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The 'literacy' idea

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Much of ACER's assessment work aims to measure levels of student literacy in the various knowledge domains of interest, rather than narrowly defined curriculum-based achievement. This document explains ACER's approach.

Knowledge, education and literacy

Good practice in teaching and learning has long been concerned with the application of acquired knowledge. In an influential early essay about this issue, Alfred North Whitehead describes the central problem of education as 'the problem of keeping knowledge alive, of preventing it from becoming inert' (Whitehead, 1929, p.4). According to Whitehead, elements of knowledge risk becoming inert if they are 'merely received into the mind without being utilised, or tested, or thrown into fresh combinations'.

Later, cognitive scientists such as Herbert Simon contrasted the notion of inert knowledge with that of conditionalised knowledge (Simon, 1980). Conditionalised knowledge is transferable – items of conditionalised knowledge are readily thrown into the 'fresh combinations' that different contexts demand.

Concepts and skills that make up conditionalised knowledge are transferable because they have been consolidated and generalised. An education that enables this consolidation and generalisation is an education that empowers students to take their abilities beyond the classroom to other theatres of daily activity, and beyond schooling to work and other areas of adult life.

Such an education is said to have a *literacy orientation*.

Literacy in learning domains

The phrase scientific literacy has been used since the early 1950s, and from the early 1960s it began to appear frequently in papers and discussions about science education. The phrase *mathematical literacy* dates from even earlier. These days we often see references in academic literature and the general media to a wide range of literacies, including financial literacy, environmental literacy, digital literacy, economic literacy, statistical literacy and information literacy.

One reason that education researchers and practitioners describe a learning domain in terms of literacy is to emphasise the fact that the domain has dimensions that extend beyond any traditional, narrow definition. In this way they are aiming to promote appreciation of the domain as a significant focus of human endeavour.

Another, more central reason researchers and practitioners refer to domain literacy is to draw attention to the kinds of things students learn in the domain. In a traditional learning domain the focus might be on the acquisition of discrete facts, skills and procedures that have little obvious connection or utility. In a learning domain with a literacy orientation, the focus is on *applying* the domain's facts, skills and procedures to support creativity and inventiveness, to solve novel problems and to deal with the kinds of challenges that life presents outside the classroom.

In the case of mathematics, for example, a literacy orientation enables students to forge the connections between the facts and procedures that constitute the basis of mathematical knowledge and the real-life situations in which mathematical knowledge can be used. Specifically, through studying mathematics with a literacy orientation students learn to:

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- express mathematical ideas and mount mathematical arguments
- understand the mathematical ideas and arguments of other people
- reason mathematically
- use a variety of different kinds of representations of mathematical phenomena, including graphs, tables, charts, equations
- think strategically, and plan and implement a sequence of mathematical processing steps
- recognise and use, or devise and manipulate mathematical models of real-world phenomena
- reflect on which elements of their mathematical skills and technical knowledge might be relevant to a particular challenge
- identify when particular mathematical tools (such as computer-based tools, or measuring instruments, or calculating devices) might be useful, and make effective use of those tools.

Box 1: Real-world mathematical challenges

Two examples of real-life situations in which mathematical knowledge is used are formulating a personal budget and planning a trip on public transport.

To formulate a personal budget, an individual must model projected income and expenditure. This involves making assumptions about what might transpire over a specified period of time, transforming those assumptions into numerical form, selecting an appropriate tool for recording the information and using that tool effectively.

To plan a trip by public transport, an individual must exercise spatial awareness in determining directions and possible routes for the proposed journey, analyse timetable information (perhaps even linking timetables of different transport modes) with reference to assumptions about desired departure, duration and arrival times, and put all findings together in the form of an action plan.

In both examples, successful negotiation of the situation depends on the individual's ability to connect and operationalise mathematical facts, skills and processes. This connecting and operationalising is mathematical literacy.

In the case of reading and writing, the literacy orientation is perhaps more immediately accepted than it is in domains that are traditionally regarded as highly content driven, such as science and mathematics. Of course, this is partly to do with the fact that the original meaning of the word 'literacy' is the ability to read and write. Nevertheless, our use of the terms 'reading literacy' and 'writing literacy' deserves some elaboration. Like mathematical literacy, reading and writing literacy emphasise the application of sets of skills, knowledge and understanding – applications across many contexts both inside and outside school.

While **reading** literacy necessarily depends on knowledge of the basic components of decoding skill – phonemic awareness and phonics (for alphabetic languages), knowledge of symbols (for non-alphabetic languages), fluency and vocabulary knowledge – these components are not sufficient indicators of reading literacy, which requires also the ability to understand, reflect upon, evaluate and apply what is encountered in written texts. This complex and interwoven set of proficiencies gives access to a range of human knowledge far beyond what can be experienced directly; it allows readers to learn from what they encounter in texts, to combine what they have learnt with prior knowledge, and thus to create new meanings and solve problems. Making meaning from written texts by activating knowledge of language structures and features, and by combining what is already understood with new information in the text – these capabilities are at the heart of reading literacy.

Similarly, the literacy orientation conceives of **writing** as making meaning through expression and communication in language, rather than as the exercise of a mechanistic set of language rules or the display of atomised pieces of knowledge about grammar, vocabulary and other linguistic features. Writing literacy is the use of language to express thoughts, feelings and ideas. Increasing proficiency in writing literacy is indicated by increasing range and depth of expression, and flexibility in communicating with a variety of audiences and for multiple purposes.

Assessing literacy

Assessments of literacy and curriculum-based assessments

Assessments with a literacy orientation are often contrasted with curriculum-based assessments. Yet this contrast sets up an unhelpful, outdated dichotomy. Since it is now widely recognised that curriculum goals should be informed by literacy goals, it follows that curriculum-based assessments should in some ways have a literacy orientation themselves.

