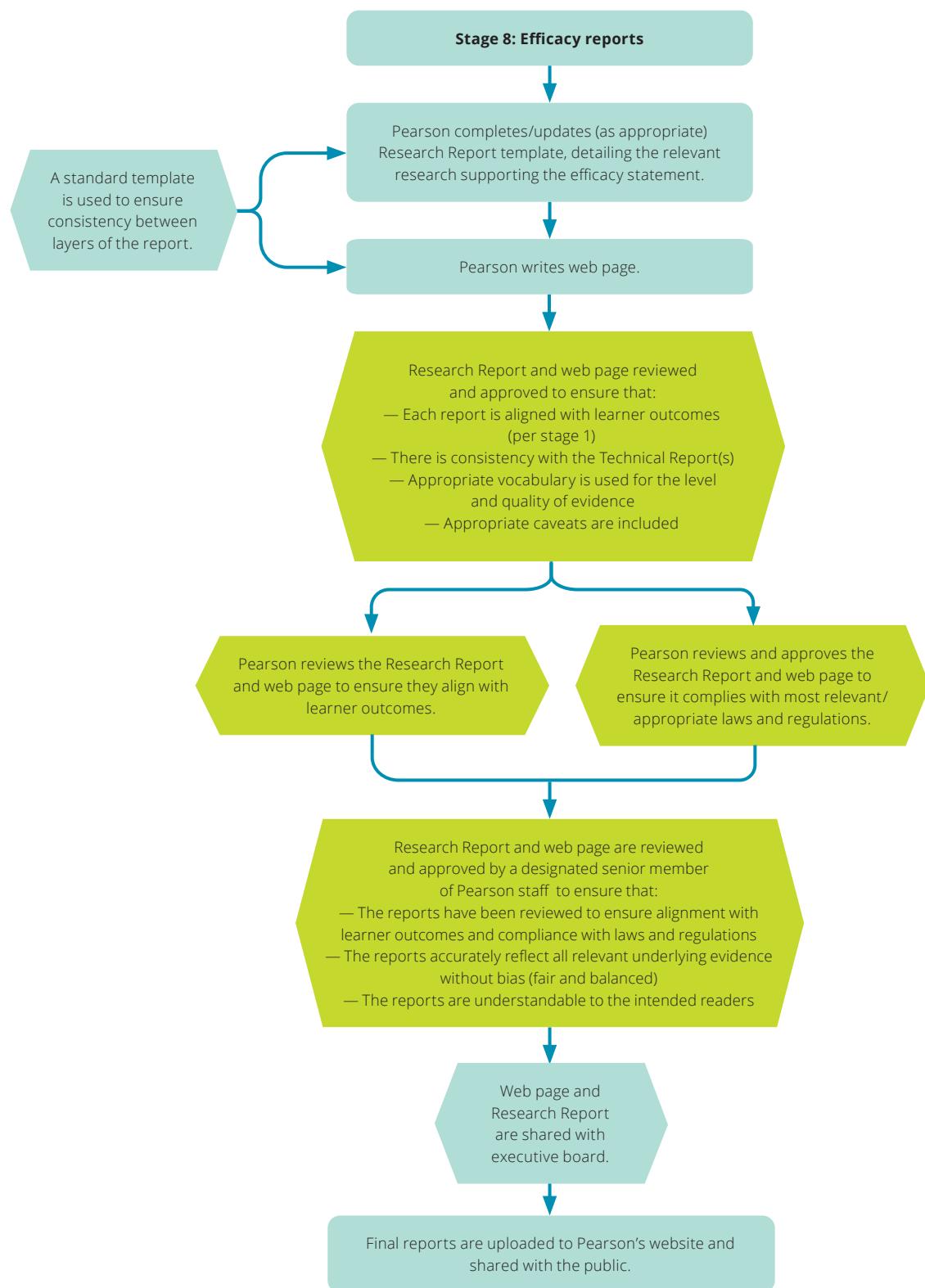
The stage 8 review document is designed to make sure the product's efficacy web page and Research Report are:

- Consistent with the Technical Report(s) and with each other
- Approved by the relevant people within Pearson

The document functions by:

- Assessing whether the efficacy reporting for the product is aligned to its intended learner outcomes
- Assessing whether the product's efficacy web page and Research Report are consistent with the Technical Report(s)
- Considering whether the vocabulary used in the efficacy reporting is appropriate to the design and quality of the evidence, and whether appropriate caveats have been included
- Recording the review and approval of the efficacy reporting by the relevant Pearson stakeholders

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Key

- █ Key control activity for audit
- █ Relevant process for audit
- █ Relevant control for audit

Efficacy statement terminology by study design type

Pearson uses the following guidance when preparing efficacy statements about the use of its products. The aim of the guidance is to ensure that efficacy statements accurately represent the evidence they are based on, by aligning their wording with the standard and design of the underlying research studies.

