



# Untapping the potential of resource banks in the classroom

Resource banks support learning in classrooms by improving the quality of teacher instruction and assessment. They are typically online platforms that include examples of curriculum-aligned assessment tasks and complementary instruction, assessment and learning materials. These can be used by teachers, students and parents to improve learning in schools. While resource banks have become an important curriculum and assessment tool in many OECD countries, information about them remains scarce. This policy perspective provides a framework to help educators plan, design and use resource banks. First, policymakers should have a thorough concept of the resource bank and carefully plan its governance and resourcing structure. Second, the definition and development of its content and the platform's underlying technology should be guided by quality, security and privacy principles that place users at the centre. Thirdly, once released, it is important to promote awareness of the resource bank to key stakeholders and maintain content and IT-support. This will ensure resource banks have a long-lasting and positive impact on educational practices.

This policy perspective was drafted by Lynn Abi Raad and Till Kadereit from the Directorate for Education and Skills and Saskia Kesepaik (external consultant). The authors would like to express their gratitude to Jonathan Fisher, Patrick Coffey, and Thierry Rocher for the feedback provided based on their experiences as resource banks practitioners in New Zealand (Assessment Resource Bank), Ireland (Scoilnet), and France (International Item Library), respectively. The authors are equally grateful for the peer review and support received from colleagues at the OECD, including Elizabeth Fordham, Caitlyn Guthrie, Mario Piacentini, and for the overall guidance from Andreas Schleicher and Paulo Santiago. Editorial support was provided by Jane Birchall and Rachel Linden.

# Table of contents

1 Introduction	4
2 Users and uses of resource banks	6
Item banks for standardised assessments	8
Item banks are integral to the design of standardised assessments	9
Item banks may contribute to sharing standardised assessment practices and promoting innovation in large-scale assessments	9
Item banks underpin a wide variety of standardised assessment instruments	11
Resource banks as a curriculum and assessment tool	12
Resource banks contribute to improving the quality of classroom assessments	13
Resource banks are a central lever for standards-based instruction and assessment	14
Resource banks can foster collaborative learning among teachers	15
Resource banks can be useful for broader audiences	17
3 What are key considerations for developing a resource bank?	18
Phase 1: Conceptualising and preparing for the resource bank	19
Step 1.1: Defining the purpose, scope, and audience of the resource bank	19
Step 1.2: Setting up the governance of the resource bank	20
Step 1.3: Identifying and allocating the necessary human and financial resources	25
Phase 2: Developing the content and the technological infrastructure underpinning the resource bank	27
Step 2.1: Developing the content and determining the organisation of the resource bank	27
Step 2.2: Determining workflows for item development and validation	29
Step 2.3: Defining the functional requirements of the resource bank	32
Step 2.4: Considering broader technical requirements and their implications for the underlying technology solution of the resource bank	35
Phase 3: Deploying and maintaining the resource bank and promoting its use	38
Step 3.1: Maintaining and updating the content and technological solution	38
Step 3.2: Promoting the buy-in of and use by key stakeholders	38
4 Summary: framework for the establishment of a resource bank	40
References	44
Annex A. Glossary of Terms	51
Functionalities of resource banks	52
Annex B. Overview of resource banks case studies	56
<b>Tables</b>	
Table 3.1. Key decisions on functions, audience, and scope of the item bank	20
Table 3.2. Validation methods for resource banks	30
Table 3.3. Options for developing and hosting resource bank technological solution	36
Table 4.1. Framework for developing a resource bank	40

## Figures

Figure 2.1. Uses and value of item banks	7
Figure 3.1. Phases for the development of a resource bank and steps within each	18

## Boxes

Box 1.1. Rationale for a resource bank for classroom assessments in Morocco	5
Box 2.1. Strengthening student learning through innovation with PILA	8
Box 2.2. The International Item Library (IIL) Project	10
Box 2.3. Standardised diagnostic assessment in France	12
Box 2.4. E-asTTle - New Zealand's resource bank to improve the quality of classroom assessments	14
Box 2.5. Teacher collaboration through the Scoilnet Resource Bank in Ireland	16
Box 2.6. Engaging different actors through learning resources in Estonia	17
Box 3.1. Decentralised Management through the Smarter Balanced Assessment Consortium	22
Box 3.2. Public-Private Collaboration in the Development of Resource Banks - The case of the NWEA	23
Box 3.3. Stakeholder engagement – Example from the Banks of Educational Digital Resources (BRNE) in France	25
Box 3.4. Content development and item validation in New Zealand's ARBs	31
Box 3.5. Digital test delivery	34

# 1 Introduction

With the shift towards standards-based education, countries are increasingly providing teachers with tools and resources to align their instruction and assessment practices with learning standards. Changes in the approach to student assessments – including the increased focus on formative assessments and the need to assess higher-order competencies – have also led to a greater need for teacher professional development and guidance in this area. Resource banks have emerged as a key tool to improve the quality of instruction and assessment in the classroom and their alignment with national norms. They provide teachers (and other stakeholders) with a range of assessment tasks and complementary instructional and assessment material to support teaching and learning.

Studies on the use of resource banks to support instruction, learning, and assessment in the classroom remain limited (See, for example, (Joyce and Fisher, 2014<sup>[1]</sup>)), particularly those from a policymaking perspective. The literature tends to focus on item banks used by test designers to develop standardised (or other external) assessments and their technical, functional, and methodological requirements (See, for example, (Ward and Murray-Ward, 1994<sup>[2]</sup>; Rudner, 1998<sup>[3]</sup>; Vale, 2006<sup>[4]</sup>)). Resource banks imply different purposes, audiences, uses, and technical and functional requirements than item banks for standardised assessment. Policymakers would benefit from a more in-depth analysis of resource banks and guidance on their development and use to support instruction and assessment.

This policy perspective seeks to address this gap in the literature by building on the OECD experience of supporting Morocco to develop a resource bank for classroom assessments (See Box 1.1). It presents a framework for policymakers to reference as they consider creating (or further developing) a resource bank to support classroom-based assessment and teaching and learning.

- Section 2 distinguishes between resource banks and item banks for standardised assessments, explaining their different uses and users.
- Section 3 presents the key phases of the development of a resource bank – from its initial conceptualisation and set up of its governance and resource arrangements, to the development of its content and technological platform, and to promoting its use by the target audience and ensuring its ongoing maintenance and updating. It puts forward the different questions and choices that policymakers face throughout the process of developing a resource bank and suggestions on how to address those informed by country experience and good practice.
- Section 4 presents a summary overview of the suggested framework for the development of a resource bank.

### Box 1.1. Rationale for a resource bank for classroom assessments in Morocco

Since 2015, the OECD has provided policy advice and technical assistance to the Moroccan Ministry of Education with the aim of improving its evaluation and assessment system. The Review of the Evaluation and Assessment System in Morocco revealed a need to improve the quality of classroom-based assessment and assessment capacity of educational actors (Maghnouj et al., 2018<sup>[5]</sup>). In Morocco, teachers are solely responsible for the design and marking of the *contrôle continu*, which are summative classroom-based assessments that contribute to decision-making on student progression and certification. The absence of national learning standards, reference frameworks, and other tools to guide teachers results in a strong variation in the quality of assessments by teachers between schools across different regions and even within the same school. Moreover, teachers lack the training and resources necessary to use the *contrôle continu* formatively to inform future teaching and learning.

Providing tools for student assessments and initial and continuous training in this area were deemed essential to boost assessment quality and capacity among teachers, principals, and pedagogical inspectors. One of the OECD's recommendations for Morocco was to establish a resource bank for classroom-based assessment. Such a bank could improve the validity and reliability of classroom-based assessments by providing teachers with examples of quality items or assessment tasks aligned with the national curriculum. It can also boost teacher assessment capacity by providing complementary resources to guide teachers in their design, correction, interpretation, and use of classroom-based assessments to inform teaching and learning. In the long term, the bank could also become a tool that reinforces teacher collaboration and peer-learning, making it a tool by teachers for teachers. As part of a series of technical assistance projects, funded by the Millennium Corporation Challenge and coordinated by the Millennium Challenge Account-Morocco, the OECD provided technical guidance to Morocco on the development of such a resource bank. This guidance on the resource bank constituted one part of a broader multi-project engagement seeking to improve capacity for student assessment at the system, regional, and classroom-level, as well as the evaluation of school quality. At the time of publication, Morocco has not yet implemented the resource bank, which requires the mobilisation of substantial human and financial resources.

Sources : Maghnouj et al. (2018<sup>[5]</sup>), *Examens de l'OCDE du cadre d'évaluation de l'éducation : Maroc*, <https://dx.doi.org/10.1787/9789264301832-fr> ; OECD (unpublished<sup>[6]</sup>), *Étude de diagnostic sur une banque d'items pour le contrôle continu au Maroc*

## 2 Users and uses of resource banks

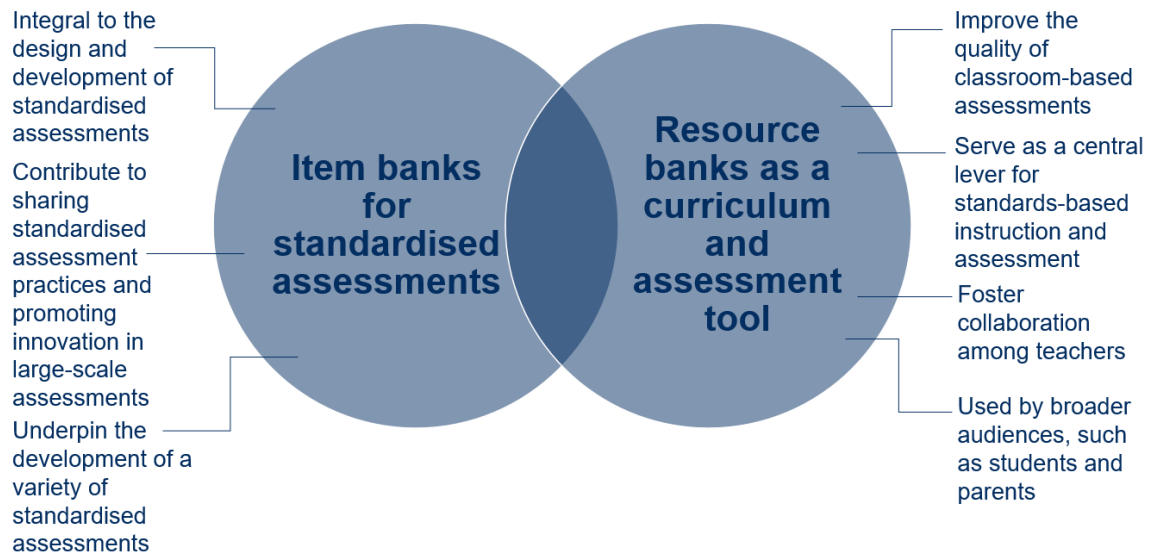
Across OECD countries, the use of resource banks as a curriculum and assessment tool in the classroom has become common practice. This trend was partly spurred by the shift towards a standards-based approach to education starting in the 1990s and partly by technological advancements.

A standards-based approach to education considers learning standards as the basis for instruction, assessment, and system accountability. Learning standards define what students should know and be able to do at various stages of the learning process (OECD, 2013<sup>[7]</sup>). In this context, resource banks have emerged as a core curricular and assessment tool that can help teachers implement a standards-based approach. Resource banks provide teachers with instructional and/or assessment material that are aligned with the learning standards. This enables teachers to design or use assessments that measure progress towards the achievement of learning standards and inform next steps for teaching and learning accordingly.

Moreover, technological advancements have enhanced resource banks' design and functionality and improved their measurement and educational potential. Resource banks have evolved from simple repositories to sophisticated platforms with user-friendly interfaces that provide varied functionalities to their users. Technological advancements have also enabled more accurate and in-depth measurement of student learning and their interpretation to inform teaching, through adaptive testing (see Box 3.5) or the use of innovative assessment items that allow students to demonstrate their skills in authentic contexts. For example, technology-enhanced items can simulate scientific experiments or programming tools to assess students' computational thinking and digital skills (see for example Box 2.1 on the OECD'S PISA).

This section distinguishes between item banks for standardised assessments and resource banks as curriculum and assessment tools (which are the focus of this policy perspective) and presents the uses, users, and value of each.

Figure 2.1. Uses and value of item banks





### Box 2.1. Strengthening student learning through innovation with PILA

The Platform for Innovative Learning Assessment (PILA) is a cutting-edge project by the OECD. PILA is a resource bank that aims to foster innovation in learning and measurement of 21<sup>st</sup> century competencies. It can also help students to master the use of technology to acquire skills in the digital world.

PILA is a free open-source online platform that supports teaching and learning through formative classroom assessments aligned with learning standards. The expert-designed tasks are thereby mapped to competency frameworks that are aligned with the Programme for International Student Assessment (PISA) competency frameworks. Currently, PILA provides content that helps teach and assess complex skills, such as *computational problem-solving*, *self-regulated learning*, and *systems thinking*. PILA allows teachers to customise or create tasks aligned with teaching targets/learning objectives. It also provides learning resources and other forms of support, such as worked examples, hints, automated feedback, and tutorials to support learning. To ensure high standards, the platform is developed based on research evidence and relies on experts and teacher feedback, as well as trialling in classrooms.

Projects like PILA contribute to gaining insights on students' skills and progress by enhancing the variety of assessments and using more immersive formats. PILA familiarises users with innovative assessment and helps teachers (and test designers more broadly) develop assessments of 21<sup>st</sup> century competencies. PILA enables students to learn new concepts and practice both disciplinary and transversal thinking skills. It can also help teachers to use the results generated by PILA to adapt teaching and discuss next steps together with their students (and their parents). Currently, PILA is working to improve the design of its digital dashboards by developing a system that uses AI to identify and cluster similar solutions and common mistakes. Teachers could then use this intelligent dashboard during their feedback interactions with students, for instance to show all possible ways a task has been solved. Finally, PILA enables the research community to use its (anonymised) data to push frontiers in applying machine learning to education and to create innovative assessments more easily.

In the future, PILA aims to expand to include a wider set of transversal competences and 21<sup>st</sup> century skills in its assessment repertoire. Given its innovative interface and task formats, expanding PILA to include traditional subjects like Mathematics or Reading could add value to support teaching and learning worldwide. The PILA team is also currently translating the resources and core platform in other languages and integrating translation tools to make it more accessible to a global audience.

Sources: OECD (2023<sup>[9]</sup>), *PILA*, <https://pilaproject.org/>, accessed on 10 July 2023 ; OECD (2023<sup>[9]</sup>), *PISA 2025 Learning in the Digital World*, <https://www.oecd.org/pisa/innovation/learning-digital-world/>, accessed on 10 July 2023; OECD (n.d.<sup>[10]</sup>), *PILA Twopager. What is PILA?*

### Item banks for standardised assessments

Today, most OECD and partner countries use standardised assessments to generate reliable and comparative measures of student learning outcomes and system performance (OECD, 2013<sup>[7]</sup>). Standardised assessments can be developed for classroom use as well as for national or regional examinations and national or international assessments. Item banks are integral to the development of standardised assessment and a core part of the infrastructure underlying these increasingly complex operations. Given the growing need to efficiently test large numbers of individuals, item banks allow users to generate tests (automatically or manually) using pre-tested items that are valid and reliable (Vale,



2006<sub>[4]</sub>) (Weiss, 2011<sub>[11]</sub>). Item banks, enabled by an underlying technology solution, can also generate different versions of a test that are equivalent in the knowledge and skills assessed and level of difficulty. This can ensure the comparability of results across student groups taking the test at separate times and/or locations.

Typically, specialised assessment agencies or units within the Ministry of Education oversee the development, roll-out, use, and maintenance of standardised item banks. This involves creating the items and field-testing them on large samples of test takers<sup>1</sup>, which is necessary for their calibration, coding the responses, and cleaning the data and managing it. The development of such item banks requires significant financial (Vale, 2006<sub>[4]</sub>) and human resources, including multidisciplinary teams made up of domain experts, item writers, psychometricians, and software developers (if the items are technologically enhanced). Assessment agencies benefit from specialised expertise and adequate capacity to design and validate assessment instruments and manage the implementation of assessment procedures at a national level (OECD, 2013<sub>[7]</sub>). On the other hand, standardised items banks can also be developed and owned privately by education publishers or testing services, for example, for the development of certifying tests. Common examples include Education Testing Service (ETS), Cambridge Assessment, and Pearson Assessment.

### ***Item banks are integral to the design of standardised assessments***

Item banks are integral to the construction and interpretation of results of standardised assessments. Using psychometric methods item banking enables the construction of tests with similar measurement characteristics and their grading against constant standards (Saville, 2016<sub>[12]</sub>).

Through pre-testing or previous administration, the qualities of items stored in an item bank (such as their difficulty and degree of discrimination) are known, that is, they have been calibrated to a single scale (Saville, 2016<sub>[12]</sub>). Moreover, the items provide a concrete, detailed description of progression in terms of the (learning) content being measured. This enables the construction of tests (or multiple equivalent versions of a test) by selecting and retrieving items of appropriate difficulty and target level. Depending on the functionalities implemented in the underlying technology solution, digitized item banks may also allow for random and (semi)automated selection of items according to conditions predefined by the test specification (also called *test blueprint*) (Vale, 2006<sub>[4]</sub>).

The use and value of item banks have therefore been closely linked to the application of psychometric methods that underpin standardised assessments (Vale, 2006<sub>[4]</sub>). As these methods become more sophisticated, so have item banks (and their underlying technological solutions). For instance, the implementation of adaptive tests through digitized item banks have changed the inherent structure of tests from fixed forms to customised collections of items drawn, for each examinee at the time of testing, from a larger set of calibrated items (Vale, 2006<sub>[4]</sub>).

### ***Item banks may contribute to sharing standardised assessment practices and promoting innovation in large-scale assessments***

Item banks for standardised assessments can also serve broader purposes such as the exchange of best practices and experiences and promoting innovation internationally. An example of this is the International Item Library (IIL) project, conducted under the aegis of the FLIP+ association, which aims to provide evaluation professionals with a platform for sharing traditional and innovative and diverse items. Innovative items (also known as technology-enhanced items) may include interactive situations, complex tasks, or

---

<sup>1</sup> Item banks can also include items from past standardised assessments (such as large-scale assessments) and their statistical characteristics can be known and calibrated through the previous administration of this item.

tasks assessing 21<sup>st</sup> century skills that require test takers to demonstrate their knowledge, skills, and abilities in ways made possible through technological advancements such as, “drag and drop” responses or reordering or rearranging content (Russell, 2016<sup>[13]</sup>). Item banks can thus play a role in capacity-building and peer-learning in the area of standardised assessments.

### Box 2.2. The International Item Library (IIL) Project

The [International Item Library](#) (IIL) project, conducted under the aegis of FLIP+, is an innovative global project that allows education institutions to share assessment content and tools. It shows strong potential in strengthening mutual learning between educational institutions responsible for standardised student assessments in their country (such as Ministry departments, specialised assessment agencies etc.). It can also promote innovation in assessments by sharing technology-enhanced items and supporting the assessment of 21<sup>st</sup> century skills.

