

Assessment of Children as Confident and Involved Learners in Early Childhood Education and Care: Literature Review

**Victorian Early Years Learning
and Development Framework**

Dr Dan Cloney, Dr Jen Jackson and
Pru Mitchell

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The Victorian Early Years Learning and Development Framework (VEYLDF) aims to guide all early childhood professionals in their work with children and families. It sets out eight Practice Principles that provide a foundation for achieving the five nationally agreed Early Years Learning Outcomes (Early Years Learning Framework for Australia, Australian Government Department of Education and Training 2009).

The VEYLDF describes five Learning and Development Outcomes for children from birth to eight years, connecting the Learning Outcomes from the Early Years Learning Framework to the first three levels of the Victorian Curriculum Foundation–10 (Victorian Curriculum and Assessment Authority 2017). This reflects the evidence that children’s brains continue to develop rapidly throughout the first eight years of life, and that children benefit from continuity in their learning experiences during this time. The five Outcomes help early childhood professionals to plan for and assess children’s learning and development, and provide a common language to support collaborative approaches between early childhood professionals and families. The five Learning and Development Outcomes are:

1. Children have a strong sense of identity.
2. Children are connected with and contribute to their worlds.
3. Children have a strong sense of wellbeing.
4. Children are confident and involved learners.
5. Children are effective communicators.

This literature review is part of a series of reviews designed to assist Victorian early childhood professionals to implement the VEYLDF.

The primary focus of this review is on supporting early childhood professionals to monitor children’s progress in relation to the fourth Outcome: *Children are confident and involved learners*. As the Outcomes are closely related, it may also assist in monitoring progress towards other Outcomes. For example, children’s confidence in learning is closely associated with their sense of wellbeing and identity, while the development of problem-solving skills (a key component of learning) may expand children’s ability to connect with and contribute to their worlds. Early childhood professionals are therefore encouraged to read this review with children’s holistic development in mind.

The VEYLDF also includes eight Practice Principles to guide evidence-based practice:

1. Reflective practice
2. Partnerships with families
3. High expectations for every child
4. Respectful relationships and responsive engagement
5. Equity and diversity
6. Assessment for learning and development
7. Integrated teaching and learning approaches
8. Partnerships with professionals.

This review focuses primarily on the sixth Practice Principle, *Assessment for learning and development*. Its relevance extends across the other principles too, reflecting the integrated nature of early childhood practice. For example, the effective assessment of children's learning and development can provide a strong evidence base for early childhood professionals' critical reflection; conversations with families or other professionals about children's progress; and efforts to improve equity and responsiveness to diversity. Early childhood professionals are therefore encouraged to explore the relevance of this review for all areas of practice.

The content of this review will be used to inform a *Learning Practice Guide*, which will provide practical support for early childhood professionals to use the findings of this review in their practice. The primary goal of this review is to introduce the key concepts and tools that will underpin the *Learning Practice Guide*, thereby establishing a strong base of common knowledge and understanding among early childhood professionals.

Executive summary

This literature review is one of a series of reviews to support Victorian early childhood professionals to assess children's learning and development in relation to the five Learning and Development Outcomes in the Victorian Early Years Learning and Development Framework (VEYLDF). This review focuses on the Outcome: *Children are confident and involved learners*. Its purpose is to provide a comprehensive resource that will equip early childhood professionals with the knowledge to identify and assess children's progress towards this Outcome, in all early childhood settings.

Early identification of learning capabilities and challenges is essential to support children's long-term social and educational outcomes.

Section 1 defines confident and involved learners. This section defines the three components of Outcome 4 of the VEYLDF: *Children are confident and involved learners*.

- Learning refers to the acquisition of knowledge and skills that are not only learnt in their own right, but also lay the foundations for future learning. This review focuses on four components of learning that are first acquired in early childhood, and continue to grow throughout the life course:
 - executive function
 - problem-solving
 - social skills
 - motor skills.
- Confidence in learning refers to children's belief in their ability to learn, including their academic self-efficacy, and belief that success in learning is associated with effort.
- Involvement in learning refers to children's engagement in the learning process. While this is closely related to confidence in learning, it is a distinct concept in theory and research.