The standards by which Pearson judges research studies are informed by and aligned with recognized research frameworks developed by the What Works Clearinghouse and the American Education Research Association.

The illustrative example efficacy statements presented here should not be construed as comprehensive or exhaustive. Rather, they are intended to illustrate the types of wording that would be acceptable for a given combination of efficacy statement type and underlying evidence. The wording of efficacy statements may vary slightly, while still preserving their meaning.

Where a research study investigated a relationship or difference between factors, Pearson will include efficacy statements that describe the relationship or difference found. Where the research study found that the relationship or difference was not statistically significant, the efficacy report will state this clearly.

Types of efficacy statement

Efficacy statements can be categorized as either general or specific. Alongside this broad categorization, efficacy statements may be descriptive, relational (correlational, not predictive), relational (correlational and predictive), comparative, or causal.

General vs. specific efficacy statements

General efficacy statements express a trend, relationship, or effect in simple and broad terms.

Specific efficacy statements provide more detail by:

- Communicating more precise numeric estimates
- Representing effect sizes or mean differences along with relevant statistical tests
- Interpreting general statements in terms of practical significance

To be considered complete and accurate, specific efficacy statements should include certain important components. These are set out below.

Typically, efficacy reporting will use both general and specific efficacy statements.

Descriptive efficacy statements

Specific descriptive efficacy statements:

- Characterise a numeric percentage
- Identify the focal group
- Identify the outcome of interest

Research study designs associated with descriptive efficacy statements include:

- Surveys
- Secondary analysis of administrative data
- Cohort analysis with no controls for baseline factors or potential mediating/moderator variables

| General vs. specific | Learner outcomes category | Illustrative example efficacy statements |
|----------------------|--|--|
| General | Access and experience | More than #% of students indicated that the product is accessible and easy to navigate |
| | Timeliness and completion | <i>General statements in this category are not considered applicable as efficacy statements</i> |
| | Standard of achievement or level of competence | Around #% of students suggest that the product helped them achieve their goal, with #% saying it did so "significantly" or "very significantly" |
| | Progression | #% of students believe the product prepares them well for the next level of their learning More than #% of students suggest that several of the product's features and exercises support learning |
| Specific | Access and experience | #% of students had a positive experience using the product #% of students are able to access the product on their computer #% of students are able to access the product on their smartphone #% of students could access their assignments easily #% of students find the product easy to navigate |
| | Timeliness and completion | #% of students completed the course |
| | Standard of achievement or level of competence | #% of students indicate that the product helps them to improve their English "very significantly" or "significantly" #% of students indicate that the product helps them improve speaking, listening, vocabulary, grammar and writing |
| | Progression | #% of students employed after completing the credential/course #% of students progressed to the next level after completing a course/module in which the product was used |

Relational (correlational, not predictive) efficacy statements

Specific correlational efficacy statements (i.e., where model fit indices cannot be reported):

- Include a clear description of the comparison or reference groups, which are defined in terms of the independent variable of interest (e.g., "heavy" vs. "light" users)
- Specify a dependent variable of interest and identify the metric (e.g., final exam scores)
- Specify the nature of the relationship (i.e., whether significant or not; whether positive or negative)
- Suggest magnitude in terms of an effect size or mean differences along with statistical test statistics

Study designs associated with relational (correlational, not predictive) efficacy statements include:

- Cohort analysis with controls for baseline factors or potential mediating/moderator variables
- Cohort analysis with no controls for baseline factors or potential mediating/moderator variables

| General vs. specific | Learner outcomes category | Illustrative example efficacy statements |
|----------------------|--|---|
| General | Access and experience | <i>General statements in this category are not considered applicable as efficacy statements</i> |
| | Timeliness and completion | <i>General statements in this category are not considered applicable as efficacy statements</i> |
| | Standard of achievement or level of competence | <p>Use of the product is associated with/related to/linked to/connected to an increase in test scores</p> <p><i>For continuous outcome variables:</i></p> <p>Among students using the product, students who completed more homework assignments tended to earn higher final exam scores than students who completed fewer homework assignments</p> <p>Among students using the product, completion of homework was associated with higher final exam scores</p> |
| | Progression | <p><i>For binary outcome variables:</i></p> <p>Among students using the product, time spent on the assignments was positively related to the probability of passing the course</p> |