The IIL aims to provide an open-source and free-to-access platform that enables users – currently non-profit institutions specialised in standardised student assessments – to share assessment content. Users can upload, access, browse and borrow assessment content to be used in their national assessment programs. Moreover, the IIL will also enable the sharing of technology-enhanced items (such as interactive situations and complex task-resolution problems) to improve assessments of the 21st century skills. Some of these 21st century skills remain difficult to assess, particularly because of their novelty, their transversal nature, and the inadequacy of traditional assessment methods (such as paper-based items or multiple-choice questions) for their measurement. Technology-enhanced items that will be included in the IIL also make assessments more authentic. Finally, the IIL aims to eventually contribute to the measurement of UNESCO’s SDGs (with the support of the UNESCO Institute of Statistics) by sharing items mapped against and aligned with the UNESCO global proficiency framework.

The IIL is an ambitious project which shows how item banks can contribute to mutual learning and sharing of good practices in assessment. The central idea of the IIL project is to offer a space for inspiration, mutual learning, and collaboration between assessment designers. Sharing large-scale standardised assessment items can reinforce national assessment systems and promote the exchange of good practices across systems. Sharing technology-enhanced items is particularly useful given that it is a relatively new field that requires extensive resources to develop the items and ensure their interoperability between systems. In that way, the IIL also serves as a platform to promote technological progress and innovation in assessments. Expanding the IIL project to enable teachers to use items for their classroom assessments is already envisaged. This would be an important next step to promote innovation and peer-learning in the classroom and provide an item bank that also serves pedagogical purposes.

Sources: International Item Library (n.d.<sup>[14]</sup>), *Sharing assessment tools for a better education*, [https://uploads-ssl.webflow.com/626be7bab94c1ad8543b5ab6/62c706dce299b282e0f0ec73\\_20220525%20International%20Item%20Library%20-%20Leaflet%20-%203%20page.pdf](https://uploads-ssl.webflow.com/626be7bab94c1ad8543b5ab6/62c706dce299b282e0f0ec73_20220525%20International%20Item%20Library%20-%20Leaflet%20-%203%20page.pdf) ; OECD (2019<sup>[15]</sup>), *OECD Future of Education of Skills 2030. OECD Learning Compass. A Series of Concept Notes*, [https://www.oecd.org/education/2030-project/teaching-and-learning/learning/learning-compass-2030/OECD\\_Learning\\_Compass\\_2030\\_Concept\\_Note\\_Series.pdf](https://www.oecd.org/education/2030-project/teaching-and-learning/learning/learning-compass-2030/OECD_Learning_Compass_2030_Concept_Note_Series.pdf) ; Salles, Dos Santos and Kespaik (2020<sup>[16]</sup>), *When didactics meet data science: process data analysis in large-scale mathematics assessment in France*, <https://doi.org/10.1186/s40536-020-00085-y> ; Pellegrino (2017<sup>[17]</sup>), *Teaching, learning and assessing 21st century skills*, <https://doi.org/10.1787/9789264270695-en> ; OECD (unpublished<sup>[6]</sup>), *Étude de diagnostic sur une banque d’items pour le contrôle continu au Maroc* ; FLIP (n.d.<sup>[18]</sup>), *About us*, <https://flip-plus.org/about>, accessed on 10 July 2023 ; International Item Library (2023<sup>[19]</sup>), *International Item Library*, <https://www.itemlibrary.org/>, accessed on 10 July 2023

***Item banks underpin a wide variety of standardised assessment instruments***

As mentioned previously, item banks go hand in hand with the application of psychometric methods for the development of standardised tests. The most common application is for large-scale standardised assessments, such as national assessments aimed at measuring system performance or high-stakes examinations (such as end of cycle or exit examinations). Other uses of standardised assessments enabled by item banks include certifying assessments such as English language certifications (TOEFL or IELTS) or the SAT widely used in the US to assess student readiness for higher education. Item banks can also support classroom-based student assessment, such as diagnostic or formative tests that aim to provide teachers with information on where their students stand with regards to the national standards.

For example, some countries, such as France and Morocco, have centrally developed standardised diagnostic assessments that are administered in the classroom at the beginning of the academic year in certain grades. These standardised diagnostic assessments aim to provide teachers with information on their students' performance measured against a unified scale that is associated with stable learning standards and progressions. Teachers can use such assessments to detect areas where students do not sufficiently master the content or do not meet the level of performance required at their grade level. They can then adapt their instruction accordingly, for example by revising content from previous grades or organising catch-up or preparatory sessions for students who need it. As the example of the standardised diagnostic tests in France shows, these assessments can also be effective in providing understandable and actionable information to students and parents (see Box 2.3).

### Box 2.3. Standardised diagnostic assessment in France

In France, the department of Evaluation, Planning, and Performance (DEPP) in the Ministry of Education conducts external standardised diagnostic assessments at the beginning of each school year at different levels (6<sup>th</sup> grade, beginning of upper secondary/*Lycée*, first year of the vocational track). It relies on an item bank that is built up through a construction, experimentation, and psychometric validation process to ensure the assessments' *validity* and *reliability*.

The diagnostic assessments are important tools that enable teachers, as well as students and their parents, to monitor students' learning against national standards and adapt teaching and learning accordingly. Students' achievement in the evaluated subjects is assessed via a digital platform and correction is automated. The results are communicated to teachers, students, and parents in an actionable and understandable way, so that all involved actors can use the results to support students' learning over the year. Individual, class, and school reports are provided within 24 hours after the test, and consolidated national reports with psychometric analyses are provided two months after the test. Each student and their parents/legal guardians receive an individual feedback form, which positions the students' achievement along three (6<sup>th</sup> grade) or four (upper secondary) mastery groups – unsatisfying, weak, satisfying, and very good mastery – for each assessed domain. For the test in the 6<sup>th</sup> grade, the feedback form has for the first time been accompanied by a QR code that allow legal guardians to easily access test questions and student responses. Teachers also receive this positioning for each student in the upper secondary test, and they receive a table at the class-level that lists the mastery groups of all students in all domains. This allows teachers to easily identify student groups that need more targeted support.

The item bank underpinning France's standardised diagnostic assessments enables the measurement of student performance against learning standards and the generation of information on student learning. Besides providing useful information to support student learning in the classroom, such assessments also enable the production of indicators at the national, regional, and school level to monitor student achievement. So far, the item bank underpinning the diagnostic assessment is owned and controlled internally by the Ministry. Teachers cannot decide which items to use or when to conduct the assessment. Providing (partial) access to teachers to draw items or diagnostic assessments to use freely throughout the year would enhance the bank's pedagogical value and turn it into a useful resource for teachers.

Sources: Ministère de l'Éducation nationale et de la Jeunesse (2022<sup>[20]</sup>), *Tests de positionnement de seconde et de CAP*, <https://eduscol.education.fr/1501/tests-de-positionnement-de-seconde-et-de-cap>, accessed on 10 July 2023 ; Direction de l'évaluation de la prospective et de la performance France (2022<sup>[21]</sup>), *Test de positionnement de début de seconde 2022. Premiers résultats*, <https://www.education.gouv.fr/test-de-positionnement-de-debut-de-seconde-2022-premiers-resultats-343810>, accessed on 10 July 2023 ; Direction de l'évaluation de la prospective et de la performance France (2022<sup>[22]</sup>), *Test de positionnement de début de première année de CAP 2022*, <https://www.education.gouv.fr/test-de-positionnement-de-debut-de-premiere-annee-de-cap-2022-premiers-resultats-34386>, accessed on 10 July 2023 ; Direction de l'évaluation de la prospective et de la performance France (2022<sup>[23]</sup>), *Évaluations de début de sixième 2022*, <https://www.education.gouv.fr/evaluations-de-debut-de-sixieme-2022-premiers-resultats-343396>, accessed on 10 July 2023

## Resource banks as a curriculum and assessment tool

Resource banks are increasingly being used as valuable instruction and assessment tools for teachers, as well as for students and their parents. They typically include assessment tasks aligned with the national curriculum as well as complementary assessment and instructional resources. For example, resource banks typically include correction grids for open-ended questions, guidelines for providing feedback to

students, suggestions of next steps for teaching and learning, and complementary concept maps and instructional material, among other resources.

By providing quality assessment tasks and associated assessment and curricular material for teachers, resource banks can improve the quality of classroom assessments and their use to improve learning. They can also support standard-based instruction and assessments by aligning the items and resources to a common curricular and assessment framework. In that sense, resource banks have become a core tool for curriculum implementation and teacher professional development, particularly in the area of student assessment. Students and their parents may also be provided with (restricted) access to instructional and assessment material in the bank to support and complement students' learning in the classroom.

*Given that resource banks cut across curriculum development, assessment design, and teacher training, they often require institutional and governance arrangements that bring together distinct functions. For instance, resource banks can be overseen by bodies responsible for curriculum, research, teacher training, and/or assessment within or outside the Ministry of Education. Even if one agency takes the lead on the management of the resource bank, cross-institutional coordination and partnerships are necessary if the bank is to serve as a valuable teaching and assessment resource (See*

Policy pointer 1.2.1: Define governance arrangements that foster co-operation across distinct functions).

### **Resource banks contribute to improving the quality of classroom assessments**

Resource banks provide teachers with items and/or assessment tasks (and associated resources) that are of high-quality and are specifically aligned with learning objectives and standards. Teachers may draw on the items and assessment tasks in the bank to generate ready-to-use assessments in their classrooms. They can alternatively use them as examples or inspiration to develop their own items and assessments. By doing so, teachers can develop assessments that accurately measure the knowledge and/or skills they intend to measure (i.e. are valid). They can also use correction grids and feedback guidelines to ensure that students' results and teachers' judgements on their performance are consistent (i.e. are reliable).

Resource banks can help teachers not only develop better quality assessments but also use the assessments more formatively to improve student learning. Teachers can draw on such banks for ideas of formative assessments that can be used to monitor student progress on a topic or throughout a term. They can also draw on the resource bank to assign classwork or homework to their students that foster deeper learning and student engagement, for example by using performance tasks or open-ended questions. The suite of associated resources included in a bank can also guide teachers in their correction of assessment tasks, analysis and interpretation of results, and in providing feedback to students and their parents to improve learning. Some resource banks also provide suggested next steps for teaching.

### Box 2.4. E-asTTle - New Zealand's resource bank to improve the quality of classroom assessments

New Zealand provides teachers with a bank of ready-to-use standardised assessments, *e-asTTle*, that they can use freely in their classrooms for diagnostic, formative, or summative purposes. Assessments within the *e-asTTle* bank are aligned with curriculum statements and designed to assess student achievement at different curriculum levels in subjects like reading, mathematics, or writing. *E-asTTle* serves as useful assessment resource for teachers and contributes to improving validity and reliability of classroom assessments.

*E-asTTle* allows teachers to generate paper-based or onscreen assessments by specifying (within limits) the proportions of items addressing different content areas and their level of difficulty. The tool selects items automatically according to the information stored in the system regarding each calibrated item (metadata). This provides teachers with valid and reliable measurements of their students' learning against national standards and allows teachers to compare students' progress over time. Besides standard customised tests, teachers can also generate adaptive tests onscreen, in which case they only select the difficulty of the first stage. Marking for closed questions is done automatically by the programme, while teachers mark open-ended questions with access to correct examples. After the marking, *e-asTTle* generates interactive graphic reports that help analyse student achievement against curriculum objectives. This can help teachers understand what their students know and might need to learn next. Conversations among teachers around administration consistency, ensuring appropriate time between assessments, and/or shared moderation of results support the effective use of *e-asTTle* and increases teachers' assessment literacy.

Schools using *e-asTTle* quickly reported changes in teachers' formative assessment practices. In interviews with a sample of teachers in the early years of *e-asTTle*'s deployment, around half of the interviewed teachers indicated that they use the tool to improve student learning, for instance to diagnose areas in which students need more support or to decide on learning goals. Several factors were reported to contribute to *asTTle*'s success, among them the use of item response theory analysis for scores and reporting of results, large-scale involvement of teachers in the development and evaluation of *e-asTTle*, and the support provided to schools from the Ministry of Education (for instance online tutorials and help desks). The New Zealand Ministry of Education is currently working on strengthening *e-asTTle* to measure learning progressions, not only achievement. Today already generates *e-asTTle* progress reports to track student progress over time and allows to set targets for students. This can help teachers assess where students are in the mastery of key concepts and learning objectives and tailor teaching to support their progression.

Sources: Education Gazette Editors (2022<sup>[24]</sup>), *The Power of e-asTTle in a Classroom*, <https://gazette.education.govt.nz/articles/the-power-of-e-as-ttle-in-a-classroom/>, accessed on 10 July 2023 ; Brown (2013<sup>[25]</sup>), *AsTTle - A national testing system for formative assessment: How the national testing policy ended up helping schools and teachers*, [https://doi.org/10.1108/S1474-7863\(2013\)0000014003](https://doi.org/10.1108/S1474-7863(2013)0000014003) ; Brown and Harris (2009<sup>[26]</sup>), *Unintended Consequences of using Tests to Improve Learning: How Improvement-Oriented Resources Heighten Conceptions of Assessment as School Accountability* ; World class arena limited (n.d.<sup>[27]</sup>), *asTTle – Assessment Tools for Teaching and Learning*, <http://www.worldclassarena.net/doc/file1.pdf> ; New Zealand Ministry of Education (2023<sup>[28]</sup>), *About e-asTTle*, <https://e-as-ttle.tki.org.nz/About-e-asTTle>, accessed on 10 July 2023 ; New Zealand Ministry of Education (2023<sup>[29]</sup>), *e-asTTle*, <https://assessment.tki.org.nz/Assessment-tools-resources/Commonly-used-assessments/e-asTTle#:~:text=e%2DasTTle%20is%20a%20New,Writing%3A%20curriculum%20levels%201%E2%80%9336>, accessed on 10 July 2023

### **Resource banks are a central lever for standards-based instruction and assessment**

Resource banks enable teachers to align their classroom assessments with common standards and improve the quality of their judgements of student learning to inform further instruction. They can enable teachers to better understand learning standards and identify key learning objectives against which students are assessed. In that way, teachers can orient their teaching to focus on what students need to

know and be able to do at a certain level and modify their current lesson plans accordingly. Similarly, they enable teachers to develop assessments that measure student progress against the learning standards and to use those to identify particular aspects that students have or have not mastered.

For example, the Assessment Resource Banks (ARBs) in New Zealand (see Box 3.4) provide assessment tasks that have been carefully thought of in line with a range of curriculum frameworks in New Zealand [the revised New Zealand Curriculum (2007), National Standards (2010) and the Learning Progression Frameworks (2012)] (Joyce and Fisher, 2018<sup>[30]</sup>). They seek to provide in-depth evidence of students' strengths and weaknesses compared to the frameworks (such as whether an aspect of a progression step has been reached or has not been understood/mastered). They also provide guidance to inform future teaching and learning activities. It is important to note, however, that ARBs should be used in complement to normal classroom activities (interactions and observations) to derive judgements on student learning. Another example is the Next Generation Science Assessments project lead by James Pellegrino and Louis DiBello at the University of Chicago. Collaborating with educators across multiple locales, they aim to develop a new formative assessment system that is aligned with the new Next Generation Science Standards (NGSS). Developed by states in the US, the NGSS aims to link Science education closer to how scientists work and think. The assessment system includes task design templates, assessment tasks, task rubrics, and teacher support material to use tasks in the classroom, to help educators teach aligned with the standards (University of Illinois Chicago, 2023<sup>[31]</sup>; Next Generation Science Standards, n.d.<sup>[32]</sup>).

### ***Resource banks can foster collaborative learning among teachers***

Resource banks can also serve as platforms for collaborative learning and mutual exchange of best practice among teachers and teaching staff. For instance, teachers can be invited to submit their own items or assessment resources to the bank. This is the case for Scoilnet in Ireland (see Box 2.5) and e-koolikott in Estonia (see Box 2.6). However, this would require a degree of curation to ensure that the items and resources included in the bank are of quality, aligned with curricular/assessment frameworks, and contribute to the improvement of teaching and learning (See Step 2.2: Determining workflows for item development and validation). A space for exchanges among teachers, such as discussion boards or comment sections, could also be integrated in the resource bank.



### Box 2.5. Teacher collaboration through the Scoilnet Resource Bank in Ireland

In Ireland, the Department of Education provides a resource bank that fosters teacher collaboration and peer learning. *Scoilnet* is the Department of Education’s official portal for education, and features more than 24,000 online open education resources for teachers, among them lesson plans, teacher notes, videos, and different types of assessment tasks (including self- and peer assessments and quizzes and games). Developed as support for teachers at primary and post-primary levels, the standard-based repository allows teachers to upload and share their own teaching and assessment resources.

Scoilnet provides an important platform for teachers, who account for most of the resource uploads, to share knowledge and good practices and learn from each other. Teachers registered with the Irish teaching council can register on Scoilnet to upload and share their material, as well as view and borrow material provided by colleagues. When uploading resources, teachers tag and link resources to the Irish curriculum to ensure their alignment. Apart from occasional inspections by the Professional Development Service for Teachers (PDST) or contracted teachers, there is no formal validation or approval system in place for these resources.

The literature suggests that collaboration and mutual learning has positive effects for teachers, and empirical evidence indicates a positive link between teacher collaboration and student achievements. Through the provision of a repository with high-quality resources and a platform to encourage teacher collaboration, the Irish Department of Education can make an important contribution to improving teachers’ instructional and assessment practices. The fact that the resources are created by educators ensures they are primarily pedagogically driven and respond to the needs of Irish teachers and students. However, more efforts should be made to communicate the criteria for submitting resources and implement quality assurance mechanisms. While teachers reported that Scoilnet has become a particularly valuable teaching and assessment resource, especially during the COVID-19 pandemic, it is still not being used as much as it should be. The inadequate uptake by teachers may be linked to the volume of resources and the difficulty of finding suitable ones, as well as the lack of communication on the benefits of using Scoilnet. This might point to the need for greater stakeholder engagement including awareness-raising at local or regional levels and trainings to encourage its use. Revisions to the functionalities of the resource bank and the filtering and classification of its contents may also make it more user-friendly.

Sources: PDST Technology in Education (2023<sup>[33]</sup>), *Scoilnet. About us*, <https://www.scoilnet.ie/scoilnet/about-us/>, accessed on 10 July 2023 ; Marcus-Quinn and Hourigan (2022<sup>[34]</sup>), *Digital Inclusion and Accessibility Considerations in Digital Teaching and Learning Materials for the Second-level Classroom*, <https://doi.org/10.1080/03323315.2021.2022519> ; Hourigan (2020<sup>[35]</sup>), *Reflections on the impact of Covid-19. Ireland's Yearbook of Education 2020*, <https://irelandseducationyearbook.ie/downloads/IEYB2020/Irelands-Education-Yearbook-2020.pdf> ; Goddard, Goddard and Tschannen-Moran (2007<sup>[36]</sup>), *A Theoretical and Empirical Investigation of Teacher Collaboration for School Improvement and Student Achievement in Public Elementary Schools*, <https://journals.sagepub.com/doi/pdf/10.1177/016146810710900401> ; Marcus-Quinn (2021<sup>[37]</sup>), *Open educational resources; The need for formal inclusion in compulsory education*, <https://conference.pixel-online.net/files/foe/ed0011/FP/7553-ESOC5283-FP-FOE11.pdf>; PDST Technology in Education (2023<sup>[38]</sup>), *Uploading Basics*, <https://www.scoilnet.ie/site-info/help/uploading-basics/>, accessed on 10 July 2023 ; The National Centre for Technology in Education Ireland (2009<sup>[39]</sup>), *Creating your school's website using scoilnet blogs*, <https://breaffyns.scoilnet.ie/blog/files/2014/04/Using-Scoilnet-blogs-to-create-your-school-Website.pdf>

**Resource banks can be useful for broader audiences**

Students may be granted (restricted) access to the resource bank for assessment and learning purposes. For example, students could have access to items or assessment tasks that are no longer used in tests (i.e. "released items") for self-assessment or practice purposes. Moreover, students may be able to sit for assessments or complete activities assigned by their teachers through the resource bank's platform and their results could be automatically transmitted to teachers. Students could also be given access to their results and invited to discuss their responses with the teacher and/or other students, as is the case of the Assessment Resource Bank in New Zealand (see Box 3.4). This would promote students' involvement in their own learning and in the assessment process (Joyce and Fisher, 2018<sup>[30]</sup>). Similarly, parents may be granted access to educational material and assessment tasks in the resource bank to support their children's learning. The Banks of Educational Digital Resources (BRNE) in France (see Box 3.3), for instance, provided students and parents with access to all educational material and activities to discover, revise, or reinforce learning in school (Thillay, Jean and Vidal, 2020<sup>[40]</sup>).