Indeed, modern conceptions of effective assessment increasingly focus on a complex set of benefits and outcomes that go far beyond summarising individuals' levels of mastery of knowledge taught in a particular school year. Assessment is most useful when it generates information that describes progress; when it informs future action; when it takes account of current research on learning in the relevant domain; when it accommodates the need for information about broader life skills and attributes, especially those relevant to 21st-century workplaces and life circumstances; and when it takes advantage of advances in technology and engages the kinds of technology in common use among citizens of the 21st century (Masters, 2013).

Literacy in ACER's assessment activities

When developing the Programme for International Assessment (PISA) for the OECD in the late 1990s, ACER introduced and then advocated a literacy orientation for the assessment domains. This action was based on the firm belief that what an assessment of learning outcomes should measure is the extent to which students can demonstrate the capacity to use their knowledge and skills effectively in a range of contexts.

The literacy orientation has subsequently been used successfully in many other ACER projects. One example is the International Schools' Assessment (ISA) project, which assesses students from grades 3 to 10 in international schools worldwide. Developers of the ISA see both traditional domain content knowledge and critical mathematical, writing and reading process skills as central goals of instruction and key targets of assessment.

Literacy in ACER's Monitoring Trends in Educational Growth partnership program

ACER's Monitoring Trends in Educational Growth (MTEG) partnership program has a flexible, collaborative approach to assessment. ACER staff members work with individual participating countries to set the policy direction for the assessment, to determine the target populations and to formulate the test design.

MTEG's three core assessment domains of mathematics, reading and writing all have a literacy orientation. ACER believes that a literacy orientation to assessment is important for all countries, but particularly important for countries with rapidly developing education systems.

In a rapidly developing education system, advances in teaching and learning practices can lead to significant improvements in student performance in a relatively short period of time. Assessments should yield data that give a full picture of the extent and nature of this improvement. An assessment with a literacy orientation is better able to do this than an assessment that merely measures the mastery of facts and processes.

The seminal report of the Committee on the Prevention of Reading Difficulties in Young Children (Snow et al, 1998) points to the complexity that lies behind a well-developed ability to find meaning in text. It presents a clear case for the need to base reading and writing instruction on a broad and inclusive literacy notion that includes specific skills and techniques as well as a range of processes essential to developing a full understanding of text written for a variety of purposes, and forging the required links to relevant contextual elements. This complexity is missed in assessments limited to basic skills of reading and writing such as phonological knowledge, alphabet knowledge, grammar, punctuation and the location of directly stated information in short, simple texts. While appearing attractive because they can be relatively cheap and easy to administer, such basic assessments can create a cycle of misunderstanding about what being a literate reader and writer means that reinforces inadequate teaching methodologies and poor student outcomes. Assessments with such a limited focus can give inflated measures of students' 'reading' ability, because they do not address the

complex skills that underpin finding substantive meaning in texts. This can lead to a consequent lack of intervention at the very point at which it is most critical. Misjudging students' reading skills also leads to erroneous assumptions by teachers in later years about why some students fail to progress. Teachers and systems assume that the assessments used in the early years have correctly identified that most students can read, and the issues in later years concern students' ability to understand the subjects they have been taught. Teachers may seriously overestimate students' ability to read and understand the prescribed workbooks and other texts. Students' ability to progress is seriously hampered if a limited ability to read remains undiagnosed. Rigorous assessments of reading in the early years of school model the complexity of the skills required and identify what students need to learn so that they have the requisite skills to progress in the later years of schooling.

Assessments of literacy and developmental scales

In an assessment that measures the mastery of facts and processes, if students manage to complete a discrete task successfully, the results do little more than reveal their successful completion, and perhaps highlight which other discrete tasks they should be able to complete successfully. If students do not complete a task successfully, the results merely reveal that their attempts were unsuccessful, and perhaps highlight which other discrete tasks they may not be able to complete successfully. The results are atomised and lacking in nuance, and they do not tell us how well the education system is preparing students for the demands of life.

In an ACER assessment with a literacy orientation, the results locate students on empirically derived developmental scales. The scales are continuous and cover a range of proficiency levels. Each proficiency level is described in real-life terms. Given their continuous and wide-ranging nature, and their literacy – or real-life – orientation, these scales can be powerful tools for tracking student progress towards the attainment of a set of skills that enable them to participate fully in life beyond the classroom. In addition, since the proficiency levels in the scales are not tied to curriculum goals, they can be applied across different settings – different students, different classes, different schools, different grades, even different countries.

ACER's approach

ACER draws upon and constantly updates its research on what is known about teaching and learning in the various knowledge domains in which its projects are located. It takes into account current contextual information such as the curriculum and assessment arrangements that apply in a particular jurisdiction or learning environment, and while understanding the need to work within existing contexts, seeks means of advancing practice to take account of relevant research.

ACER bases its work wherever possible on a developmental approach, which seeks to generate and promulgate information that can be used by systems, schools or individuals to make and map progress in relation to relevant learning objectives.

ACER seeks to take into account broad learning objectives in teaching and learning, and in assessment processes. It conceives of learning domains as comprising an intricate web of knowledge, skills and understanding that will be relevant to and can be applied in the work and life of individuals in the 21st century. These approaches taken by ACER can be summarised as the literacy orientation.

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The ACER Centre for Global Education Monitoring supports the monitoring of educational outcomes worldwide, holding the view that the systematic and strategic collection of data on educational outcomes, and factors related to those outcomes, can inform policy aimed at improving educational progress for all learners.