Section 2 explains the principles for assessing children as confident and involved learners. In assessing children as confident and involved learners, educators face questions about how to select appropriate measures across phases of development, how to administer assessments, how to interpret the results, and how to translate their findings into planning and communication to parents. The following six principles for assessing learning have been identified in this review, and these can inform early childhood professional practice:

- Assessment addresses established components of children's learning.
- Assessment enables early childhood professionals to describe a continuum of learning.
- Assessment is valid, reliable and fair.
- Assessment is conducted in a way that enhances engagement and relationships.
- Assessment includes children's self-assessment.
- Assessment involves the child's community and informs professional partnerships.

Section 3 identifies a range of tools available to support early childhood professionals in their assessment of children's learning. The tools selected address each of the key components of the Learning Outcome across the full range of learning skills that children develop from birth to eight years:

- Ages & Stages Questionnaires, Third Edition (ASQ-3)
- Children's Independent Learning Development 3–5 (CHILD 3–5)
- Dimensional Change Card Sort (DCCS) Border Version
- Early Abilities Based Learning and Education Support (Early ABLES)
- Individualized Classroom Assessment Scoring System (inCLASS)
- Leuven Involvement Scale for Young Children (LIS-YC)
- Measuring Early Learning Quality and Outcomes (MELQO) Measure of Development and Early Learning (MODEL)
- Preschool Learning Behaviors Scale (PLBS)
- Social Skills Improvement System (SSIS)
- Who Am I? (WAI).

These tools are summarised in a table.

In Section 4 the 10 tools identified are each described in more detail, with an overview, instrument description and discussion.

Some of the tools on this list are likely to be familiar to Victorian early childhood professionals, such as Early ABLES, which is used to guide programs for children with a disability or developmental delay. Yet many of these will be unfamiliar to Victorian early childhood professionals and few are commonly used in early childhood education and care (ECEC) services. This highlights a paradox in assessments of young children's learning: although many tools have been developed and most have undergone some form of validation, few are available and applicable for use by early childhood professionals in their day-to-day practice.

One reason is that most tools for assessing young children's learning have been developed for use in research or clinical settings (such as clinical psychology). The tools on the list above were selected because they were the most readily available for early childhood professionals to access. Many other tools discovered in this review were restricted in access; for example, requiring the user to be a registered clinician.

Another reason is that most assessments of early learning do not describe children's progress in a way that can help practitioners to develop their programs. Many of the tools relevant to Outcome 4 are checklist-style measures, which measure what a child can or cannot do at a given point in time. While this may provide valuable diagnostic information, it is less useful for early childhood professionals who are seeking to build children's knowledge and skills, step-by-step over time. Measures that describe a learning progression are more useful for this purpose, but few such measures exist in the early years.

The tools listed above are still valuable for Victorian early childhood professionals in understanding the dimensions of Outcome 4: *Children are confident and involved learners*, and how these dimensions may be measured. They equip early childhood professionals with rich language and concepts to use in their observational assessments of children's learning, and suggest the kinds of tasks or experiences through which milestones in children's learning might be demonstrated. At the same time, there remains scope to develop tools that are more fit for purpose and can:

- be used by educators
- capture a progression of learning
- describe the knowledge and skills acquired along the progression
- measure growth within individual children.

This will require further collaborative effort between early childhood professionals, researchers and government.

This report also includes a glossary to support understanding of any unfamiliar terms, and a list of references to help early childhood professionals identify further reading to build their knowledge in greater depth.