**Box 2.6. Engaging different actors through learning resources in Estonia**

Estonia's crowd-sourcing resource bank, *e-koolikott*, supports teaching and learning at different educational levels and in line with Estonia's curriculum. By making its resources freely available to different users, it enables teachers to strengthen their instructional and assessment practices, while allowing students to practice and parents to support their children's learning.

The digital learning portal *e-koolikott*, developed by Estonia's Ministry of Education, comprises material such as games, tests, guides, exercises, and lesson plans. Teachers and other specialists can create and share learning materials. They can also select, adapt, and use the resources in their classrooms (for example by organising and saving resources into personal learning kits). This can promote peer-learning among teachers in Estonia. *E-koolikott* is not only open to teachers, but also to students and parents. Students can use the platform to access materials to complement their learning in the classroom and for practice and self-improvement purposes. Parents and guardians can use the resources to support children's learning at home and understand and follow their children's progress. The tool makes accessing and using resources simple, as it does not require any account or log-in for the use of resources (only for submission of resources by teachers). This could facilitate and encourage the use of the tool by broader audiences, notably students and parents.

*E-koolikott* shows potential to improve teaching practices and encourage peer learning. An important feature of this resource bank is the free and easy access to the resources for a range of different users, among them students and parents. Students are thus more involved in their learning process and parents can support their children more easily and effectively. Facilitating parents' support to their children's learning is of particular importance given the pivotal role parents' involvement plays in students' success and motivation.

Sources: Pfister (2020<sup>[41]</sup>), *A step ahead: Estonia emerges as leader in worldwide distance learning experiment*, <https://ncee.org/quick-read/a-step-ahead-estonia/>, accessed on 10 July 2023 ; UNESCO (2021<sup>[42]</sup>), *Parental support to learning*, <https://learningportal.iiep.unesco.org/en/issue-briefs/improve-learning/parental-support-to-learning>, accessed on 10 July 2023 ; Education and Youth Authority Estonia (2022<sup>[43]</sup>), *KKK*, <https://projektid.edu.ee/pages/viewpage.action?pageId=72155602>, accessed on 10 July 2023 ; Education and Youth Authority Estonia (n.d.<sup>[44]</sup>), *ekoolikott*, <https://e-koolikott.ee/en>, accessed on 10 July 2023

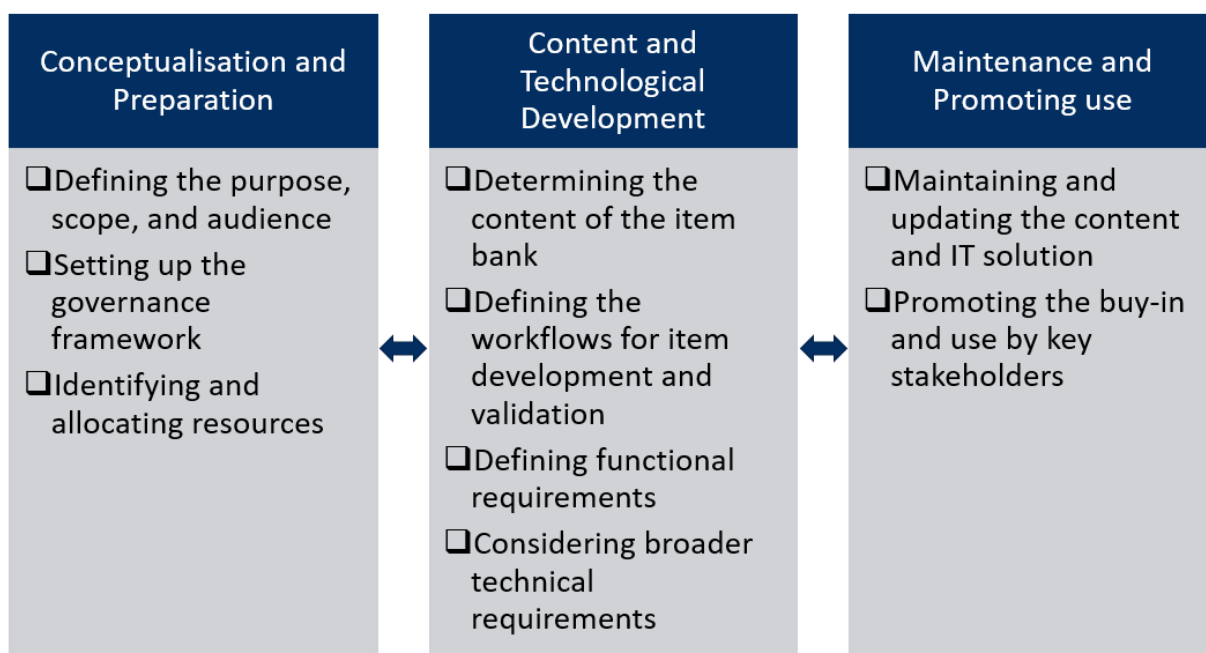
# 3 What are key considerations for developing a resource bank?

Setting up a resource bank is a long term process that involves taking several decisions that determine the ultimate output (the digital bank) and outcome (its value and use) of this tool. It is important for policymakers to have an overview of the process and the policy levers that enable the development of a resource bank to support better instruction and assessment practices.

The following section is structured around the key phases of a resource bank’s development – from initial conceptualisation and preparation to content and technological development, and to maintenance and use of the resource bank. It presents key considerations for policymakers at every step of a resource bank’s development and how decisions can be informed by country experience and good practice.

It is important to note that, in practice, the different phases of resource bank development are not as sequential and separated as presented in the framework. The development of a resource bank often involves back-and-forth between the different steps and phases to inform its continuous refinement over time. For example, determining the purpose of the resource bank (Phase 1) has implications on the choice of technology (Phase 2), which then has implications in terms of human and financial resources required (Phase 1). To the extent possible, the policy perspective tries to make the links between the different phases and steps explicit; while ensuring that the framework remains simple and accessible to policy makers.

Figure 3.1. Phases for the development of a resource bank and steps within each



## Phase 1: Conceptualising and preparing for the resource bank

Setting up a resource bank requires policymakers to first make decisions on the bank’s purpose, scope, and audience to inform its future development. Resource banks also rely on an established governance framework that brings together key actors and dedicated human and financial resources to support its development and ensure its long term success.

### **Step 1.1: Defining the purpose, scope, and audience of the resource bank**

Creating a resource bank requires a considerable investment (in human resources, time, and capital) and the choice to do so should be informed by an identified or expressed need and a clearly defined scope. Typically, resource banks aim to improve the quality of classroom-based assessments and teachers’ ability to use them formatively to inform instruction and improve student learning. Countries may have different motivations or purposes for creating a resource bank. These include, but are not limited to, the following:

- **To support curricular reforms:** Resource banks can be particularly helpful in the case of reforms to the curriculum and/or assessment frameworks. They can provide teachers with assessment tasks that are aligned with learning standards, as well as complementary teaching or assessment resources. For instance, while the ARBs in New Zealand were initially created for summative use, there was a shift in 2003 to a focus on classroom-based formative assessment in support of curriculum and assessment reforms that emphasised assessment for learning (See Box 3.4 ).
- **To support capacity-building:** Resource banks can respond to teachers’ identified needs for professional development or support in a particular area. For example, in its review of Morocco’s evaluation and assessment, the OECD recommended that Morocco develop a resource bank aligned with the revised competency-based curriculum (see Box 1.1). This bank would aim to improve the quality of classroom-based assessment and improve teachers’ capacity in developing and using competency-based assessment (Maghnouj et al., 2018<sup>[5]</sup>).
- **To consolidate resources:** Developing a resource bank can also serve to consolidate and complement resources that are available to teachers. This can help enhance the accessibility and promote the use of such resources by teachers and other stakeholders. One example is the BRNE in France (see Box 3.3), which consolidated digital education resources and made them available to ensure educational continuity during the COVID-19 pandemic (Thillay, Jean and Vidal, 2020<sup>[40]</sup>).

Having identified the primary purpose(s) of or need for the resource bank, policymakers can make decisions on its scope, key functions, and its audience. Table 3.1 summarises the different choices available to policymakers. These decisions are not always as clear-cut or as mutually exclusive as presented below and often require trade-offs and compromises.

Table 3.1. Key decisions on functions, audience, and scope of the item bank

Decision	Options	Trade-offs
Scope	Type of assessments	The scope could be defined by clarifying the type of assessments and/or material included in the resource bank. This can be linked to curricular and assessment reforms and/or the identified needs for teacher professional development. For example, the resource bank could focus on assessment tasks and complementary material that support teachers in implementing formative assessments (See ARBs Box 3.4 and e-asTTle Box 2.4).
	Subjects/grades	Countries may choose to prioritise grades or subjects depending on the purpose of the item bank. For example: <ul style="list-style-type: none"> <li>• Focusing on grades during which decisions on progression or certification are made to improve the validity and reliability of classroom assessments,</li> <li>• Focusing on early years and core subjects (such as numeracy and literacy) to improve students' mastery of basic knowledge and skills, or</li> <li>• Focusing on new curricular areas, such as transversal 21<sup>st</sup> century skills, in case of curricular reforms.</li> </ul> Gradually, the scope of the resource bank may be expanded to include other subjects and/or grades depending on the feedback from initial deployment of the bank or emerging needs (See BRNE Box 3.3).
Function	Repository of resources	Advantages: can develop teacher assessment capacity, especially when accompanied by complementary guidelines on the development, correction, and use of standards-based assessments to inform teaching and learning Disadvantages: Lesser impact on improving the reliability and validity of classroom-based assessment
	Ready-to-use assessment tasks	Advantages: High reliability and validity of assessments (especially important for standardised and/or summative/high-stakes tests) Disadvantages: Limited teacher autonomy
Audience	Open access	Advantage: Access to a broader set of stakeholders, including students, parents, researchers, and others Disadvantage: Limited use for generating assessments for summative or high-stakes purposes
	Restricted access	Advantage: Ensures confidentiality of test content if the resource bank is used to generate ready-to-use assessments, particularly for summative purposes Disadvantage: Limited use by other stakeholders, such as students and parents to support learning outside the classroom or for secondary research

### Step 1.2: Setting up the governance of the resource bank

When considering the development of a resource bank, questions arise about its governance: who in government is responsible for overseeing its development? Who creates its content? Which agency/unit houses and maintains the bank? What other parts of government need to be involved? Which other actors should contribute feedback on its conceptualisation, content, and technological development? The answers to these questions are often context-dependent and vary depending on the purpose, scope, and audience of the resource bank.

While standardised item banks are often managed by specialised evaluation agencies or units, the governance of resource banks may involve a variety of institutional actors. These can include bodies responsible for the curriculum, research, teacher training, and/or assessment within or outside the Ministry of Education. Depending on the purpose and scope of the resource bank, different governance arrangements can be put in place to oversee its creation.

- **Central management of resource banks:** In some cases, the resource bank is owned and developed in-house by units within the Ministry of Education or central bodies responsible for curriculum, assessment, and/or teacher professional development. They collaborate with teachers, researchers, subject experts, and other stakeholders to develop the assessment tasks and related resources and as needed throughout the development of the resource bank.

For instance, Scoilnet in Ireland (see Box 2.5) is managed in-house by the Professional Development Service for Teachers (PDST), under the aegis of the Department of Education and Skills. PDST collaborates with practising teachers to develop the resources included in Scoilnet. The PDST Technology in Education unit is responsible for developing and maintaining the educational website portal (PDST Technology in Education, n.d.<sup>[45]</sup>).

- **Decentralised management of resource banks:** Governance of resource banks can also be decentralised and managed at the level of school districts or states. Moreover, several school districts or states can collaborate in overseeing and managing a resource bank, such as the Smarter Balanced Assessment Consortium's Teacher Tool (See Box 3.1).
- **Collaboration with the private sector:** It is also worth noting that some resource banks are developed and/or owned privately, both for and not-for-profit. Education authorities may contract assessment providers to construct or supply resource banks and other instructional/assessment solutions for their teachers (See Policy Pointer 2.4.1: Carefully studying internal and external options for software development and hosting). Even in such cases, the responsible education authority plays an active role in conceptualising the assessment resources to ensure alignment with national curricula and standards and utility for schools, teachers, and other stakeholders. They also produce (or commission) research to monitor the impact of the resource banks against initial objectives and may provide private suppliers with feedback for improvement. The BRNE in France and the Northwest Evaluation Association (NWEA) in the US serve as examples of public-private collaboration in the development of resource banks (see Box 3.2 and Box 3.3).

### Box 3.1. Decentralised Management through the Smarter Balanced Assessment Consortium

In 2010, several US states created the *Smarter Balanced Assessment Consortium*. The member-led consortium collaborates with state education agencies, districts, schools, and educators to develop a cost-efficient and high-quality assessment system. *Smarter Balanced* provides standards-aligned assessments and tools to support teaching, among them the *Tools for Teachers*. The tool is a resource bank that contains educator-created lessons, activities, formative assessment strategies and professional development material. *Smarter Balanced's* governance structure can enable cost-sharing and the exchange of best practices and better respond to state's needs.

*Smarter Balanced's* organisational structure includes a governing board, state-appointed K-12 and higher education leads that serve as the liaison between Smarter Balanced and the member's (higher) education community, an executive committee, an executive director and staff, and standing advisory committees. Members, which include several states in the US, lead the consortium's work by making policy decisions, approving budgets, and directing their educators to review and create resources. Educators write test items and create and revise Smarter Balanced resources. The executive committee, composed of representatives elected by member states, oversees the management of the assessment system and the consortium's finances.

This decentralised structure of the resource bank management can have advantages for the participating states. Member's lead in the consortium's work can enable a better identification of students' and teachers' needs at the state or district level. This can help build a flexible assessment system that is responsive to the needs of states, districts, and teachers. The consortium can also enable cost-sharing through pooling resources and cost-efficiency through economies of scale. It also enables the exchange of good practices between the different states and actors improving the quality of the Teacher Tool. Finally, the involvement of educators in the development of resources can ensure that the resources are best adapted to students' needs and aligned with classroom practices.

Sources: Smarter Balanced (2023<sup>[46]</sup>), *Tools for Teachers*, <https://smartertoolsforteachers.org/>, accessed on 10 July 2023 ; Smarter Balanced (2022<sup>[47]</sup>), *The power of partnerships and collaboration*, <https://smarterbalanced.org/our-vision/partnerships/>, accessed on 10 July 2023 ; Smarter Balanced (2010<sup>[48]</sup>), *Smarter Balanced Governing Board Procedures*, <https://portal.smarterbalanced.org/library/en/governing-board-procedures.pdf> ; Smarter Balanced (2022<sup>[49]</sup>), *10 Years of smarter collaboration*, <https://smarterbalanced.org/our-vision/our-history/>, accessed on 10 July 2023 ; Smarter Balanced (2022<sup>[50]</sup>), *A Decade of Advancing Teaching and Learning*, <https://smarterbalanced.org/our-system/>, accessed on 10 July 2023 ; Smarter Balanced (2022<sup>[51]</sup>), *A Commitment to Supporting Teachers*, <https://smarterbalanced.org/our-system/educators/>, accessed on 10 July 2023 ; Smarter Balanced (2022<sup>[52]</sup>), *Governance Structure*, <https://smarterbalanced.org/our-vision/partnerships/governance/>, accessed on 10 July 2023



### Box 3.2. Public-Private Collaboration in the Development of Resource Banks - The case of the NWEA

The Northwest Evaluation Association (NWEA), a not-for-profit non-governmental research organisation, partners with states in the US and other countries to provide them with assessment and learning solutions. These solutions typically include online computer-adaptive tests to assess student achievement and growth against learning standards and over time; student-level reports to inform next steps for teaching and learning; and suggestions of personalised content based on a student's identified strengths and areas for improvement. The NWEA's close collaboration with state leaders and educators enables the co-development of solutions tailored to the state's vision, needs, and expectations and to local context and classroom needs.

Throughout the stages of development and deployment of the assessment and learning solution, the NWEA's personnel work with each state to develop differentiated, student-centred programs. For example, the NWEA engages local educators in the design and development of assessments, including in tasks such as item writing, alignment studies, bias and sensitivity review, and standard setting. It defines with the state the data to include in various student-level reports for different audiences (assessment directors, school leaders, and teachers). Jointly with the state, the NWEA designs a complementary professional development programme for teachers to support them in their use of assessment results to support students' learning.

A case in point, the Nebraska Department of Education (NDE) collaborated with the NWEA to co-create an assessment and learning solution. Seeking to reform its assessment system to become more balanced and student-centred, the NDE requested a solution that would provide multiple, accurate measures of student learning, timely reporting of results to stakeholders, and support to teachers in fostering student engagement. The NDE insisted on the engagement of teachers in the development of items and in defining the standards for the system. The result was a through-year assessment system (NSCAS Growth) that includes interim criterion-referenced assessments administered in the fall, winter, and spring. The spring assessment produces an annual summative score for accountability, replacing the previous traditional summative test. These assessments provide instructionally relevant information for teachers to track student achievement and progress against the Nebraska learning standards at each grade-level and adapt teaching and learning accordingly. They also produce grade-independent learning levels and normative information allowing to track students' progression in acquiring state learning standards. This was complemented by a teacher training program to improve assessment literacy and help teachers triangulate data from different components of the system to inform instructional next steps. NSCAS Growth was piloted in the 2021–22 school year and will be operational in 2022–23.