| | | |
|----------|--|---|
| Specific | Access and experience | <i>Specific statements in this category are not considered applicable as efficacy statements</i> |
| | Timeliness and completion | <i>Specific statements in this category are not considered applicable as efficacy statements</i> |
| | Standard of achievement or level of competence | After controlling for other factors that may influence achievement, use of the product is associated with/related to/ linked to/connected to a #% increase in students' course test score |
| | Progression | <i>For binary outcome variables:</i> Among students using the product, time spent on the assignments was associated with a #% greater probability of passing the course |

Relational (correlational and predictive) efficacy statements

Specific correlational and predictive efficacy statements (i.e., where model fit indices can be reported):

- Include a clear description of the comparison or reference groups, which are defined in terms of the independent variable of interest (e.g., "heavy" vs. "light" users)
- Specify a dependent variable of interest and identify the metric (e.g., final exam scores)
- Specify the nature of the relationship (i.e., whether significant or not; whether positive or negative)
- Suggest magnitude in terms of an effect size or mean differences along with statistical test statistics

Research study designs associated with relational (correlational and predictive) efficacy statements include:

- Cohort analysis with controls for baseline factors or potential mediating/moderator variables
- Cohort analysis with no controls for baseline factors or potential mediating/moderator variables

| General vs. specific | Learner outcomes category | Illustrative example efficacy statements |
|----------------------|--|--|
| General | Access and experience | <i>General statements in this category are not considered applicable as efficacy statements</i> |
| | Timeliness and completion | Students who make more homework attempts are more likely to complete the course |
| | Standard of achievement or level of competence | Homework scores in the product are significantly predictive/a significant predictor of final exam scores |
| | Progression | Among students using the product, students who spent more time on the assignments were more likely to pass the course than students who spent less time on the assignments |
| Specific | Access and experience | <i>Specific statements in this category are not considered applicable as efficacy statements</i> |
| | Timeliness and completion | Students who make 10 more homework attempts are 5% more likely to complete the course |
| | Standard of achievement or level of competence | Completion of homework predicted 8% of the variance in final exam scores |
| | Progression | Among students using the product, students who spent more than 30 hours on the assignments were twice as likely to pass the course as students who spent fewer than 30 hours |

Comparative efficacy statements

Specific comparative efficacy statements:

- Specify the treatment group
- Specify the comparison group
- Use the terms “matched” or “similar” only to indicate variables on which baseline equivalence was achieved; where baseline equivalence is not reached, those variables should be included in the model as covariates, and statements can only reflect that the analyses “adjusted” for those variables, not that they were matched or similar
- Indicate whether there was a significant difference between groups and, if so, the direction of difference
- Suggest magnitude in terms of an effect size or mean differences along with statistical test statistics
- Indicate the outcome measure (e.g., final exam scores)

Technical Reports and Research Reports must include a statement that results cannot be interpreted as causal and identify the specific reason (e.g., failure to achieve baseline equivalence, differential attrition, other confounding factors unable to control for). Where “predictive” language is used in the statements, appropriate model fit indices must be provided (e.g., R-squared or pseudo-R-squared).

Study designs associated with comparative efficacy statements include:

- Quasi-experimental (via propensity score matching)
- Randomized controlled trial

| General vs. specific | Learner outcomes category | Illustrative example efficacy statements |
|----------------------|--|---|
| General | Access and experience | Students using the product reported a better learning experience than students who did not use the product, when groups were matched on prior achievement and after adjusting for gender, age, and race/ethnicity |
| | Timeliness and completion | Students using the product were more likely to complete assignments than students who did not use the product, when groups were matched on prior achievement and after adjusting for gender, age, and race/ethnicity |
| | Standard of achievement or level of competence | Students using the product earned significantly higher final exam scores than students who did not use the product, when groups were matched on prior achievement and after adjusting for gender, age, and race/ethnicity |
| | Progression | Students using the product were more likely to progress to college level after using the product than students who did not use the product, when groups were matched on prior achievement and after adjusting for gender, age, and race/ethnicity |
| Specific | Access and experience | Students using the product were $\#%$ more likely to report they had a positive learning experience than students who learned the same skill without using the product when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |
| | Timeliness and completion | Students using the product were $\#%$ more likely to complete and master assigned tasks/activities compared to students who did not use the product when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |

| | | |
|-------------|--|--|
| Specific | Standard of achievement or level of competence | Students using the product earned #% higher exam scores than students who did not use the product when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |
| | | Students using the product showed #% higher course pass rate than students who did not use the product when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |
| Progression | | Students using the product were #% more likely to progress to college level after using the product than students who did not use the product when groups were matched on prior achievement, and after adjusting for socio-economic status, gender, and race/ethnicity |