Introduction

The Victorian Early Years Learning and Development Framework (VEYLDF) recognises that in their work all early childhood professionals can support children's learning. Some early childhood professionals contribute to children's learning, whether they are in the early years of school, kindergarten, long day care, family day care or other early childhood education and care (ECEC) services. Other early childhood professionals also enhance children's learning, through supported play groups, maternal and child health services, early childhood intervention, and allied health services. Young children have brains that are built for learning, so every interaction with the adults in their lives can make a difference.

If children are learning all the time, then understanding and describing this learning can seem like an overwhelming task. Especially in the earliest years, children's learning is deeply integrated with other aspects of their development. Think of an infant reaching out to grasp a toy for the first time, or a toddler experimenting with saying a new word. In these moments, cognitive, physical, social and emotional development come together in complex ways.

Early childhood professionals need to make sense of what is occurring in these moments in order to understand how they can help children take the next steps in their learning. By describing clearly and precisely the learning that is occurring in each moment, early childhood professionals can identify what is most important for children's development and for planning their programs. These precise insights help add structure and purpose to the exciting, unpredictable experiences that occur within a play-based learning program. They are not intended to replace or restrict learning through play, but to provide a frame to ensure that early childhood professionals are pursuing meaningful goals within the play-based program, through their intentional teaching.

Assessment is the practice of monitoring children's learning through systematic observation. Most early childhood professionals use many types of assessment to monitor children's learning in formal and informal ways, including learning stories, diagnostic tests and spontaneous observations of changes in what children know and can do. Systematic observation of children is more purposeful: it begins with a clear understanding of what is being observed (the construct), and often uses a tried-and-tested tool or process that reliably captures information about that construct. Ideally, it enables early childhood professionals to see where children are on a continuum of learning, and is able to describe their progress over time.

This review aims to support the systematic observation of children's learning in early childhood services by identifying tools that can help early childhood professionals recognise and describe the learning that is occurring. It focuses on Outcome 4 of the VEYLDF: *Children are confident and involved learners*. The review draws on contemporary learning science to identify the key components of this Outcome. It also proposes some guiding principles for the assessment of children's learning, to guide early childhood professionals in selecting and applying the various assessment tools that are available for their use.

Assessment of young children's learning is a contested issue in some areas of ECEC practice. Concerns have emerged about teaching and assessment methods from school education 'pushing down' into ECEC services and compromising early childhood professionals' ability to prioritise play-based learning and caring interactions (Le et al. 2019; Pilcher & Fox 2017). The use of assessment tools that focus on particular aspects of learning may also be seen as contrary to the holistic Learning and Development Outcomes that early childhood professionals strive to support.

These concerns are important considerations in determining how any assessment tools are incorporated into ECEC services. Early childhood professionals must develop assessment approaches that align with their pedagogy and philosophy. There nevertheless remains a place for rigorous assessment of learning, where it is used to enhance early childhood programs. Assessment of learning in early childhood does not have to resemble assessment in the later years of schooling, and a rich body of research exists that is focused specifically on assessing the constructs of learning that are unique to the early years.

The purpose of this review is to introduce this evidence base to early childhood professionals, and enable them to make informed choices about how they explore the impact of their programs on children's learning. By using these tools in innovative, child-centred ways, early childhood professionals may not only enhance their own programs, but also contribute to the growth of new practices in early childhood pedagogy and assessment.

Section 1: How are children defined as confident and involved learners?

The Victorian Early Years Learning and Development Framework (VEYLDF) is a valuable tool for situating learning at the heart of all early childhood programs, alongside the other outcomes that contribute to children’s holistic learning and development. However, because of its breadth, the VEYLDF leaves many questions unanswered in defining exactly what children’s learning involves. The VEYLDF associates many different terms with the concept of learning, including problem-solving, hypothesising, experimenting, researching, investigating and metacognition (VEYLDF, p. 21). While this helps to demonstrate the broad scope of learning – and importantly, helps to extend the concept beyond a narrow focus on literacy and numeracy – it can make it difficult for early childhood professionals to understand, in practical terms, what confident and involved learning looks like and how to support it.