Sources: NWEA (2021<sup>[53]</sup>), *One coherent system to drive action: Nebraska is committed to supporting the connection between curriculum, instruction, and assessment*, [https://www.nwea.org/resource-center/case-study/48050/One-coherent-system-to-drive-action\\_NE\\_NWEA-State-Solutions\\_Overview-1.pdf/](https://www.nwea.org/resource-center/case-study/48050/One-coherent-system-to-drive-action_NE_NWEA-State-Solutions_Overview-1.pdf/) ; NWEA (n.d.<sup>[54]</sup>), *MAP Suite: Partnering to help all kids learn*, <https://www.nwea.org/the-map-suite/>, accessed on 10 July 2023 ; NWEA (n.d.<sup>[55]</sup>), *Instructional Connections*, <https://www.nwea.org/instructional-connections/>, accessed on 10 July 2023 ; NWEA (2021<sup>[56]</sup>), *Partnering with NWEA to deliver impactful statewide assessment programs*, [https://www.nwea.org/resource-center/fact-sheet/48056/State-Solutions-Overview-one-sheet\\_NWEA\\_factsheet-1.pdf/](https://www.nwea.org/resource-center/fact-sheet/48056/State-Solutions-Overview-one-sheet_NWEA_factsheet-1.pdf/)

*Policy pointer 1.2.1: Define governance arrangements that foster co-operation across distinct functions*

In developing a resource bank, countries should consider devising institutional arrangements that foster collaboration across policy areas and sharing of expertise. For the resource bank to serve as a central resource for curriculum implementation and assessment, it cannot operate in a silo. Bodies across the Ministry of Education should be motivated and engaged to contribute to the success of the resource bank. Even if a single body is responsible for the resource bank, it will have to work in partnership with other parts of the Ministry with different responsibilities and scopes of work.

Countries can consider hosting the resource bank in a body that brings together functions related to the curriculum and assessment. For example, in Northern Ireland, the Council for the Curriculum, Examinations & Assessment ([CCEA](#)) delivers research and advice to the Department of Education and a range of freely available [resources](#) to support educators in their instruction and assessment practices, among other functions (CCEA, n.d.<sup>[57]</sup>). Alternatively, mechanisms that foster collaboration across bodies with separate responsibilities for curriculum, assessment, and teaching could be imbedded in the governance of the resource bank. Examples include creating a steering committee for the resource bank with representatives of different bodies, establishing joint management of the resource bank by the institutions responsible for curriculum and assessment, and/or creating channels for regular communication and reporting between Ministry departments. For example, Education Service Australia, which manages Australia's resource bank Scootle, works closely with the Australian Curriculum, Assessment and Reporting Authority (ACARA), the Australian Institute for Teaching and School Leadership (AITSL) and the Australian Children's Education and Care Quality Authority (ACECQA) to deliver its mission (Australian Government, n.d.<sup>[58]</sup>).

*Policy pointer 1.2.2: Engage stakeholders from the start of resource bank development*

If the resource bank is to achieve its primary purpose – of being a key resource for assessment and teaching and learning – it needs to be responsive to the target audience's needs. Engaging stakeholders from the outset optimises the process of developing the resource bank – from defining its functionalities, to decisions and feedback on its content, to promoting collaboration and local ownership. Stakeholders may include teachers, principals, supervisors, teacher trainers, representatives of assessment and/or curricular bodies, parents and students, among others. If key stakeholders are not included in the discussions from the beginning, the project is more likely to be contested at a later stage and opportunities for synergies may be missed. Stakeholder involvement can thus enhance the quality, relevance, acceptance, and use of the resource bank over time.

Decisions on which stakeholders to engage as a priority will depend on the purpose and audience of the resource bank. As the end users, teachers are key stakeholders to engage in the development process of a resource bank. However, their degree of involvement varies depending on the bank's purpose. For instance, if the purpose of the resource bank is to improve the quality of classroom assessments by providing ready-to-use (or standardised) tests, then a more central orientation may be necessary. This depends on the maturity of the system and the concentration of psychometric expertise, capacity, and resources at the central/regional levels. Moreover, central orientation may be necessary in the initial stages of development to ensure strong alignment with learning standards and curricular frameworks. Select teachers may be consulted on an ad-hoc basis to provide their teaching and subject matter expertise. On the other hand, banks that are designed as a teaching and assessment resource for teachers, such as the BRNE in France, would require a greater degree of teacher involvement from the outset (See Box 3.3).

Stakeholder consultation can be done in an ad-hoc manner at times when stakeholder input is needed, such as when deciding on the content or organisation of the resource bank. It can also be done in a more systematic manner through the creation of user consultation groups. For example, creating a teacher committee at the outset of the project could be a helpful way to gather the input, ideas, and feedback of

teachers throughout the process of developing the resource bank. To consider different perspectives, the teacher committee should be representative and include teachers of the different subjects and grade levels, from the different regions/localities, and with various levels of experience (novice vs. experienced teachers). This will ensure that the resource bank best meets all teachers' needs, which would promote its use in schools and classrooms.

### Box 3.3. Stakeholder engagement – Example from the Banks of Educational Digital Resources (BRNE) in France

The Banks of Educational Digital Resources (BRNE), developed by publishers and Edtech companies through previous public tenders, provide teachers with curriculum-aligned content and the tools to facilitate teacher and student interactions. At the outset of the COVID-19 pandemic, the French government facilitated access to the BRNE to a wide range of stakeholders, most notably students and their parents. It also expanded the scope of the banks to cover all grade levels to ensure learning continuity during school closures. The French government's strong relationships with education stakeholders and ability to leverage existing resources was key to the success of the BRNE during the COVID-19 pandemic.

The French government ensured the rapid deployment and mass uptake of BRNE by mobilising its existing resources and long-standing partnerships and networks. To develop the content of the BRNE to cover more grade levels and subjects, the government relied on educational resources developed through past public procurements and an established taxonomy for digital resources. The good relationship between the Ministry and Edtech contract holders facilitated a rapid agreement on opening access to all teachers, students, parents, and broader stakeholders. French academies (regional subdivisions), who took part in the BRNE's content development and qualification, were key in promoting the use of the BRNE and increasing their audience during the COVID-19 pandemic. They provided extensive support to the Ministry of Education in terms of teacher training and in disseminating information on teaching methods. The French Network of Digital Education Advisers was also mobilised to provide teacher training throughout the BRNE's deployment. Moreover, the administrative challenges associated with the expansion of the BRNE's scope and audience were managed through the mobilisation of all involved institutions, such as the Ministry's *Eduscol* website, pedagogical inspection bodies, and digital advisors in the field.

The case of the BRNE shows that cultivated relationships, ongoing dialogue, and collaboration with key education actors are important for optimising the development and promoting the use of a resource bank. Close ties with stakeholders and leveraging of existing resources can help Ministries act quickly and decisively to respond to emerging problems, particularly important if rapid changes at scale are to be done.

Sources: Thillay, Jean and Vidal (2020<sup>[40]</sup>), *France: les banques de ressources numériques éducatives (BRNE) (Banks of Educational Digital Resources)*, <https://oecdeditoday.com/wp-content/uploads/2020/09/France-Banks-of-educational-digital-resources.pdf>

### Step 1.3: Identifying and allocating the necessary human and financial resources

Setting up a resource bank requires sustained investments. As the intensity and duration of each phase in the development of a resource bank varies, the human and financial resources and time required also vary accordingly. Some of the key resources that policymakers should plan for include:

- **Human resources:** Creating a resource bank often requires the establishment of a core team with diverse expertise and functions. The team might expand or contract and include different expertise

and roles depending on the phase of the resource bank's development. Assessment, teaching, and curricular expertise is critical throughout the resource bank's development; but the amount of expertise needed varies depending on the intensity of resource production/revision. For example, a greater number of team members with teaching and assessment expertise may be required in the conceptualisation and development phases than in the maintenance phase. Technical expertise – such as subject matter expertise, user experience design, and software engineering – is required during the development of the resource bank's content and technological platform. Once the resource bank is set up and running, a more restrained team focused on application support, content updating and maintenance may be more suitable. This team can expand again as needed, for example if new functionalities are being considered and/or curricular or assessments reforms require more significant revisions of its content and structure.

- **Time:** The time needed to conceptualise, develop, and set up a resource bank varies from one education system to another and depends on a variety of factors. These factors include the skills, experience, and number of people in the team (human resources), the type and the amount resources to be produced, and the complexity of the development and validation process. It also depends on the system's maturity and its ability to leverage existing resources, as was the case of the BRNE in France (See Box 3.3). These resources include existing curricular and assessment frameworks, capacity, expertise, and previous experiences, repositories of items or resources created for different purposes, and/or established ed-tech solutions or applications. The time required also varies depending on the stage of development of the resource bank. The conceptualisation stage may be shorter than the content and technological development stage, while the maintenance stage could be more of a longer-term, less intensive process.
- **Financial resources:** As the human resources and time required at different phases of resource bank development vary, so do the financial resources required. For instance, the phase of developing the resource bank's content and underlying technology solution tends to be more cost-intensive than the initial conceptualisation and maintenance phase. During the maintenance phase, the financial resources required are reduced and can be spread out over a longer period of time – for example, reducing the number of resources reviewed yearly and having longer cycles for reviewing, updating, and replacing resources.

*Policy Pointer 1.3.1: Develop a roadmap for the creation of the resource bank*

Establishing a roadmap can provide an overview of the distinct phases of setting up the resource bank and the steps within each phase. It enables the resource bank's project manager(s) to get a sense of the time and resources (both human and financial) that need to be mobilised on the short, medium, and long term and plan accordingly. If used for external communication and signalling, it can also ensure that key stakeholders are aware of the timeframe to set up the resource bank and assess its impact. This can help ensure more stable financing and support for the resource bank over the time required to develop it and make it available for teachers and other stakeholders.

To support Morocco in creating its resource bank for classroom-based assessments, the OECD, in consultation with Moroccan stakeholders, developed a roadmap to guide the conceptualisation, development, and implementation of the resource bank. The roadmap is meant to guide those responsible for overseeing the development of the resource bank within the Ministry of Education's Centre for National Evaluations and Examination. It aims to serve as an operational document or checklist detailing the key phases of development of the resource bank and the steps that need to be completed within each phase. It provides an estimation of the time and resources required for each step based on the Moroccan context to inform planning and budgeting. It can also be used to communicate with decision makers within the Ministry of Education or external donors to secure funding for the resource bank project.

## Phase 2: Developing the content and the technological infrastructure underpinning the resource bank

Once the resource bank’s foundations have been set through the conceptualisation and preparation phase, the development of its content and technological infrastructure can begin. This involves decisions on what content to include in the resource bank, as well as the process for content development and validation. It also involves decisions on the functionalities of the technological solution underpinning the resource bank, and whether it will be developed and hosted in-house or outsourced. Broader considerations, such as privacy and security risks, also have implications for the technology solution of the resource bank.

### **Step 2.1: Developing the content and determining the organisation of the resource bank**

Determining what goes into a resource bank and how it is organised is a crucial step. Policymakers should devote sufficient time to this part of a resource bank’s development, as these elements determine the bank’s organisational structure and its contents. This is particularly important for resource banks that aim to support teaching and assessment in line with the curriculum. In such cases, the bank’s content should be carefully mapped against, aligned with, and classified in accordance with the curriculum and associated resources (such as learning standards and progressions). While the content and organisation of resource banks vary, they typically include the following elements:

- **Items or assessment tasks:** Items are often referred to as “questions” but can take various other forms, particularly in the context of computer-based assessment and innovative assessment situations. For example, items can include problems to solve, assertions to evaluate or rate, or any other activity used to evaluate whether a student has achieved the specified learning objectives (Vale, 2006<sup>[41]</sup>). An item is often associated with other reference information such as text, images and, in the case of digital assessments, multimedia. Multiple related items can form a coherent group and constitute an assessment task, activity, or exercise.

Assessment items or tasks can be mapped and classified according to learning objectives, units, and/or modules supporting the measurement of specific curriculum content. Moreover, organising and/or tagging items or assessment tasks according to learning standards and progressions can enable teachers to monitor students’ mastery (or progression towards mastery) of the expected learning outcomes. For example, Scootle allows teachers to browse resources based on the Australian Curriculum by filtering based on subject, modules and learning objectives, grade-level, general capabilities, and cross-curriculum priorities.

- **Metadata:** Resource banks must also include information associated with each item, assessment task, and/or complementary assessment or instructional material. This auxiliary information is referred to as metadata, or the properties of the item or resource. Metadata can support the organisation of the resource bank according to the properties of items or associated resources (such as the grade, the content/competency targeted, the type of resource, etc.). Metadata supports the search and selection of items and resources through keywords, labels, authors, or date of creation/revision, among others. If used to classify and organise content, metadata can also facilitate the filtering and selection of a subset of items or resources having the same structure or content features (for example, all open-ended questions).

The metadata associated with each item or assessment resource can also be designed to support the implementation of the curriculum and learning standards. For example, the “Connecting to the Curriculum” feature in the ARBs (see Box 3.4) provides information on the resource itself such as level, keywords, task description as well as links to the learning progressions, and key competencies (Maguire, 2016<sup>[59]</sup>).

- **Associated materials:** Finally, a resource bank should also include complementary material such as scoring rubrics especially for open-ended questions, common errors and their interpretations, sample feedback guidelines, suggestion of instructional/remediation next steps, and/or links to curricular or instructional resources. Such material can support teachers in using assessments to inform their teaching and improve students' learning. For example, the ARBs (see Box 3.4) include extensive teacher notes to support the analysis of student responses (*Working with Students*) and suggested *Next Steps* for future teaching and learning based on the learning progressions (Joyce and Fisher, 2018<sup>[30]</sup>).

*Policy Pointer 2.1.1: Identify key reference documents to ensure alignment of the resource bank's content with national standards*

Identifying and/or developing reference documents that guide a resource bank's content development and its organisation is a crucial first step. In a standards-based approach to education, the curriculum, learning standards and progressions, are usually among the key reference documents for the design of classroom-based assessments. The curriculum itself describes the content, teaching and learning strategies, and assessments that enable students to achieve the learning standards (CSAI, 2018<sup>[60]</sup>). Associated with learning standards, learning progressions describe the steps students need to take to progressively acquire the knowledge and develop the skills set out in the standards.

Mapping the contents of the resource bank against the curriculum and associated resources (learning standards and progressions) can boost its instructional and assessment value and support a standards-based approach. This mapping can ensure that the content of the resource bank is well aligned with national requirements and expectations for learning. It can also identify any gaps that need to be addressed, such as curricular content or aspects of learning standards (such as a proficiency level or progression step) that are not sufficiently covered. The mapping can also facilitate the organisation of the resource bank in a way that supports curricular implementation and that is easily accessible to teachers and other users. For instance, when the curriculum is broken down into content themes or learning objectives, these themes can be used to organise the assessment tasks and complementary material and make them easier to find.

*Policy Pointer 2.1.2: Consult end-users in the reflection on the content and organisation of the resource bank*

To encourage uptake of the resource bank, its content must respond to the needs of teachers (and other end users) and be organised in a logical way so that users can easily access it (Vale, 2006<sup>[4]</sup>). Teachers have first-hand knowledge of the types of items and resources that are useful, relevant, and effective in their classroom and can provide input on how to classify them. For example, resource banks may classify items and resources based on content domains, learning standards and progression steps (among other criteria). This approach can enable teachers to access the materials when they need support in a particular curricula area or with a specific assessment process.

Given the importance of this step, it is helpful to involve teachers as early as possible in the reflection on the resource bank's content and organisation. A collective mapping of curricular and assessment materials could be helpful to locate and classify existing resources from across the system as well as identify gaps or resources that need to be updated. This could be done in consultation with the committee of teachers, through in-person or virtual workshops, or by organising focus groups. A wider consultation could be organised using online questionnaires. This initial user consultation on the content and organisation of the resource bank can also serve an opportunity to raise awareness and engage stakeholders from the beginning of the process. Teachers should also be consulted on an ad-hoc basis throughout the development process to provide feedback on the resources, identify gaps and areas for improvement, and

refine the resource bank over time. These efforts can help build collective ownership over the resource bank, in turn promoting its use and its long term success.

### ***Step 2.2: Determining workflows for item development and validation***

Once decisions on the content and organisation of the resource bank have been taken, item production and validation may begin. Identifying the actors involved in writing items and defining the process (or workflow) to review and validate them is the first step.

Item writers are often chosen for their relevant and complementary expertise, their knowledge of the subject matter and curriculum, their training, or their experience in teaching and/or writing items and developing tests. In addition to a range of educational expertise, other types of expertise may also be required such as user experience design, software development and/or technical support. Such technical expertise is particularly important for designing technology-enhanced items and complex technology solutions underpinning the resource bank. It is also possible that the responsibility for authoring items is assigned to specialised assessment institutions (such as evaluation agencies or specialised departments within Ministries of Education). Private companies, such as textbook publishers or testing services, can also be contracted to develop items and educational resources, as was the case for the Banks of Educational Digital Resources in France (See Box 3.3).

Authored items need to also pass through a review process that guarantees their quality before being entered into a resource bank. This process often involves multiple layers of revisions by persons with different expertise/specialisations or by persons with increasing responsibilities/authority. The degree of validation and complexity of these processes depend on the purpose of the resource bank and its intended use by teachers (See Table 3.2. Validation methods for resource banks).



Table 3.2. Validation methods for resource banks

	Definition	Relevance	Advantage	Disadvantage
Psychometric/ Statistical Validation	Complex validation process that involves prior testing of the items on sufficiently large samples and analysis of their psychometric qualities	Particularly relevant for resource banks that provide ready-to-use (standardised) tests (for example, the e-asTTle's in New Zealand)	Ensures that all items included in the resource bank are valid and reliable and their statistical qualities (such as their difficulty or level of discrimination) are known Supports the understanding of item/task behavior (for example, time to complete the task or the extent to which the item might behave differently in subgroups defined by gender, race, culture, etc.) and the development of additional resources (for instance, coding guides/rubrics using typical responses to open-ended questions) Ensures that all students understand the item/task and item wording is appropriate	Requires significant human, technological, and financial resources and capacities, which may not be readily available
Small-scale trials	Validation process that can involve more or less complex methods, depending on the availability of resources and expertise required Ranges from simple informal pilots, accompanied by individual or group interviews, cognitive laboratories with well-defined observational protocols, or more in-depth micro analyses (using eye tracking and brain scanners)		Supports the understanding of item/task behavior (for example, time to complete the task or the extent to which the item might behave differently in subgroups defined by gender, race, culture, etc.) and the development of additional resources (for instance, coding guides/rubrics using typical responses to open-ended questions) Ensures that all students understand the item/task and item wording is appropriate Through cognitive labs and eye tracking methods, can inform on content validity and help estimate item complexity, which is a good proxy for item difficulty	Complex methods (such as cognitive labs or micro analyses) require significant human, technological, and financial resources and capacities, which may not be readily available
Expert or peer review	Validation process during which assessment experts or peers review items for their validity, alignment with reference documents, wording (clearly worded, appropriate vocabulary/reading load for target level, etc.), and biases (cultural, gender, geographic, or other), among others	Particularly relevant for (crowd-sourced) resource banks that serve as a repository of a host of instructional and assessment material	Ensures the quality of the content in crowd-sourced resource banks Promotes peer-learning and the exchange of good practices among teachers Ensures that the resources are pedagogically driven and respond to classrooms' needs	Not as scientific or objective as psychometric validation Requires clear and set criteria against which to assess items/resources

### Box 3.4. Content development and item validation in New Zealand's ARBs

The Assessment Resource Banks (ARBs) in New Zealand provide teachers with more than 2850 research-based formative assessment tasks and complementary resources. The content of the ARBs is aligned with the national curriculum and learning statements, promoting a learning progression approach to instruction and assessment. Resources also undergo an extensive review and trialling process during their development, which guarantees that they are valid and adapted for classroom use.