Causal efficacy statements

Specific causal efficacy statements:

- Specify the treatment group
- Specify the comparison group
- Indicate whether there was a significant difference between groups and, if so, the direction of difference
- Use the terms “matched” or “similar” only to indicate variables on which baseline equivalence was achieved
- Suggest magnitude in terms of an effect size or mean differences along with statistical test statistics
- Indicate the outcome measure (e.g., final exam scores)
- For instrumental variables or fuzzy regression discontinuity techniques, specifically describe who results apply to, and refrain from generalizing beyond research study samples

Research study designs associated with causal efficacy statements include:

- Randomized controlled trial
- Propensity score matching
- Instrumental variables
- Regression discontinuity
- Fuzzy regression discontinuity

| General vs. specific | Learner outcomes category | Illustrative example efficacy statements |
|----------------------|--|---|
| General | Access and experience | Students using the product reported a better learning experience than similar/matched students using a competitor product |
| | Timeliness and completion | Students using the product were more likely to complete assignments than similar/matched students using a competitor product |
| | Standard of achievement or level of competence | Students using the product earned significantly higher final exam scores than similar/matched students using a competitor product |
| | Progression | Students using the product are more likely to progress to college level after using the product than similar/matched students who did not use the product/who used a competitor product |
| Specific | Access and experience | Students using the product are # ¹ % more likely to report they had a positive learning experience than similar/matched students who learned the same skill without using the product/using a competitor product |
| | Timeliness and completion | Students using the product are # ¹ % more likely to complete and master assigned tasks/activities compared to similar/matched students who did not use the product/who used a competitor product |
| | Standard of achievement or level of competence | Students using the product achieve # ¹ % higher on tests compared to similar/matched students who did not use the product/who used a competitor product |
| | Progression | Students using the product are # ¹ % more likely to progress to college level after using the product than similar/matched students who did not use the product/who used a competitor product |

Audit of efficacy statements

Pearson has commissioned PwC to audit the efficacy statements identified in our Research Reports. The PwC audit opinion is included within each Research Report.

The scope, approach and limitations of PwC's work are set out below.

Professional standards applied and level of assurance

PwC performs a limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised), *Assurance Engagements Other Than Audits and Reviews of Historical Financial Information*, issued by the International Auditing and Assurance Standards board.

A limited assurance engagement is substantially smaller in scope than a reasonable assurance engagement in relation to both the risk assessment procedures (including an understanding of internal control) and the procedures performed in response to the assessed risks.

What is a material misstatement?

A material misstatement would be an efficacy statement that does not reflect the study design and quality of underlying research or the omission of key information from a relevant study.

Work performed by PwC

PwC's audit focuses on:

- The process that generates the efficacy statements that appear in the Research Report
- The integrity of the efficacy statements themselves

PwC's work includes the following procedures:

- Making enquiries of relevant Pearson management
- Evaluating the design of the Efficacy Reporting Framework including key structures, systems, processes and controls for managing, generating and reporting the efficacy statements
- Testing all the controls across the eight stages of the Efficacy Reporting Framework
- Confirming that all management reviews are performed by at least two members of Pearson's efficacy and research team
- Performing substantive testing, on a sample basis, of the data that underpins the research studies and the resulting efficacy statements, and the controls over the completeness and accuracy of that data (supported by Pearson's internal audit team in those instances where student data is subject to confidentiality restrictions)
- Assessing the quality and conclusions of the underlying research studies
- Inspecting the statistical analysis to assess whether the efficacy statements are valid, supportable and consistent with the underlying research studies
- Independently re-performing the screening of relevant external public research studies and comparing to that done by Pearson
- Assessing the efficacy statements and underlying Technical Report(s) for consistency with the Efficacy Reporting Framework
- Reviewing the product's efficacy web page, Research Report, and Technical Report(s) for alignment of research studies and efficacy statements

Important limitations

- The audit opinion is product-specific.
- Efficacy research studies reflect the implementation and use of a product in a particular context.
It would not be appropriate to assume a product would always generate similar outcomes in the future.



Pearson