In the learning sciences, concepts of learning are typically defined more precisely. Rigorous research exists around many specific aspects of children’s learning, using consistent constructs, terms and definitions that are recognised by researchers around the world. While research terms may sometimes seem far removed from the day-to-day lives of early childhood professionals working with children, it is useful to consider how this precise language can improve the clarity of everyday definitions of learning. Applying these precise terms to day-to-day practice is like putting everyday experiences under a microscope to understand the science of the learning that occurs and reveal what may be otherwise hidden.

This section aims to build a bridge between the precise definitions of children’s learning from the learning sciences and the ways in which everyday learning is described in the VEYLDF. It shows that the terms used to describe learning in the VEYLDF originate from the learning sciences, and that understanding these origins can help early childhood professionals to implement the VEYLDF more intentionally. It can also help busy early childhood professionals focus their attention on key aspects of children’s learning, at every age and stage.

The section is divided into three parts, reflecting the three components of Outcome 4 of the VEYLDF:

- **Learning** refers to the acquisition of knowledge and skills that are not only learnt in their own right, but also lay the foundations for future learning. In this review, we have focused on aspects of learning that are first acquired in early childhood, and continue to grow throughout the life course.
- **Confidence as a learner** refers to children’s belief in their ability to learn, including their academic self-efficacy, and belief that success in learning is associated with effort (known as locus of control). Higher levels of academic self-efficacy are associated with success in learning throughout a child’s education (Lamb et al. 2015). Conversely, low levels of confidence may inhibit children’s progress in learning, if children do not believe that they can succeed.
- **Involvement in learning** refers to children’s involvement, or engagement, in the learning process. While this is closely related to confidence in learning, it is a distinct concept in theory and research.

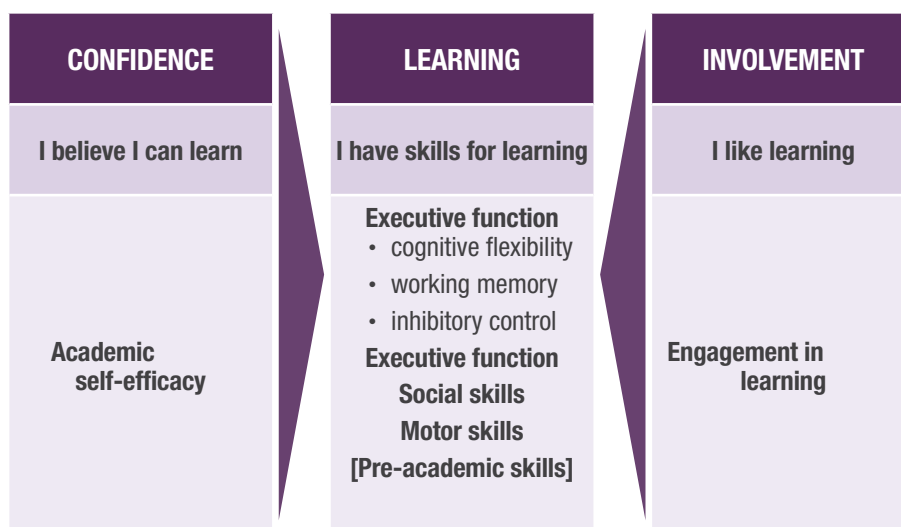


Figure 1: Three focus areas of confident and involved learning

This review looks closely at assessment tools in each of these areas, which together cover all the key components of VEYLDF Outcome 4. This does not mean that the constructs presented below are the only ways in which children's confidence and involvement in learning may be described, and many other definitions may be found within the literature. They nevertheless cover what is most important to learning in the early years, and translate the key elements of Outcome 4 into constructs that can be measured reliably. The definitions presented here will hopefully also spark interest among early childhood professionals to read more about the learning sciences, and compare what they find to their own philosophies and beliefs about what learning involves. Figure 1 illustrates the relationships between the three focus areas of this review.