Assessment resources, which include student tasks and teacher support information, are linked to the New Zealand Curriculum and learning statements. The *Connecting to the Curriculum* button for each assessment resource redirects teachers to the relevant curriculum statement (achievement objective), key competencies, or learning progressions, amongst others. As a result, teachers can easily identify assessment resources that they can use to monitor student learning at a specific progression step. A completed ARB task can serve as one piece of evidence for teachers that an element of a learning progression step has (not yet) been reached by students. Moreover, teacher support information can help inform teacher's future instruction and support students' learning. This support information includes teacher notes, links to assessment and curriculum articles, formative or diagnostic information (such as common incorrect answers) and/or possible next learning steps.

The development and validation process of ARB resources involves interaction with teachers, and students to adapt resources to classrooms' needs. After resource developers (who are former teachers) from the New Zealand Council for Educational Research have designed a task, it is first piloted with a small student group. The resource is then trialled on a small scale with a sample of approximately 200 students to establish difficulty levels and resources' reliability. Following the trialling, student responses are then coded and analysed using Item Response Theory (IRT) methods. This analysis can enable resource developers to adapt the items to students' needs and/or develop complementary teacher resources. At a later stage, resources undergo several review cycles to further check their quality, including content validity (for example ensure a resource is an appropriate assessment of a learning idea) and a cultural review (for example ensure the resources reflect a wide range of diversity). These reviews can be done by a wider team of researchers in curriculum assessment.

Aligning resource banks with the curriculum and learning statements and carefully validating their content can ensure the quality, usefulness, and relevance of assessment resources. An extensive review and trialling process as in the case of the ARBs can be key to establish validity and reliability of items and adapt them to classroom needs. In the future, New Zealand aims to better connect the ARBs to learning frameworks and progressions and allow for a more flexible mapping to adapt to the changing education landscape and curriculum.

Sources: Presentation by Jonathan Fisher (NZCER); Joyce and Fisher (2018<sup>[30]</sup>), *Learning Progression Frameworks and the ARBs*, <https://arbs.nzcer.org.nz/otjs-learning-progression-frameworks-and-arbs>, accessed on 10 July 2023 ; Maguire (2016<sup>[59]</sup>), *Rediscovering the ARBs*, <http://dx.doi.org/10.18296/set.0038> ; New Zealand Ministry of Education (2023<sup>[61]</sup>), *Assessment Online. Assessment Details*, [https://assessment.tki.org.nz/Assessment-tools-resources/Selecting-an-assessment-tool/Browse-assessment-tools/English/Viewing-and-presenting/Assessment-Resource-Bank-ARB-Viewing-and-Presenting/\(back\\_to\\_results\)/Assessment-tools-resources/Selecting-an-asse](https://assessment.tki.org.nz/Assessment-tools-resources/Selecting-an-assessment-tool/Browse-assessment-tools/English/Viewing-and-presenting/Assessment-Resource-Bank-ARB-Viewing-and-Presenting/(back_to_results)/Assessment-tools-resources/Selecting-an-asse), accessed on 10 July 2023 ; New Zealand Ministry of Education (2023<sup>[62]</sup>), *Learning Progression Framework - Reading Map*, <https://arbs.nzcer.org.nz/learning-progression-framework-reading-map>, accessed on 10 July 2023 ; Joyce (2005<sup>[63]</sup>), *The ARBs and Assessment for Learning*, <https://arbs.nzcer.org.nz/research-and-articles#the-arbs-and-assessment-for-learning>, accessed on 10 July 2023 ; NZCER (2022<sup>[64]</sup>), *About the ARBs*, <https://arbs.nzcer.org.nz/about-arbs>, accessed on 10 July 2023 ; Joyce and Fisher (2014<sup>[11]</sup>), *Assessment for learning, online tasks, and the new Assessment Resource Banks*, <https://doi.org/10.18296/set.0314>

*Policy Pointer 2.2.1: Consider involving local and regional actors in item development and validation*

Involving actors beyond the central level, namely at the school, local, or regional levels, in the creation, review, and validation of items for the resource bank can enhance their assessment competencies and encourage local buy-in. Involving local actors can ensure the transfer of competencies to develop high-quality assessment tasks and resources from the central level to the local, school, and classroom levels. It can also increase the number of assessment tasks and resources available and improve their quality and relevance through teacher reviews. Actors involved in the creation of the resource bank are also more likely to endorse it and promote its use, helping meet the resource bank's objectives.

However, local involvement can require more extensive quality control measures to filter and validate locally developed items/resources. This external validation is crucial to maintaining the trust of the teaching community in the quality and usefulness of the resource bank. For instance, in Estonia, subject experts or experienced teachers contracted by Estonia's Ministry of Education review teacher-submitted content to the resource bank e-koolikott to ensure their quality (accuracy, spelling, wording, etc.) and curriculum-alignment (see Box 2.6). They also improve items' metadata to make them more accessible. While the experts are not allowed to modify resources, they can contact the authors to suggest changes and resources that exhibit significant faults can eventually be removed from the platform.

There are trade-offs between sourcing items and resources from local and/or regional actors – such as encouraging transfer of competencies and buy-in – and more centralised development and validation processes – including guarantee of quality and less complex validation processes. These trade-offs should be considered and weighed with the purpose of the resource bank in mind (See Step 1.1: Defining the purpose, scope, and audience of the resource bank).

**Step 2.3: Defining the functional requirements of the resource bank**

With the recent advancements in technology, a major part of setting up a resource bank now revolves around the functionalities of the digital (online) platform and the technological solution underpinning it. The choice of functional requirements depends on the purpose of the resource bank and needs of its intended users. Policymakers can choose to prioritise key functionalities at the beginning and then gradually expand the technological solution by adding more functionalities based on users' feedback and needs.

At a minimum, the technical solution should enable users to explore and navigate the content of the resource bank by searching, filtering, selecting, and viewing an assessment task or complementary resource. Authorised users should be also able to add assessment items and resources into the bank through an internal authoring function or an import function linking to an external functionality. Providing acceptable authoring and editing capability when developing an resource bank is often a challenge (Vale, 2006<sup>[4]</sup>), especially when dealing with interactive technology-enhanced items, characterized by their wide variety of formats. Deciding which types or formats of items the bank should contain will help determine the type of authoring and editing functionality included or integrated with the resource bank<sup>2</sup> (for example, text, image, and/or video editors).

Beyond basic functionalities, a range of additional functionalities can be added to the technology solution from the outset or gradually after initial deployment and revision.

---

<sup>2</sup> The item bank's underlying technological solution can rely on external functionality for the creation and modification of items (image or video editors, for example). However, that functionality should be integrated in a reasonably seamless way in order to avoid users having to navigate between different systems (Vale, 2006<sup>[4]</sup>). For example, while the technology solution should for instance not include a complete multimedia editing studio, it would be reasonable to link to a commercial video editor that can store and retrieve the video material from the bank.

- **Item review and validation process:** The workflow of item review and validation can be integrated into the underlying technological solution of the bank to streamline the quality assurance process. This ensures that each item is validated before being entered into the bank and made available to teachers and other users. It also becomes easier to keep track of the modifications made to items. A review and validation workflow for the items - and the associated roles (for example, author, validator, supervisor) - must be set up to enable this functionality.
- **Test assembly:** Resource banks' underlying technological solution can also allow for test assembly, which involves selecting items and defining the order in which they appear in the test, or in sub-sections of the test. Functionalities can be added to automate the selection of items according to a test blueprint and create multiple versions of a test with equivalent difficulty, as in the case of the e-asTTle in New Zealand. However, this requires a relatively large number of equivalent or similar items and psychometric calibration. This functionality is useful for resource banks that generate ready-to-use assessments.
- **Test delivery, correction, and reporting:** This functionality depends on whether the assessment tasks included in the bank are paper-based or computer-based. For banks containing items destined for paper-based assessments, the final phase of item selection or test assembly is often one or more printed tests. On the other hand, resource banks containing computer-based assessment items can be connected to test delivery modules (see Box 3.5). Moreover, modules for correction, analysis and reporting of results can also be provided. For digital assessments, these functionalities often include the automated correction of results; while for paper-based assessments, this implies prior data entry into the resource bank's technology solution. The OECD's pilot resource bank, PILA, provides an example of the advantages of digital test delivery, correction, and reporting (see Box 2.1 and Box 3.3).

### Box 3.5. Digital test delivery

One additional functionality which has gained relevance in recent years concerns test delivery. The use of digital assessments has grown considerably across different education systems over the years and was further accelerated by the COVID-19 pandemic. Digital test delivery offers several advantages over classic paper-based tests for classroom-based assessments, if measures are put in place to ensure that stakeholders receive adequate guidance, training, and resources to benefit from them.

Digital assessments facilitate data collection and processing through instant automated recording of student responses and make printing of tests or manually entering results no longer necessary. They can also allow for live monitoring of students and immediate feedback to the student, teacher, or other stakeholders at the end of the test. This can lead to greater efficiency and reduced costs due to saved material. Digital solutions also enable the development and integration of innovative and interactive technology-enhanced items into assessments targeting skills that are difficult to assess through paper-based formats. For example, OECD's resource bank PISA uses cutting-edge technologies to provide innovative and interactive assessments of complex skills. Teachers can monitor students' progress in real-time and by replaying student's work post-assessment. PISA collects time-stamped data on students' actions on the platform and uses this stream of information to provide students with live feedback on their performance, or to describe students' reasoning through complex problems in summary dashboards. In some cases, such as the Banks of Educational Digital Resources in France, digital delivery may also make assessments more accessible for students with special education needs (e.g. font type, font size, colours, contrasts, subtitles, oral instructions, and activities, etc.) or propose alternative learning scenarios or activities more adapted to their needs (e.g. digital manipulations for students with dyspraxia).

For digital assessments to be widely adopted in the classroom, schools must have the necessary IT resources, and students and teachers must be familiar with their use. Most importantly, access to at least one device and sufficient bandwidth for every student is needed for digital assessments. Teachers and students (among other stakeholders, such as parents) must then have the capacities to use the digital tools. Teachers' digital assessment literacy is particularly important enabling their use of various technological systems to advance student learning. Important basic digital assessment abilities and skills of teachers include the use of digital tools in all phases of the assessment process, routine evaluation of the effectiveness and suitability of different technological tools, or the interpretation of summative or formative assessment results of digital assessments, amongst others. Regardless, digital assessment resources must be designed keeping in mind that not all users are technologically literate; with particular attention given to improving the product's usability and aesthetic to maximise users' experience (through User Interface (UI) and User Experience (UX) design).

Sources: Thillay, Jean and Vidal (2020<sup>[40]</sup>), *France: les banques de ressources numériques éducatives (BRNE) (Banks of Educational Digital Resources)*, <https://oecdutoday.com/wp-content/uploads/2020/09/France-Banks-of-educational-digital-resources.pdf> ; Weiss (2011<sup>[11]</sup>), *Item banking, test development, and test delivery*, <https://doi.org/10.1037/14047-010> ; OECD (2023<sup>[6]</sup>), *PISA*, <https://pisaproject.org/>, accessed on 10 July 2023 ; UNESCO (2020<sup>[65]</sup>), *How can digital formative assessment help monitor student learning during and after the COVID-19 era?*, <https://learningportal.iiep.unesco.org/en/blog/how-can-digital-formative-assessment-help-monitor-student-learning-during-and-after-the-covid>, accessed on 10 July 2023 ; Eyal (2012<sup>[66]</sup>), *Digital Assessment Literacy - The Core Role of the Teacher in a Digital Environment*, <https://www.jstor.org/stable/10.2307/jeductechsoci.15.2.37> ; OECD (unpublished<sup>[6]</sup>), *Étude de diagnostic sur une banque d'items pour le contrôle continu au Maroc*

*Policy Pointer 2.3.1: Define a Minimum Viable Product (MVP) for the resource bank*

The initial development of the resource bank's underlying technology solution could be thought of in terms of a "minimum viable product" (MVP). This refers to the minimum technological solution that brings the most value with the least amount of time and lowest cost. For example, rather than waiting for the development of a full-scale IT solution, simpler web solutions can be used as a minimal and effective solution to begin sharing the contents of the resource bank with the intended users. This would allow for (some of) the resources to be made available to and accessible to teachers and other stakeholders while awaiting the development of a fully-fledged technological solution.

One example are the downloadable classroom assessment resources made available on the French Ministry of Education website, rather than through a fully developed resource bank platform. These contain sample assessment tasks by subject and by education cycle that align with the curriculum and learning standards (see examples for [French](#), [math](#), and [sciences](#)). They also contain examples of student productions, rubrics, guidelines on interpreting student performance based on the learning standards and progressions, as well as suggestions on how to support students' learning. Teachers, as well as students and their parents, can freely access, download, and use these resources to support teaching and learning.

*Policy Pointer 2.3.2: Consult end-users prior to the development of the technological solution underlying the resource bank*

An endless number of functionalities can be included in the resource bank. Defining them alongside the end-users can better reflect their needs and encourage uptake. Discussion workshops, brainstorming sessions and focus groups can be organised to gather user needs. Other techniques used in software development, such as design sprints and user tests, can be effective for testing a multitude of functionalities with real users (such as teachers or students) in a short period of time and collecting their feedback to inform future developments. These techniques can reduce unnecessary costs by ensuring that only relevant functionalities are developed and avoiding subsequent modification or deletion of features. They can also ensure that the technological solution is accessible to users and responds to their needs before launching it at scale.

**Step 2.4: Considering broader technical requirements and their implications for the underlying technology solution of the resource bank**

Policymakers need to assess the capacities that exist internally within the responsible institutions and evaluate options available externally for developing and hosting the technological solution for the resource bank.

- **Software development:** Institutions may develop the technological solution underpinning the resource bank in-house if the human and capital resources are available internally. They may also turn to one of the many education technology vendors that offer off-the-shelf or customised solutions that contain modules for creating and managing paper-based and/or digital items, as well as for editing, managing, and delivering tests.
- **Hosting:** The resource bank requires a sufficiently robust hosting infrastructure and capacities to guarantee the performance and proper functioning of the developed IT solution. The maximum number of concurrent connections, the complexity of the requests, the necessary storage space, the level of security, and the scalability (or adaptability) of the system must be studied to set up an adequate hosting solution. For example, a free-to-use resource bank made accessible to all teachers, students, and/or broader audiences requires a more robust infrastructure than a

restricted resource bank. Opening up access to the BRNE in France implied the risk that the server would not be able to accommodate all demands and concurrent connections. However, the external cloud solution used enabled an automatic calibration of server use based on the exceedingly high initial demand (Thillay, Jean and Vidal, 2020<sub>[40]</sub>). Similarly, a resource bank with advanced functionalities, such as item authoring for technology-enhanced items or digital test delivery, correction, and reporting, would require a more robust hosting infrastructure than a simple repository of items and assessment resources.

Countries also need to carefully consider the security and privacy risks associated with the resource bank and their implications for the development of the technological solution.

*Policy Pointer 2.4.1: Carefully studying internal and external options for software development and hosting*

Policymakers should carefully weigh the options for developing the software and hosting the technology infrastructure internally or through external vendors and services. Key considerations in making the choice to develop and host the technology solution in-house or externally relate to the capacities and resources available internally and the availability, suitability, cost-efficiency, and sustainability of external solutions. Other factors to take into consideration when assessing an external solution include performance, security and privacy, assistance and other client services, and adaptability and scalability.

If institutions choose to outsource the development and/or hosting of the technology solution underpinning the resource bank, they should pay particular attention to avoiding dependence on a single, private provider. Convening all players in the educational digital ecosystem and developing a good relationship early on can be helpful for institutions as they develop or adapt a resource bank (Thillay, Jean and Vidal, 2020<sub>[40]</sub>). Opting for open-source solutions, where the source code is free to use and modify by developers other than those of the company that provides it, reduces the risk that the bank becomes impossible to access, use or develop if the private provider stops working on the project (for any reason). It is also important that each item is designed in a way that makes it easily transferable to another technology. For example, in the case of digital items, the use of interoperability standards, such as QTI® (*Question and Test Interoperability*), allows the transfer of items (as well as the resulting data) between different software solutions or platforms (such as item banks or learning management systems) that adhere to the same standards. These technical standards guarantee the continuity of the item database when the supplier or software solution changes.

**Table 3.3. Options for developing and hosting resource bank technological solution**

	Advantages	Disadvantages
In-house development and/or hosting	<p>More tailored and responsive to the intended users' needs</p> <p>Enables direct control and management of the technological solution and the server's infrastructure in case it is also hosted internally</p>	<p>Requires significant resources and technical skills that may not be available internally</p>
Outsourced development and/or hosting	<p>Relies on extensive human capacities and technological resources available externally</p> <p>Enables rapid deployment through off-the-shelf or customised/customisable education technology and hosting solutions made available by private vendors</p>	<p>May not be well adapted to the purpose and users of the resource bank and may require extensive customisations (if possible) that bring with them associated costs</p> <p>May lead to dependence on external provider and lack of control over technological solution and/or server infrastructure</p> <p>Raises potential issues related to privacy and security</p> <p>May not be as responsive to user needs and scalable/adaptable</p>



*Policy Pointer 2.4.2: Ensuring the security of the resource bank's content*

The degree of security of the resource bank depends on its uses and target users. The security of a resource bank refers to the confidentiality of its contents. This is particularly important in the case of resource banks providing ready-to-use classroom assessments, particularly for summative or high-stakes purposes (such as certification). In this case, disclosing the content of a resource bank can have important negative consequences on the credibility of the tests and the validity of the results. On the other hand, when a bank serves as a pedagogical resource by providing users with sample items and useful resources, security issues are less critical. Such resources are often made available in different formats so that all stakeholders, including students and their parents, can access them freely.

The main security measures for a digital resource bank are data encryption and access control (Vale, 2006<sup>[41]</sup>). Various encryption methods and algorithms are used to guarantee the security of data flows or exchanges within the resource bank. Moreover, access to the resource bank may be subject to an authentication method (such as a username and password) to limit access to its content and different functions to the intended users. For example, for Estonia's e-koolikott and Ireland's Scoilnet, no login is required to search and use learning material, but a personalised (teacher) account is needed to create new material. Furthermore, different roles can be defined and associated to specific users; each role enabling access to different content or functionalities depending on defined user rights (for example, right to view an item or right to edit/add/delete items). For example, New Zealand assigns roles for different users of e-asTTle (school administrator, teacher, external coordinator, school leader, MoE administrator and students) that are associated with different rights related to creating or deleting tests, managing students, and other rights such as sitting for tests or generating reports (See overview [here](#)) (TKI, n.d.<sup>[67]</sup>).

*Policy Pointer: 2.4.3 Guaranteeing the privacy of resource bank users*

In addition to security concerns for the bank itself, attention should also be given to ensuring the protection of the personal data of users, particularly if the resource bank is open to students. Personal data protection should be defined by a clear set of rules made explicit to both the persons responsible for developing and implementing the resource bank (including internal staff and contractors) and its users (OECD, 2023<sup>[68]</sup>). Such rules tend to restrict the processing, use, sharing and storage of personal data only for legitimate purposes, in a transparent manner, and for a limited time period. These measures, as well as the definition and management of data life cycles (archiving, data anonymisation, and automatic purging of historical data, among others), must be applied to any processing of personal data. It is also considered good practice to conduct a risk assessment identifying the potential security and privacy risks, their likelihood, and actions to avoid or mitigate their impact. This could lead to the development of a risk management plan and/or the establishment of processes in the cases of data breaches.

Countries are encouraged to implement national, as well as global or regional standards on personal data protection, such as the General Data Protection Regulation of the European Union or the OECD Privacy Framework. This is not always easy to implement, particularly when resource banks are deployed under tight timelines to respond to an emerging need or crisis, such as the COVID-19 pandemic. However, measures can and should be taken to ensure commitment to the protection of privacy and personal data. For example, the BRNE partly removed authentication requirements so that individual platforms no longer collected personal data of users (Thillay, Jean and Vidal, 2020<sup>[40]</sup>). Also, OECD's PILA resource bank commits to following different privacy principles like storing sensitive student information in an encrypted format that only teachers can access and decrypt and refraining from selling data or research findings. Student responses in PILA are pseudonymised, which means that they can no longer be attributed to the student without any additional information. All information students provide are treated confidentially following the OECD Personal Data Protection rules (OECD, 2023<sup>[69]</sup>).

### Phase 3: Deploying and maintaining the resource bank and promoting its use

To ensure the success of the resource bank, as much thought should be accorded to its operational and maintenance requirements, as to its functional and technical features. This includes maintaining and updating the content of the resource bank and its underlying technological infrastructure and promoting the use of the resource bank through adequate communication, training, and incentive frameworks.

#### **Step 3.1: Maintaining and updating the content and technological solution**

Once the resource bank is implemented and made available to the intended users, regular maintenance and updates are needed to ensure its content's continued relevance and the functioning of the underlying technology solution. The regularity of updates to the resource bank's content depends on its purpose and function.

- **Resource banks generating ready-to-use tests:** If the bank is intended to generate ready-to-use classroom assessments, its contents should be frequently updated to maintain the validity and reliability of those assessments. It will also prevent phenomena such as overexposure of certain items and teaching to the test.
- **Resource banks as repositories of examples and resources:** If the bank is used for formative purposes in the classroom or as examples and resources for teachers, updating its contents only becomes necessary in the case of changes to the curricula and/or assessment frameworks. This is the case of the ARBs in New Zealand, which continue to serve as an important resource for teachers even though no new resources have been added since 2016.
- **Resource banks that promote collaboration and peer-learning:** Resource banks that seek to promote mutual exchange and collaboration should be perceived as “live” resources to enhance their relevance and value for teachers. In this case, it is recommended that the resource banks are consistently updated with resources provided by teachers and other stakeholders.

The IT maintenance of the underlying solution is also indispensable to the proper functioning and sustainability of the resource bank. This includes all technical, administrative and management tasks conducted during the life cycle of an IT system. The maintenance of the IT solution aims to ensure that it can perform the required functions as well as update it with new functions or features over time.

#### **Step 3.2: Promoting the buy-in of and use by key stakeholders**

The sustainability of a resource bank depends primarily on the educational community's support for the project and their contribution to its promotion and development. Without the buy-in of key stakeholders, notably teachers, principals, and schools but also parents and students, the resource bank is unlikely to succeed in achieving its purpose or objectives.

*Policy Pointer 3.2.1: Organise training and communication activities to promote the use of the resource bank*

A series of (in-person or online) communication and training activities should be organised during the deployment of the resource bank to promote its use. These will serve to present an overview of the resource bank, its value for users, and its functionalities, as well as answer any questions or concerns of key stakeholders. These types of dissemination activities are important to ensure that all intended users are aware of the resource bank and know how to use it as part of their teaching, learning, and assessment practices. In France for example, regional academies, pedagogical inspection bodies, and a network of digital education advisors provided teacher training to help disseminate information on the BRNE, contributing to the rapid diffusion of the initiative (Thillay, Jean and Vidal, 2020<sub>[40]</sub>). Similarly, in New

Zealand, the Ministry of Education contracted independent professional development providers to support teachers in their use of e-asTTle software as part of their teaching and assessment practices (Hattie et al., 2006<sub>[70]</sub>).

After the initial dissemination efforts, keeping communication channels open with the various users of the resource bank is important for troubleshooting issues and collecting feedback for its medium-to-long term improvement. This can be done through a ticketing solution to resolve technical issues and/or a contact or feedback form. For instance, e-koolikott has a *Report a Bug* function that redirects users to the service provider, which provides information like documentation or troubleshooting articles. Users can also contact the support team if they create an account with the service provider. Other forms of technological support include a toll-free phone number and email, as was used at the launch of the e-asTTle. User focus groups could also be organised to evaluate the resource bank and identify areas for improvement. These can be done on a more regular basis (for example, quarterly or yearly) at the launch of the project and later, on an ad-hoc basis at critical junctures or based on identified needs.

*Policy pointer 3.2.1: Create incentives or reward structures for the use of the resource bank*

Incentive and reward mechanisms that are integrated into the IT solution is another way to promote the use of a resource bank. For example, teachers (and other users) could earn virtual badges for using the resource bank to assign tasks as classwork or homework (among other things). Virtual badges could also be attributed to teachers for submitting their own resources or assessments that are then reviewed, validated, and entered in the system. These can also be linked to continuous professional development, for example by receiving equivalent teacher professional development credits.

Users can also be assigned statuses such as novice, advanced, or expert users. “Expert” users could serve as resource bank champions at their schools or within their region/district. Their role could be to transfer their acquired knowledge or competencies and answer questions or provide advice on the use of the resource bank. This would help promote the continued use of resource banks.

# 4 Summary: framework for the establishment of a resource bank

This concluding section presents an easily accessible framework to guide policymakers through the steps of developing a resource bank and provide them with key considerations that are informed by country practices and research evidence.

**Table 4.1. Framework for developing a resource bank**

Phases	Key steps	Key considerations	Policy pointers
1. Conceptualisation and Preparation	1.1 Defining purpose, scope, and audience	<p>The purpose of the resource bank may be to support curricular reforms, to support capacity-building, and/or to consolidate resources.</p> <p>Based on the purpose, decisions need to be made on the function (repository or ready to use), audience (open or restricted access) and the scope of the resource bank (subjects or grades targeted or type(s) of assessments included).</p>	
	1.2 Setting up the governance of the resource bank	<p>Determining the governance of the resource bank depends on its purpose and scope. It can take the form of central or decentralised management and/or collaboration with the private sector.</p>	<p>Facilitating collaboration across different bodies within the Ministry is recommended. This can be done through creating a joint steering committee, establishing joint management of the resource bank, and/or creating channels for regular communication and reporting between bodies and agencies responsible for curriculum, assessment, and teacher training.</p> <p>Engaging stakeholders from the beginning of the process can enhance the quality, relevance, acceptance, and use of the resource bank over time. Decisions on which stakeholders to involve and to what extent depend on the purpose and scope of</p>

Phases	Key steps	Key considerations	Policy pointers
			the resource bank. Mechanisms for stakeholder engagement include a user committee and/or ad-hoc consultations.
	1.3 Identifying and allocating resources	Determining and allocating the human, financial, and time resources required over the whole lifecycle of the resource bank is crucial for its operational success.	Developing a roadmap for the creation of the resource bank can provide an overview of the time and resources that need to be mobilised on the short, medium, and long term and enable planning. If used for external communication and signalling, it can also create greater awareness and support for the resource bank and secure more stable financing.
2. Content and Technological Development	2.1 Determining the content and organisation of the resource bank	Determining what goes into a resource bank and how it is organised is a crucial step. Resource banks typically include the following content: items or assessment tasks, metadata, and associated resources.	<p>Mapping the contents of the resource bank against key reference documents, including the curriculum and learning standards, can boost its instructional and assessment value and support a standards-based approach.</p> <p>Involving teachers in the reflection on the resource bank's content and classification ensures that the bank is responsive to their needs. A collective mapping of curricular and assessment resources could be helpful at the beginning of the process. Teachers could also be consulted throughout the content development process to provide feedback and identify gaps and areas for improvement.</p>
	2.2 Defining the workflows for item development and validation	<p>Identifying the actors involved in writing items and defining the process to review and validate them is a necessary step in the development of resource bank's content.</p> <p>Item authoring can involve a range of actors (from local/regional/national levels and even private actors) chosen for their relevant expertise and experience.</p> <p>The degree and complexity of validation processes depend on the purpose of the resource bank and its intended use by teachers. Validation processes can include psychometric and/or statistical</p>	<p>Involving actors at the school, local, or regional levels in developing or validating the content of the resource bank can enhance their competencies in assessment and promote buy-in. However, it requires more extensive quality control for locally sourced/validated content. The decision to involve local actors and their degree of involvement should be considered in light of the purpose of the resource bank.</p>

Phases	Key steps	Key considerations	Policy pointers
		validation, micro validation, and expert or peer review.	
	2.3 Defining functional requirements	Developing a digital resource bank requires a reflection on the functionalities enabled by the underlying IT solution. The essential functionalities are item authoring, visualisation, and searching and selecting, which enable users to add new items and to explore and navigate the content of the bank. Additional functions include test assembly and test delivery, correction, and reporting.	<p>Defining the Minimum Viable Product (MVP) can enable the rapid deployment of the resource bank and access by teachers to (some of) the resources while awaiting the development of a full-fledged technological solution.</p> <p>Defining the functionalities with the end-users can better reflect their needs and encourage uptake. This can be done through workshops, brainstorming sessions and focus groups, as well as design sprints and user tests. This can also allow for cost-saving and greater efficiency in the development of the IT solution.</p>
	2.4 Considering broader technical requirements	<p>Institutions can develop and host the resource bank in-house or choose among off-the-shelf or customised/customisable solutions available externally.</p> <p>Institutions also need to carefully consider the security and privacy risks associated with the resource bank and their implications for the development of the technological solution.</p> <p>Issues regarding the security and privacy of the resource bank depend on the latter's purpose and the uses by teachers and other stakeholders. These have an impact on the data management processes and controlling access to the resource bank.</p>	<p>Policymakers should carefully assess the capacities and resources available internally and the availability, suitability, cost-efficiency, and sustainability of external solutions in making the choice to develop and host the technology solution in-house or externally. Other factors to take into consideration when assessing an external solution include performance, security and privacy, assistance and other client services, and adaptability and scalability. Avoiding dependence on a single private provider is recommended, including through developing relationships with all players in the field and using open-source software or interoperability standards that ensure the continuity of the resource bank even if a private provider changes.</p> <p>Depending on the purpose and intended uses of the resource bank, policymakers should put in place measures to ensure the security of its contents and the privacy of its users. Security measures include data encryption and authentication methods, including assigning different roles and rights to different users. To ensure the privacy of users, applying regional or global standards, defining the management of</p>

Phases	Key steps	Key considerations	Policy pointers
			data life cycles, and developing a risk assessment and risk management plans are recommended
3. Maintenance and promoting use	3.1 Maintaining and updating the content and IT solution	<p>The regularity of updates to the resource bank's content depends on its purpose and functions. Changes to the curriculum and assessment frameworks might require a revision and updating of the items (and their classification) to ensure their alignment.</p> <p>The IT maintenance of the underlying solution is indispensable to guarantee the proper functioning and sustainability of the resource bank. It can also be used to expand the functionalities of the resource bank.</p>	
	3.2 Promoting the buy-in and use by key stakeholders	<p>The sustainability of a resource bank depends primarily on the educational community's awareness of and support for the project and their contribution to its promotion and development.</p>	<p>During the initial launch of the resource bank, communication and training activities organised at the central, regional and/or local levels can raise awareness and promote its use by key stakeholders. These activities could focus on the use of the bank as a resource for teaching and learning, as well as on the functionalities and navigation of the technological platform.</p> <p>Keeping communication channels open after initial deployment is important for troubleshooting issues and collecting feedback for its medium-to-long term improvement.</p> <p>Incentive and reward mechanisms, such as virtual badges and links to teacher continuous professional development, can identify champions within each school or locality/region and promote the bank's use by stakeholders.</p>



# References

- 1EdTech Consortium (2023), *1EdTech Question & Test Interoperability (QTI) Specification*, [82]  
<http://www.imsglobal.org/question/index.html> (accessed on 20 March 2023).
- Auckland Uniservices Limited (2009), *Generation 2: e-asTTle Year Three. Educator Manual*, [99]  
<https://www.yumpu.com/en/document/read/30458778/e-asttle-educator-manualpdf>.
- Australian Government (n.d.), *Education Services Australia*, [58]  
<https://www.directory.gov.au/portfolios/education/education-services-australia> (accessed on 15 March 2023).
- Brown, G. (2013), “AsTTle - A national testing system for formative assessment: How the national testing policy ended up helping schools and teachers”, in Lai, M. and S. Kushner (eds.), *A Developmental and Negotiated Approach to School and Self-evaluation*, Emerald Group Publishing, London, [https://doi.org/10.1108/S1474-7863\(2013\)0000014003](https://doi.org/10.1108/S1474-7863(2013)0000014003). [25]
- Brown, G. and L. Harris (2009), “Unintended Consequences of using Tests to Improve Learning: How Improvement-Oriented Resources Heighten Conceptions of Assessment as School Accountability”, *Journal of MultiDisciplinary Evaluation*, Vol. 6/12. [26]
- Caffrey, E. (2009), *Assessment in Elementary and Secondary Education: A Primer*, [92]  
<https://sgp.fas.org/crs/misc/R40514.pdf>.
- Cambridge Assessment English (2021), *Consequential Validity of Linguaskill*, [93]  
<https://www.cambridgeenglish.org/Images/617360-linguaskill-consequential-validity-of-linguaskill.pdf>.
- CCEA (n.d.), *About Us*, <https://ccea.org.uk/about> (accessed on 9 March 2022). [57]
- Columbia University (2023), *What is UX Design? Differences Between UX and UI Design*, [90]  
<https://bootcamp.cvn.columbia.edu/blog/what-is-ux-design/> (accessed on 28 March 2023).
- Corcoran, T., F. Mosher and A. Rogat (2009), *Learning Progressions in Science. An Evidence-based Approach to Reform*, [75]  
[https://www.cpre.org/sites/default/files/researchreport/829\\_lpsciencerr63.pdf](https://www.cpre.org/sites/default/files/researchreport/829_lpsciencerr63.pdf).
- CSAI (2018), *Standards Alignment to Curriculum and Assessment.*, [60]  
<https://files.eric.ed.gov/fulltext/ED588503.pdf>.
- CSAI (2018), *Valid and Reliable Assessments*, <https://files.eric.ed.gov/fulltext/ED588476.pdf>. [83]
- Direction de l'évaluation de la prospective et de la performance France (2022), *Évaluations de début de sixième 2022*, <https://www.education.gouv.fr/evaluations-de-debut-de-sixieme-2022-premiers-resultats-343396> (accessed on 10 July 2023). [23]
- Direction de l'évaluation de la prospective et de la performance France (2022), *Test de positionnement de début de première année de CAP 2022*, <https://www.education.gouv.fr/test-de-positionnement-de-debut-de-premiere-annee-de-cap-2022-premiers-resultats-343861> (accessed on 10 July 2023). [22]

- Direction de l'évaluation de la prospective et de la performance France (2022), *Test de positionnement de début de seconde 2022. Premiers résultats*, <https://www.education.gouv.fr/test-de-positionnement-de-debut-de-seconde-2022-premiers-resultats-343810> (accessed on 10 July 2023). [21]
- Education and Youth Authority Estonia (2022), *KKK*, <https://projektid.edu.ee/pages/viewpage.action?pagelid=72155602> (accessed on 10 July 2023). [43]
- Education and Youth Authority Estonia (n.d.), *ekoolikott*, <https://e-koolikott.ee/en> (accessed on 10 July 2023). [44]
- Education Gazette Editors (2022), "The Power of e-asTTle in a Classroom", *Education Gazette*, Vol. 101/14, <https://gazette.education.govt.nz/articles/the-power-of-e-asttle-in-a-classroom/> (accessed on 10 July 2023). [24]
- Education Services Australia (2023), *About*, <https://www.scootle.edu.au/ec/p/about> (accessed on 10 July 2023). [97]
- Education Services Australia (2023), *Privacy Policy - Scootle*, [https://www.scootle.edu.au/ec/p/privacy\\_policy](https://www.scootle.edu.au/ec/p/privacy_policy) (accessed on 10 July 2023). [95]
- Education Services Australia (2023), *Scootle*, <https://www.scootle.edu.au/ec/p/home> (accessed on 10 July 2023). [96]
- Eyal, L. (2012), "Digital Assessment Literacy - The Core Role of the Teacher in a Digital Environment", *Educational Technology & Society*, Vol. 15/2, pp. 37-49, <https://www.jstor.org/stable/10.2307/jeductechsoci.15.2.37>. [66]
- FLIP (n.d.), *About us*, <https://flip-plus.org/about> (accessed on 10 July 2023). [18]
- Foster, D. (2023), *What Is Computerized Adaptive Testing (CAT)?*, <https://blog.caveon.com/computer-adaptive-test-meaning#:~:text=The%20score%20is%20not%20based,compared%20to%20a%20traditional%20test.> (accessed on 24 March 2023). [72]
- Galaczi, E. (2020), *What is validity?*, <https://www.cambridgeenglish.org/blog/what-is-validity/> (accessed on 21 April 2023). [91]
- GBIF (2023), *Data Hosting. A quick guide for making good decisions about how to host data shared with GBIF.*, <https://www.gbif.org/data-hosting> (accessed on 10 January 2023). [79]
- Goddard, Y., R. Goddard and M. Tschannen-Moran (2007), "A Theoretical and Empirical Investigation of Teacher Collaboration for School Improvement and Student Achievement in Public Elementary Schools", *Teachers College Record*, Vol. 109/4, pp. 877-896, <https://journals.sagepub.com/doi/pdf/10.1177/016146810710900401>. [36]
- GV (2019), *The design sprint*, <http://www.gv.com/sprint/> (accessed on 21 April 2023). [78]
- Hattie, J. et al. (2006), "Formative Evaluation of an Educational Assessment Technology Innovation: Developers' Insights into Assessment Tools for Teaching and Learning (asTTle)", *Journal of Multidisciplinary Evaluation* 5. [70]

- Heritage, M. (n.d.), *Learning progressions: Supporting instruction and formative assessment*, [77]  
<https://www.michiganassessmentconsortium.org/wp-content/uploads/Learning-Progressions.pdf>.
- Hourigan, T. (2020), *Reflections on the impact of Covid-19. Ireland's Yearbook of Education 2020*, [35]  
<https://irelandseducationyearbook.ie/downloads/IEYB2020/Irelands-Education-Yearbook-2020.pdf>.
- International Item Library (2023), *International Item Library*, [19]  
<https://www.itemlibrary.org/> (accessed on 10 July 2023).
- International Item Library (n.d.), *Sharing assessment tools for a better education*, [14]  
[https://uploads-ssl.webflow.com/626be7bab94c1ad8543b5ab6/62c706dce299b282e0f0ec73\\_20220525%20International%20Item%20Library%20-%20Leaflet%20-%203%20page.pdf](https://uploads-ssl.webflow.com/626be7bab94c1ad8543b5ab6/62c706dce299b282e0f0ec73_20220525%20International%20Item%20Library%20-%20Leaflet%20-%203%20page.pdf).
- Itarian (2023), *Ticketing System*, [88]  
<https://www.itarian.com/ticketing-system.php> (accessed on 28 March 2023).
- Joyce, C. (2005), *The ARBs and Assessment for Learning*, [63]  
<https://arbs.nzcer.org.nz/research-and-articles#the-arbs-and-assessment-for-learning> (accessed on 10 July 2023).
- Joyce, C. and J. Fisher (2018), *Learning Progression Frameworks and the ARBs*, [30]  
<https://arbs.nzcer.org.nz/otjs-learning-progression-frameworks-and-arbs> (accessed on 10 July 2023).
- Joyce, C. and J. Fisher (2014), “Assessment for learning, online tasks, and the new Assessment Resource Banks”, *Set: Research Information for Teachers 2*, pp. 51-53, [1]  
<https://doi.org/10.18296/set.0314>.
- Luecht, R., A. De Champlain and R. Nungester (1998), “Maintaining Content Validity in Computerized Adaptive Testing”, *Advances in Health Sciences Education*, Vol. 3, pp. 29-41, [73]  
[https://link.springer.com/chapter/10.1007/978-94-011-4886-3\\_111](https://link.springer.com/chapter/10.1007/978-94-011-4886-3_111).
- Maghnoij, S. et al. (2018), *Examens de l'OCDE du cadre d'évaluation de l'éducation : Maroc*, [5]  
Éditions OCDE, Paris, <https://dx.doi.org/10.1787/9789264301832-fr>.
- Maguire, T. (2016), “Rediscovering the ARBs”, *Research Information for Teachers*, Vol. 1/2016, [59]  
pp. 55-58, <http://dx.doi.org/10.18296/set.0038>.
- Marcus-Quinn, A. (2021), *Open educational resources; The need for formal inclusion in compulsory education*, [37]  
<https://conference.pixel-online.net/files/foe/ed0011/FP/7553-ESOC5283-FP-FOE11.pdf>.
- Marcus-Quinn, A. and T. Hourigan (2022), “Digital Inclusion and Accessibility Considerations in Digital Teaching and Learning Materials for the Second-level Classroom”, *Irish Educational Studies*, Vol. 41/1, pp. 161-169, [34]  
<https://doi.org/10.1080/03323315.2021.2022519>.
- Ministère de l'Éducation nationale et de la Jeunesse (2022), *Tests de positionnement de seconde et de CAP*, [20]  
<https://eduscol.education.fr/1501/tests-de-positionnement-de-seconde-et-de-cap> (accessed on 10 July 2023).
- National Board of Medical Examiners (2019), *Test Blueprinting II: Creating a Test Blueprint*, [87]  
<https://www.nbme.org/sites/default/files/2020-01/Test-Blueprinting-Lesson-2.pdf>.