Early childhood professionals may notice that the components of Outcome 4: *Children are confident and involved learners* shown in Figure 1 overlap with components of other Learning and Development Outcomes. For example, involvement in learning ('I like learning') is clearly related to Outcome 3: *Children have a strong sense of wellbeing*, while social skills (one of the skills for learning shown in this diagram) are related to Outcome 5: *Children are effective communicators*. This reflects the integrated nature of the Learning and Development Outcomes, and the need to think about children's learning and development holistically and not compartmentalised into disconnected parts. Research affirms that all dimensions of children's learning and development should be considered as a totality, 'with no single dimension acting as a proxy for the complex interconnectedness of early development and learning' (Kagan, Moore & Bredekamp 1995, p. 5).

Learning

As shown in Figure 1, 'learning' is the central construct in the Learning and Development Outcome that is the focus of this review. Learning is a broad and complex concept, and any attempt to define it is therefore likely to result in oversimplification. It is beyond the scope of the review to cover the science of learning and cognitive development in significant depth. It is nevertheless possible to identify two broad approaches to the definition of learning in research literature on early childhood assessment:

- Assessments focused on **domain-general skills** define learning as a general set of skills, not associated with any particular academic domain (such as literacy or numeracy). This approach is evident in the VEYLDF itself, which does not divide children's learning into specific subject areas or domains, in contrast to the *Victorian F–10 Curriculum* (VCAA, 2017). Another example is the UK government's What Works Centre for Education, which includes non-academic and essential skills in its SPECTRUM database of assessment tools for measuring child and adolescent outcomes (Education Endowment Fund 2019a). There is therefore a strong body of evidence to support the assessment of domain-general skills as an important part of the assessment of children's learning.

- Assessments focused on **pre-academic skills**, often known as pre-literacy or pre-numeracy, address the first skills and abilities that children develop within specific academic domains. In Victoria, children experience pre-academic assessments in the early years of school, including the mandatory English Online and Mathematics Online interviews (which assess the domains of literacy and numeracy), and the language and cognitive skills (school-based) domain of the Australian Early Development Census (AEDC). The AEDC description of children who are developmentally on track provides a clear example of how pre-academic skills may be described: 'interested in books, reading and writing, and basic math; capable of reading and writing simple sentences and complex words. Will be able to count and recognise numbers and shapes' (AEDC 2019, p. 3). This description relates to specific knowledge and skills in reading and maths, rather than general skills for learning.

While acknowledging that both approaches have a role to play in monitoring children's learning, this review focuses on the assessment of **domain-general skills**, rather than pre-literacy or pre-numeracy. There are several reasons for choosing to define the assessment of learning in this way:

- Early childhood is a critical time in which domain-general skills are acquired, providing the foundation for future learning. Once children acquire domain-general skills for learning, they are well prepared to acquire knowledge in specific academic domains. Similarly, they are less likely to succeed in acquiring academic skills if domain-general skills are not yet established.
- Academic skills are already the focus of most learning assessments that children experience as they progress through school. Assessment tools such as the English Online Interview, Mathematics Online Interview and the AEDC are already well established in the Victorian education system, and well known to many professionals.
- The renewed emphasis on learning in early childhood settings sometimes leads to pre-academic skills being prioritised over the rich domain-general skills that are developed through exploration and play (Gray 2015). The exclusion of pre-academic skills from this review encourages a broader and deeper view of learning, looking beyond traditional pre-academic tasks (such as naming numbers and shapes) to the domain-general skills for learning that children can develop in high-quality play-based early childhood programs.

Four domain-general skills have been identified for this review of key components of children's learning: **executive function, problem-solving, social skills and motor skills**. Each of these components is introduced below, drawing on research about learning. These introductions also situate each component within the VEYLDF, using language that may be more familiar to early childhood professionals. This helps to reveal the connection between the VEYLDF and the research on which it is based.

1. Executive function

What is executive function?