- National Foundation for Educational Research in England and Wales (n.d.), *What are the benefits of Computer-Based Assessment?*, <https://www.nfer.ac.uk/for-schools/free-resources-advice/assessment-hub/ask-the-expert/what-are-the-benefits-of-computer-based-assessment/> (accessed on 28 March 2023). [85]
- National Information Standards Organization (2004), *Understanding Metadata*, [https://www.lter.uaf.edu/metadata\\_files/UnderstandingMetadata.pdf](https://www.lter.uaf.edu/metadata_files/UnderstandingMetadata.pdf). [80]
- New Zealand Ministry of Education (2023), *About e-asTTle*, <https://e-asttle.tki.org.nz/About-e-asTTle> (accessed on 10 July 2023). [28]
- New Zealand Ministry of Education (2023), *Assessment Online. Assessment Details*, [https://assessment.tki.org.nz/Assessment-tools-resources/Selecting-an-assessment-tool/Browse-assessment-tools/English/Viewing-and-presenting/Assessment-Resource-Bank-ARB-Viewing-and-Presenting/\(back\\_to\\_results\)/Assessment-tools-resources/Selecting-an-asse](https://assessment.tki.org.nz/Assessment-tools-resources/Selecting-an-assessment-tool/Browse-assessment-tools/English/Viewing-and-presenting/Assessment-Resource-Bank-ARB-Viewing-and-Presenting/(back_to_results)/Assessment-tools-resources/Selecting-an-asse) (accessed on 10 July 2023). [61]
- New Zealand Ministry of Education (2023), *e-asTTle*, <https://assessment.tki.org.nz/Assessment-tools-resources/Commonly-used-assessments/e-asTTle#:~:text=e%2DasTTle%20is%20a%20New,Writing%3A%20curriculum%20levels%20%E2%80%9336> (accessed on 10 July 2023). [29]
- New Zealand Ministry of Education (2023), *Learning Progression Framework - Reading Map*, <https://arbs.nzcer.org.nz/learning-progression-framework-reading-map> (accessed on 10 July 2023). [62]
- New Zealand Ministry of Education (2023), *Privacy Statement*, <https://arbs.nzcer.org.nz/privacy-statement> (accessed on 10 July 2023). [98]
- New Zealand Ministry of Education (2023), *User Roles in e-asTTle*, <https://e-asttle.tki.org.nz/Help-with-e-asTTle/Roles/User-Roles-in-e-asTTle#user-roles> (accessed on 10 July 2023). [100]
- Next Generation Science Standards (n.d.), *Next Generation Science Standards*, <http://www.nextgenscience.org/> (accessed on 30 March 2023). [32]
- Nottingham Kent University (n.d.), *About Computer-Based Assessment*, [https://now.ntu.ac.uk/d2l/lor/viewer/viewFile.d2lfile/6605/62186/CBA%20Revised/page\\_01.htm](https://now.ntu.ac.uk/d2l/lor/viewer/viewFile.d2lfile/6605/62186/CBA%20Revised/page_01.htm) (accessed on 28 March 2023). [84]
- NWEA (2021), *One coherent system to drive action: Nebraska is committed to supporting the connection between curriculum, instruction, and assessment*, [https://www.nwea.org/resource-center/case-study/48050/One-coherent-system-to-drive-action\\_NE\\_NWEA-State-Solutions\\_Overview-1.pdf/](https://www.nwea.org/resource-center/case-study/48050/One-coherent-system-to-drive-action_NE_NWEA-State-Solutions_Overview-1.pdf/). [53]
- NWEA (2021), *Partnering with NWEA to deliver impactful statewide assessment programs*, [https://www.nwea.org/resource-center/fact-sheet/48056/State-Solutions-Overview-one-sheet\\_NWEA\\_factsheet-1.pdf/](https://www.nwea.org/resource-center/fact-sheet/48056/State-Solutions-Overview-one-sheet_NWEA_factsheet-1.pdf/). [56]
- NWEA (n.d.), *Instructional Connections*, <https://www.nwea.org/instructional-connections/> (accessed on 10 July 2023). [55]
- NWEA (n.d.), *MAP Suite: Partnering to help all kids learn*, <https://www.nwea.org/the-map-suite/> (accessed on 10 July 2023). [54]

- NZCER (2022), *About the ARBs*, <https://arbs.nzcer.org.nz/about-arbs> (accessed on 10 July 2023). [64]
- OECD (2023), *Data Protection Notice*, <https://pilaproject.org/research-hub/data-protection-notice> (accessed on 10 July 2023). [69]
- OECD (2023), *Personal Data Protection at the OECD*, <https://www.oecd.org/general/data-protection.htm> (accessed on 16 January 2023). [68]
- OECD (2023), *PILA*, <https://pilaproject.org/> (accessed on 10 July 2023). [8]
- OECD (2023), *PISA 2025 Learning in the Digital World*, <https://www.oecd.org/pisa/innovation/learning-digital-world/> (accessed on 10 July 2023). [9]
- OECD (2019), *OECD Future of Education of Skills 2030. OECD Learning Compass. A Series of Concept Notes*, OECD Publishing, Paris, [https://www.oecd.org/education/2030-project/teaching-and-learning/learning/learning-compass-2030/OECD\\_Learning\\_Compass\\_2030\\_Concept\\_Note\\_Series.pdf](https://www.oecd.org/education/2030-project/teaching-and-learning/learning/learning-compass-2030/OECD_Learning_Compass_2030_Concept_Note_Series.pdf). [15]
- OECD (2013), *Synergies for Better Learning - An international perspective on evaluation and assessment*, <https://doi.org/10.1787/9789264190658-en>. [7]
- OECD (unpublished), *Étude de diagnostic sur une banque d'items pour le contrôle continu au Maroc*. [6]
- OECD (n.d.), *PILA Twopager. What is PILA?*. [10]
- PDST Technology in Education (2023), *Privacy Policy*, <https://www.scoilnet.ie/site-info/privacy-policy/> (accessed on 10 July 2023). [94]
- PDST Technology in Education (2023), *Scoilnet. About us*, <https://www.scoilnet.ie/scoilnet/about-us/> (accessed on 10 July 2023). [33]
- PDST Technology in Education (2023), *Uploading Basics*, <https://www.scoilnet.ie/site-info/help/uploading-basics/> (accessed on 10 July 2023). [38]
- PDST Technology in Education (n.d.), *About Us*, <https://www.pdsttechnologyineducation.ie/about-us/> (accessed on February 2023). [45]
- Pellegrino, J. (2017), "Teaching, learning and assessing 21st century skills", in Guerriero, S. (ed.), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264270695-en>. [17]
- Pfister, M. (2020), *A step ahead: Estonia emerges as leader in worldwide distance learning experiment*, <https://ncee.org/quick-read/a-step-ahead-estonia/> (accessed on 10 July 2023). [41]
- Rocher, T. (2015), "Mesure des compétences. Méthodes psychométriques utilisées dans le cadre des évaluations des élèves.", Vol. n° 86-87, pp. 37-60, <https://www.education.gouv.fr/media/21500/download>. [86]
- Rudner, L. (1998), "Item Banking", *Practical Assessment, Research and Evaluation*, Vol. 6/4, <https://doi.org/10.7275/29ek-tj23>. [3]

- Russell, M. (2016), “A Framework for Examining the Utility of Technology-Enhanced Items”, [13]  
*Journal of Applied Testing Technology*, Vol. 17/1, pp. 20-32,  
<https://www.jattjournal.net/index.php/atp/article/view/89189>.
- Salles, F., R. Dos Santos and S. Keskaik (2020), “When didactics meet data science: process [16]  
 data analysis in large-scale mathematics assessment in France”, *Large-Scale Assessments in  
 Education*, Vol. 8/1, <https://doi.org/10.1186/s40536-020-00085-y>.
- Sansone, S. and P. Rocca-Serra (2016), *Interoperability standards - Digital Objects in their own [81]  
 right*, Wellcome Trust, <https://dx.doi.org/10.6084/m9.figshare.4055496>.
- Saville, N. (2016), *Learning Oriented Assessment - a Systematic Approach*, Cambridge [12]  
 University Press, <https://www.cambridgeenglish.org/Images/639876-silt-volume-45.pdf>.
- seobility (n.d.), *User testing*, [https://www.seobility.net/en/wiki/User\\_Testing](https://www.seobility.net/en/wiki/User_Testing) (accessed on [89]  
 21 April 2023).
- Smarter Balanced (2023), *Interim Assessment Item Portal*, [102  
<https://smartertoolsforteachers.org/landing/items> (accessed on 10 July 2023). ]
- Smarter Balanced (2022), *A Commitment to Supporting Teachers*, [51]  
<https://smarterbalanced.org/our-system/educators/> (accessed on 10 July 2023).
- Smarter Balanced (2022), *A Decade of Advancing Teaching and Learning*, [50]  
<https://smarterbalanced.org/our-system/> (accessed on 10 July 2023).
- Smarter Balanced (2022), *Governance Structure*, [https://smarterbalanced.org/our- \[52\]  
 vision/partnerships/governance/](https://smarterbalanced.org/our-vision/partnerships/governance/) (accessed on 10 July 2023).
- Smarter balanced (2023), *Tools for Teachers*, <https://smartertoolsforteachers.org/> (accessed on [46]  
 10 July 2023).
- Smarter balanced (2022), *10 Years of smarter collaboration*, [https://smarterbalanced.org/our- \[49\]  
 vision/our-history/](https://smarterbalanced.org/our-vision/our-history/) (accessed on 10 July 2023).
- Smarter balanced (2022), *The power of partnerships and collaboration*, [47]  
<https://smarterbalanced.org/our-vision/partnerships/> (accessed on 10 July 2023).
- Smarter balanced (2010), *Smarter Balanced Governing Board Procedures*, [48]  
<https://portal.smarterbalanced.org/library/en/governing-board-procedures.pdf>.
- SREB (2022), *Standards vs Curriculum. What’s the difference?*, [74]  
<https://www.sreb.org/publication/standards-vs-curriculum> (accessed on 30 March 2023).
- The e-Assessment Association (2023), *Adaptive Testing*, [https://www.e- \[71\]  
 assessment.com/news/adaptive-testing/](https://www.e-assessment.com/news/adaptive-testing/) (accessed on 22 March 2023).
- The National Centre for Technology in Education Ireland (2009), *Creating your school’s website [39]  
 using scoilnet blogs*, [https://breaffyns.scoilnet.ie/blog/files/2014/04/Using-Scoilnet-blogs-to-  
 create-your-school-Website.pdf](https://breaffyns.scoilnet.ie/blog/files/2014/04/Using-Scoilnet-blogs-to-create-your-school-Website.pdf).
- Thillay, A., A. Jean and Q. Vidal (2020), “France: les banques de ressources numériques [40]



- éducatives (BRNE) (Banks of Educational Digital Resources)”, *Education continuity stories series*, <https://oecd.edutoday.com/wp-content/uploads/2020/09/France-Banks-of-educational-digital-resources.pdf>.
- TKI (n.d.), *User Roles in e-asTTle*, <https://e-asttle.tki.org.nz/Help-with-e-asTTle/Roles/User-Roles-in-e-asTTle#user-roles> (accessed on 28 March 2023). [67]
- UNESCO (2021), *Parental support to learning*, <https://learningportal.iiep.unesco.org/en/issue-briefs/improve-learning/parental-support-to-learning> (accessed on 10 July 2023). [42]
- UNESCO (2020), *How can digital formative assessment help monitor student learning during and after the COVID-19 era?*, <https://learningportal.iiep.unesco.org/en/blog/how-can-digital-formative-assessment-help-monitor-student-learning-during-and-after-the-covid> (accessed on 10 July 2023). [65]
- University of Illinois Chicago (2023), *Next Generation Science Assessments*, <https://lsri.uic.edu/our-research/lsri-research-projects/next-generation-science-assessments/> (accessed on 30 March 2023). [31]
- Vale, C. (2006), “Computerized Item Banking”, in *Handbook of Test Development*, <https://doi.org/10.4324/9780203874776.ch11>. [4]
- Van der Kleij, F., J. Cumming and A. Looney (2018), “Policy expectations and support for teacher formative assessment in Australian education reform”, *Assessment in Education: Principles, Policy & Practice*, Vol. 25/6, pp. 620-637, <https://doi.org/10.1080/0969594X.2017.1374924>. [101]
- Ward, A. and M. Murray-Ward (1994), “An NCME Instructional Module: Guidelines for the Development of Item Banks”, *Educational Measurement*, Vol. 13/1, pp. 34-39, <https://doi.org/10.1111/j.1745-3992.1994.tb00785.x>. [2]
- Weiss, D. (2011), “Item banking, test development, and test delivery.”, in *APA handbook of testing and assessment in psychology, Vol. 1: Test theory and testing and assessment in industrial and organizational psychology.*, <https://doi.org/10.1037/14047-010>. [11]
- Wilson, M. and R. Lehrer (2021), “Improving Learning: Using a Learning Progression to Coordinate Instruction and Assessment”, *Frontiers in Education*, Vol. 6, <https://doi.org/10.3389/educ.2021.654212>. [76]
- World class arena limited (n.d.), *asTTle – Assessment Tools for Teaching and Learning*, <http://www.worldclassarena.net/doc/file1.pdf>. [27]



## Annex A. Glossary of Terms

### Adaptive testing

Adaptive testing, or sometimes computerized adaptive testing (CAT), is an approach that adapts an assessment to a student's abilities. This often involves choosing questions based on the assessment candidate's responses to the previous questions. The difficulty of questions thereby increases if the student performs well and vice versa. Questions must be objective (i.e., computer markable) and delivered on a computer, as paper-based tests are not practical for adaptive testing. The purpose of adaptive testing is to improve precision in measuring student performance. (The e-Assessment Association, 2023<sup>[71]</sup>). For instance, items that are too easy or too difficult for a test taker do not provide meaningful information about her proficiency. When item selection is targeted to the test takers' abilities, measurement information about the test taker can be maximised. Test scores of adaptive tests are based on the level of difficulty of questions the test taker has reached, rather than on the number of correctly answered questions (Foster, 2023<sup>[72]</sup>; Luecht, De Champlain and Nungester, 1998<sup>[73]</sup>).

### Curriculum, learning standards, and learning progressions

**Learning standards** define the knowledge, skills and abilities students should have in a particular content area or at a certain level. They focus on the goals for instruction, that is what students are intended to learn. Learning standards can thus guide teachers' instruction.

On the other hand, the **curriculum** provides the content and teaching strategies to enable student learning. Curriculum resources can include activities, lessons, or textbooks, for example. A curriculum defines how students can acquire the knowledge and skills defined in the learning standards. A well-defined curriculum should provide sufficient opportunities for students to achieve the standards (CSAI, 2018<sup>[60]</sup>; SREB, 2022<sup>[74]</sup>).

**Learning progressions** have been defined as “descriptions of the successively more sophisticated ways students' thinking about an important domain of knowledge or practice develops as children learn about and investigate that domain over an appropriate amount of time” (Corcoran, Mosher and Rogat, 2009<sup>[75]</sup>). Learning progressions are closely linked to instruction and assessments. They provide an overview of what students should learn to achieve their learning goals (which are the end points of a learning progression), thus guiding instruction and assessments. Assessments thereby also serve as a measure to track students' development along the progression and to inform teachers' instruction (Corcoran, Mosher and Rogat, 2009<sup>[75]</sup>; Wilson and Lehrer, 2021<sup>[76]</sup>; Heritage, n.d.<sup>[77]</sup>).

Learning progressions are related to the curriculum and learning standards, but their development requires extensive work. While all countries have a curriculum, very few have well-designed learning progressions to be used to orient assessments.

## Design sprint

The design sprint is a creative process, generally limited to five days, that allows to validate ideas and solve central problems by creating prototypes and testing ideas with users. It aims to reduce risks when designing and building new services or innovative products, by exploring as many ideas as possible and testing them on real users on the last day of the sprint (GV, 2019<sup>[78]</sup>).

During a design sprint for a resource bank, key stakeholders validate the functionalities of the resource bank's underlying technological solution and brainstorm how to resolve issues that may arise in its development. The user tests on the last day enable resource bank designers to evaluate the design of the technology solution, adjust the functional requirements and decide which functionalities to develop in priority.

## Functionalities of resource banks

- **Authoring/importing and revision:** One of the essential functions of any resource bank is the initial entry and ongoing editing and maintenance of an item or resource by authorised users.
- **Visualisation:** Enables users to view the assessment task and resources in the technological solution.
- **Storage, organisation, and search:** A key aspect of a resource bank is the storage and organisation of items and complementary resources, so that they can be identified, retrieved, and inventoried (Vale, 2006<sup>[4]</sup>). This functionality is essential to facilitate users' navigation of items and resources stored in the bank.

## Hosting

Data hosting is the act of storing data on a stable and accessible web platform. It is a significant commitment that requires dedicated, long term capacity which maintains a persistent and reliable web-connected platform (GBIF, 2023<sup>[79]</sup>). A robust hosting infrastructure is important to ensure the performance and functionality of the technical solution of an item or resource bank.

## Interoperability standards, such as QTI® (*Question and Test Interoperability*)

Interoperability is “the ability of multiple systems with different hardware and software platforms, data structures, and interfaces to exchange data with minimal loss of content and functionality” (National Information Standards Organization, 2004<sup>[80]</sup>). Interoperability standards can allow for the efficient exchange and sharing of information between different systems (Sansone and Rocca-Serra, 2016<sup>[81]</sup>).

For instance, the Question & Test Interoperability (QTI®) specification from the 1EdTech consortium defines a standard format or data model (expressed in XML) for representing the content and results of assessments in digital form. Thus, it enables to exchange test questions (and other associated content) and the resulting data between different item banks, authoring tools, test construction tools, and/or learning platforms, amongst others (1EdTech Consortium, 2023<sup>[82]</sup>).

## Item banks

An item bank is a collection of assessment tasks that are stored, categorised, tracked, and made available to different stakeholders, chief among them teachers and test designers. A test item refers to the smallest unit of information collected from a student in an assessment task. It is often referred to as a “question”

but can take various other forms, particularly with the spread of computer-based assessment and innovative assessment situations, such as problems to solve or assertions to evaluate or rate (Vale, 2006<sup>[41]</sup>)

## Reliability

As a measure of consistency, the reliability of an assessment is the extent to which results are consistent for a given population (i.e., for test takers having the same ability) across different test situations or at different times. For example, the results should be the same when different scorers score the same tasks, or for different versions of the same test. Multiple choice and selected response items do generally have a higher reliability than open-ended items or constructed responses (CSAI, 2018<sup>[83]</sup>).

## Metadata

Metadata refers to auxiliary information associated with assessment items. Metadata facilitates the selection, understanding and contextualization of the items and supports the administration and scoring process. The metadata often used in the context of an item bank include amongst others:

- Identity of the item: unique identifier, label, etc.
- Pedagogical and didactic aspects: discipline, domain, competence, learning objectives, didactic analysis, etc.
- Type or format of the item/response: open-ended question, multiple choice question, etc.
- Reference documents: curricula, learning standards, assessment frameworks, textbooks, etc.
- Descriptors of the student population for which the item is intended: age or grade level, language of instruction, etc.
- Mode and instructions for administering the item, e.g. time to complete
- Statistical and psychometric characteristics of the item
- Indications concerning scoring/correction
- Item author
- Date of creation and last revision, and/or history of revisions
- Links to other items
- Keywords characterizing the item
- Access/use rights: released item, restricted item, etc.

## Paper-based or computer-based testing

Paper-based tests are completed on paper with a printed version of a test. Computer-based assessments started to be used in the 1970s with the introduction of Personal Computers (PCs). They replaced printed tests and answer sheets by storing test questions in the computer and allowing to type the answers directly on the computer (Weiss, 2011<sup>[11]</sup>). Today, the terms “Digitally-based assessments” and “Technology-based assessments” are increasingly being used, to refer to assessments delivered on various devices (such as tablets or smartphones). Computer-based assessments (CBA) can be used for different purposes, such as summative, formative, or diagnostic tests, and have different functionalities and benefits. Thus, they can allow to use innovative question formats (such as simulations or animations), they can be marked automatically, and provide immediate feedback on student performance. Also, Computerised Adaptive Testing (CAT) can allow tailoring the test to the specific abilities and needs of the test takers (see *Adaptive Testing*). Computer-based assessments require logistical considerations (such as schools’ computer

equipment) and to make sure that students have a similar level of technical proficiency (Nottingham Kent University, n.d.<sup>[84]</sup>; National Foundation for Educational Research in England and Wales, n.d.<sup>[85]</sup>).

## Psychometric methods

The psychometric **calibration** of items enables the estimation of an item's difficulty and other characteristics (such as the degree of discrimination), which in turn enable judgements on the items' (statistical) quality. Psychometric qualities of items are used to guide test developers in the selection of items and construction of a test. For instance, test developers can find in an item bank several items that are equivalent in terms of the content/skill measured and the level of difficulty in order to create different versions of a test.

Numerous psychometric techniques and methods are used in standardised assessments to judge the quality of items and tests, such as the **Classical Theory of Tests** or the **Item Response Theory** (e.g., Rasch-model or two parameter IRT model) (Rocher, 2015<sup>[86]</sup>).

## Technology-enhanced item

Technology-enhanced items fall into two broad categories. The first category includes items that contain media that cannot be presented on paper. These items utilize video, sound, 3D graphics, and animations as part of the stimulus and/or the response options. The second category includes items that require test takers to demonstrate knowledge, skills, and abilities using response interactions that provide methods for producing responses other than selecting from a set of options or entering alphanumeric content. To distinguish the two categories, the term technology-enabled refers to the first category and technology-enhanced labels the second category (Measured Progress/ETS Collaborative, 2012) (Russell, 2016<sup>[13]</sup>).

## Test blueprint

The test blueprint refers to the test specifications and consists of a list of the key components defining the test: its objective, the competencies or learning objectives to be covered, its duration, the weight (in terms of number of items) of each competency assessed, the format of the questions (for example, how many multiple choice questions, how many open-ended questions), etc. (National Board of Medical Examiners, 2019<sup>[87]</sup>). A test blueprint is useful in the case of an item or resource bank to (automatically or manually – depending on its underlying technological solution –) generate ready-to-use tests that are valid and reliable and/or equivalent versions of the same test.

## Ticketing solution

A ticketing system helps to streamline the resolution of customer issues by managing and tracking customer support requests. Customers can submit requests via multiple channels, which are then organised and prioritised by the ticketing system. Ticketing systems can thus help businesses or service providers to offer fast and effective support (Itarian, 2023<sup>[88]</sup>).

## User/Usability testing

In a user test, real users test the interface and functions of an application, product or service, by performing specific tasks under realistic conditions. The goal of this process is to evaluate the usability of the application and decide whether the product is ready to be launched to real users. To obtain relevant results,

testers should not be overly guided, and should be allowed to interact naturally with the application. This can enable judgements on whether the system is intuitive and suitable enough to be used by people who are not yet familiar with its use (Seobility, n.d.<sup>[89]</sup>).

## User Interface (UI) and User Experience (UX) design

User experience (UX) and user interface (UI) design are two terms that are both used in web design. UX design can be described as the “process of creating products or services that provide meaningful experiences for users, involving many different areas of product development including branding, usability, function, and design” (Columbia University, 2023<sup>[90]</sup>). So, UX designers should make sure users have a positive interaction with a product or service, for instance helping users to solve a problem or finding critical information. On the other hand, UI design focuses more on the interfaces with which users interact, which includes to add interactive elements like buttons, images or sliders. UI designers should therefore focus on how the product’s interfaces look and function (Columbia University, 2023<sup>[90]</sup>).

## Validity

The validity of an assessment is the extent to which it “measures what it aims to measure” (Galaczi, 2020<sup>[91]</sup>). For instance, a university entry test should include tasks to assess competencies that are required for a certain study programme. Also, validity can be understood as “the degree to which a certain inference from a test is appropriate and meaningful” (Caffrey, 2009<sup>[92]</sup>). **Consequential validity** refers to the potential (social) consequences the use of test scores can have for stakeholders like students or teachers. For example, the design of a language test can influence how students learn a language or how teachers teach it. To ensure tests are used appropriately, scores should be interpretable so that users clearly understand the meaning of the scores (Cambridge Assessment English, 2021<sup>[93]</sup>).

## Annex B. Overview of resource banks case studies

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
<a href="#">Assessment Resource Banks (ARBs)</a> – New Zealand	The ARBs serve since the 2000s as a collection of curriculum-aligned classroom-based formative assessment resources to support assessment for learning.	Teachers	Support teachers to use assessments formatively in light of broader curriculum and education reforms	Private-sector collaboration (managed by New Zealand Council for Educational Research (NZCER) (independent research and development organisation) under contract by Ministry of Education)	2850 formative assessment resources; various conceptual maps & articles; online interactive student tasks; online interactive and paper-based resources (freely) available	Aligned with the national curriculum and learning progression frameworks; teachers play a central role in the development process, and resource developers are former teachers; validation process includes piloting and trialling resources in the	Enable teachers to share assessment tasks with students and see online responses in real-time; Provide teacher notes and links to the curriculum to inform instruction and support learning	Accessible by NZ educators and educational organisations; registration and account verification required; <a href="#">Privacy policy</a> stated on website

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features	
						classroom, and coding and analysing them using IRT			
<a href="#">Banks of Educational Digital Resources (BRNE) – France</a>	The BRNEs provide teachers with curriculum-aligned educational content and tools to support learning in schools. Their access was significantly facilitated and expanded to all teachers, students, and parents during the COVID-19 pandemic.	Open to all stakeholders	Consolidate existing (digital) education resources to support learning continuity and assessment during the COVID19 pandemic	Private-sector collaboration (developed by publishers and Edtech companies through public tenders)	Online and interactive learning and assessment activities to be used by teachers in their classrooms and/or by students (and their parents) to complement their learning, practice, and revise	Resources aligned with and tagged to French curriculum in all disciplines and grades; Developed by educational publishers and Edtech companies with input from regional academies and other stakeholders	Provide teachers with learning resources and the tools to modify these resources and create their own, as well as services for dissemination and interaction between students and teachers	Authentication requirements removed during COVID pandemic (personal data collection stopped); Personal data protection guaranteed according to General Data Protection Regulation (GDPR)	
<a href="#">e-koolikott – Estonia</a>	Developed in 2016 by the Ministry of	Teachers/Students/ Parents	Support teaching and learning of	Centralised Governance (developed by	Online library of learning and teaching	Material aligned with national curriculum	Enable users (teachers, publishers of	Registration required to upload	



58 | No. 74 – Untapping the potential of resource banks in the classroom

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
	Education and Research, e-koolikott provides free digital learning materials for different actors (teachers, students, parents, ...).		Estonia's curriculum	the Ministry of Education and Research, and currently run by the Innove Foundation, which is integrated in the Ministry of Education, and the Estonian Information Technology Foundation for Education)	materials including games, tests, guides, exercises, textbooks, or lesson plans; Material included covers kindergartens, general education and vocational education	(classified according to the taxonomy used in curricula); reviewed by subject experts or experienced teachers contracted by the Ministry of Education	educational materials, ... to create and share learning resources	resources; accounts are personalised i.e. linked to a personal code; no need for registration to search and use resources
<a href="#">Assessment for Teaching and Learning Tool (E-asTTle) – New Zealand</a>	Initially developed starting in 2002, e-asTTle is a free online assessment tool made available to teachers and schools, allowing teachers to create and use curriculum-	Teachers	Improve quality of classroom-based assessments by providing ready-to-use standardised assessments	Private-sector collaboration (developed by <i>Auckland UniServices Limited</i> for the Ministry of Education.; research and development team independent	Automatically generated standardised computer or paper-based tests to measure student achievement in different subjects including reading, writing, and mathematics;	Test aligned with curriculum and learning statements, Psychometric validation	Provides teachers with a tool to devise customised and/or adaptive tests for use at any time of the year; Enables digital and paper-based test delivery for students; Generates a variety of reports	Requires an Education Sector Logon that is managed by schools; defines different user roles for teachers, school administrators, external coordinators, school leaders etc. (for instance,

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
	aligned tests in their classrooms.			from Ministry of Education)	and student-level reports		and analyses available to teachers and students online; Includes option for adaptive testing for reading and math	teachers and external coordinators can create, edit, or mark tests, school administrators can delete tests)
<b>NWEA State Assessment and Learning Solutions – United States</b>	NWEA is a non-profit, non-governmental research organisation that collaborates with US states and countries to co-develop assessment and learning solutions	Defined with the state; typically, Educators/School Leaders/Assessment Directors	Improve quality of classroom-based assessments	Private-sector collaboration (Developed, managed, and owned by NWEA. licensed to states/countries for defined time period; conditions defined in a <a href="#">Master Subscription Agreement</a> )	Online computer-based assessment systems aligned with national/state-level standards, instructional and curriculum resources, student-level reports for various audiences, professional development content	Item development by content experts, assessment specialists, and by engaging local educators in item writing and validation (alignment studies, bias and sensitivity review, review/definition, and standard setting);	Provide online computer-based adaptive assessments to be used by teachers in classrooms; timely results and student-level reports; links to instructional and curriculum content; content for teacher professional development	Privacy and security measures defined by the NWEA privacy <a href="#">policy</a> , in compliance with national and international regulations including Federal Educational Records Privacy Act (FERPA) and GDPR

60 | No. 74 – Untapping the potential of resource banks in the classroom

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
						psychometric validation		
<a href="#">Platform for Innovative Learning Assessment (PILA) – OECD</a>	PILA is a pilot project by the OECD. Since 2020, the innovative and free resource bank provides content to teach and assess complex skills.	Teachers	Improve the quality of formative classroom-based assessments focused on the measurement of complex skills;	Centralised Governance (managed by OECD)	Applications and customisable tasks to assess complex skills (computational problem-solving, self-regulated learning, systems thinking);	Formative assessments based on competency frameworks; developed by the PILA team in collaboration with experts; teacher feedback and testing in classrooms supports development process	Enables teachers to customise and create tasks, assign resources to students, and monitor how they respond in real-time; provides students with live feedback; generates summary dashboards that describe student reasoning	Several privacy and knowledge sharing principles are applied, such as storing all sensitive student data in an encrypted format or not selling data or research findings; student responses are pseudonymised, i.e. can no longer be attributed to the person without additional information; more information provided in the

No. 74 – Untapping the potential of resource banks in the classroom | 61

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
								<a href="#">Data Protection Notices</a>
<b>Scoilnet Ireland</b>	– Launched in 1998, Scoilnet is the Irish Department of Education’s official portal. It includes a database of more than 24,000 online education resources.	Teachers	Support teaching and assessments by providing teaching resources, and foster collaboration among teachers	Centralised Governance (managed by <i>PDST</i> in Education on behalf of the Irish <i>Department of Education</i> ; Design, development, and content management of Scoilnet delivered in partnership with digital solutions provider <i>Fluid Rock</i> )	More than 24,000 online open education resources, including lesson plans, notes, videos, quizzes, games, and different types of assessment tasks	Predominantly developed by teachers but also by the Support Services such as PDST (Professional Development Service for Teachers), COGG (Irish Language), NCCA (Curriculum) websites, NCSE (Special Education), or sometimes by selected third party organisations that PDST considers as	Enables teachers to upload and share their own teaching resources and use resources developed by peers or Support services in their classroom practice	Registration required to upload resources (Irish Teaching Council Account); <a href="#">Privacy Policy</a> stated on website;

62 | No. 74 – Untapping the potential of resource banks in the classroom

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features	
						<p>experts in a particular area</p> <p>Tagged to the Irish Curriculum</p> <p>No formal validation or approval system for teacher-developed resources, only occasional inspections by contracted teachers or the Scoilnet in-house team, and a 'report a resource' button to flag resources that do not meet expectations</p>			
<b>Scoutle Australia</b>	Scoutle is a national repository of digital resources that provides Australian	Schools/Teachers	Support teachers to use assessments formatively in light of broader curriculum and	Centralised Management (managed by ESA Australia, which is owned by all of Australia's	Digital teaching and learning resources and teacher support material like interactive multimedia	Aligned with the Australian curriculum and achievement standards: development includes	Enable teachers to browse (interactive) assessment resources, student activities and teacher	Access provided to Australian educators with their education email address; <a href="#">Privacy policies</a> mention that the	

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
	schools and teachers with curriculum-aligned and free learning material. It is managed by the not-for-profit ministerial company Education Service Australia (ESA).		education reforms	Ministers of Education and supports the delivery of national education technology initiatives)	resources, open-ended tools for teachers and students to create learning resources, interactive assessment resources, or teacher ideas and units of work	consultations with subject matter experts and validation by educational experts; resources reported to be quality-assured	support material by the Australian Curriculum; Enable teachers to create personalised “learning paths” that organise curriculum resources into learning sequences targeted to individual students (who can access them without log in)	ESA protects privacy of personal data under the Australian Privacy Act 1988
<a href="#">Tools for Teachers by the Smarter Balanced Consortium – United States</a>	The resource bank Tools for Teachers is part of the tools provided by the Smarter Balanced Assessment Consortium, which was	Teachers	Support student learning by providing classroom instructional support and professional learning and help teachers save time with	Smarter Balanced has a decentralised Governance (consensus-based governance structure; led by members (US states);	<i>Tools for Teachers</i> includes educator-created lessons, activities, formative assessment and differentiation strategies for	Tools for Teachers resources created, reviewed, and approved by educators to ensure they reflect the reality	Teacher-created and reviewed instructional tool and professional development material can be searched on the website with filter function and tips on how to use	N/A

64 | No. 74 – Untapping the potential of resource banks in the classroom

Resource Bank	Description/ Context	Target Group	Main Purpose	Governance	Content	Development & Validation Process	Key functionalities	Security /Privacy Features
	created by several states in the US in 2010. Smarter Balanced collaborates with state education agencies, districts, schools, and educators to develop a high-quality assessment system.		prepared lessons	organisational structure includes governing board, state-appointed K-12 and higher education leads, executive committee, executive director and staff, and standing advisory committees)	different grades and content areas, professional development resources, and links to interim assessment items and sample test questions;	of teaching today;	them; Interim Assessment Item Portal (IAIP) allows educators to access and print single test questions of the Smarter Balanced interim assessments, including tips on how to use them for class activities	

Sources: PDST Technology in Education (2023<sup>[94]</sup>), *Privacy Policy*, <https://www.scoilnet.ie/site-info/privacy-policy/>, accessed on 10 July 2023 ; Education Services Australia (2023<sup>[95]</sup>), *Privacy Policy – Scootle*, [https://www.scootle.edu.au/ec/p/privacy\\_policy](https://www.scootle.edu.au/ec/p/privacy_policy), accessed on 10 July 2023 ; Education Services Australia (2023<sup>[96]</sup>), *Scootle*, <https://www.scootle.edu.au/ec/p/home>, accessed on 10 July 2023 ; Education Services Australia (2023<sup>[97]</sup>), *About*, <https://www.scootle.edu.au/ec/p/about>, accessed on 10 July 2023 ; New Zealand Ministry of Education (2023<sup>[98]</sup>), *Privacy Statement*, <https://arbs.nzcer.org.nz/privacy-statement>, accessed on 10 July 2023 ; Auckland Uniservices Limited (2009<sup>[99]</sup>), *Generation 2: e-asTTle Year Three. Educator Manual*, <https://www.yumpu.com/en/document/read/30458778/e-asTTle-educator-manualpdf> ; New Zealand Ministry of Education (2023<sup>[100]</sup>), *User Roles in e-asTTle*, <https://e-asTTle.tki.org.nz/Help-with-e-asTTle/Roles/User-Roles-in-e-asTTle#user-roles>, accessed on 10 July 2023 ; OECD (2023<sup>[69]</sup>), *Data Protection Notice*, <https://pilaproject.org/research-hub/data-protection-notice>, accessed on 10 July 2023 ; Van der Kleij, Cumming and Looney (2018<sup>[101]</sup>), *Policy expectations and support for teacher formative assessment in Australian education reform*, <https://doi.org/10.1080/0969594X.2017.1374924> ; Smarter Balanced (2023<sup>[102]</sup>), *Interim Assessment Item Portal*, <https://smartertoolsforteachers.org/landing/items>, accessed on 10 July 2023



---

This Education Policy Perspective has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and any map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and are under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

---

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.