Executive function relates to the skills involved in setting goals, planning how to achieve them, and persisting until they are achieved. It is known by several names, including cognitive control, executive attention, executive control, executive functioning and fluid abilities (Diamond 2016; Hughes 2011). Executive function first appeared in the education research literature in the early 1990s, and has undergone significant refinement as a construct in the past two decades. In the VEYLDF, examples can be seen when children ‘negotiate and set achievable goals’, ‘make plans’ and ‘carry out systematic courses of action and evaluate results’ (p. 21). Periods of ‘uninterrupted play’ allow children time to plan, execute, monitor and reflect, and enhance their attention and focus.

Executive function itself has multiple components. Some researchers suggest that it has four interrelated domains: attentional control, cognitive flexibility, goal setting and information-processing (Anderson 2002). Others include processes such as sustained attention and planning (Hair et al. 2015). More recent research defines executive function as having three component skills:

[Executive function is] *a specific set of attention-regulation skills involved in conscious goal-directed problem-solving. These skills include cognitive flexibility, working memory, and inhibitory control* (Zelazo, Blair & Willoughby 2016, p. 2).

The following three skills make up the scope of executive function used in this review:

- **Cognitive flexibility** (or mental flexibility) involves thinking about something in multiple ways – for example, considering someone else’s perspective on a situation or solving a problem in various ways.
- **Working memory** involves both keeping information in mind and, usually, manipulating it in some way. For example, when playing a game or listening to a story, a child might remember several pieces of distinct information or ideas, and integrate them into a coherent whole.
- **Inhibitory control** (or self-control) is the process of deliberately suppressing attention (and subsequent responding) to something, such as ignoring a distraction, stopping an impulsive utterance, or overcoming a highly learnt response (Zelazo et al. 2016, pp. 2–3). The construct of self-control can be used to encompass a broad range of attributes, such as impulsivity, conscientiousness, self-regulation, delay of gratification, inattention, hyperactivity and willpower (Moffitt et al. 2011, p. 2693).

Why is executive function important?

Put together, these three skills are fundamental to children’s learning. By understanding a problem or situation in multiple ways, children can learn how to evaluate alternatives and extend their understanding. Children also need strategies for remembering information and regulating their thought processes, knowing how and when to focus attention and ignore irrelevant information. To self-regulate their behaviour, children need to remember their goals, suppress impulses and not respond to distractions. Higher executive function has a strong association with higher academic achievement (Best, Miller & Naglieri 2011).

Tools for assessing executive function in the early years

In the research literature, the dominant method for assessing executive function involves performance-based tasks, where the child is asked to complete a task specifically designed to measure this construct. This method continues to be the most highly regarded among expert researchers (Zelazo et al. 2016, p. 29). Each of the components of executive function also has its own detailed evidence base and array of highly specialised measurement tools. For example, several assessments designed for use by psychologists include measures of components of executive function. These include the Wechsler Intelligence Scale for Children (WISC-V) (Wechsler 2014) and the Stanford-Binet Intelligence Scale (SB5) (Roid 2003).

The research also points to challenges in measuring executive function (Morrison & Grammer 2016). One of these is the reliance on language to teach the child the task they are being asked to perform. For preverbal children there are no fine-grained, individual measures of executive function established, and researchers are working on a video-based stimulus in an attempt to measure multisensory attention skills (Bahrack, Todd & Soska 2018). Other challenges include measurement impurity, where many factors may contribute to a child’s performance on an executive function task; and validity of an assessment in different contexts (Zelazo et al. 2016).

Two tools for assessing executive function were selected for this review:

- The **Dimensional Change Card Sort (DCCS)** (Zelazo 2006) is a test that requires children to match a series of cards containing test pictures with two attributes (such as yellow balls and blue trucks) to target pictures. The child must first match the pictures according to one dimension (colour) and subsequently to a second dimension (shape). The ability to successfully switch the sorting rules is an indicator of cognitive flexibility. Most three-year-olds continue to follow the original rule during the post-switch phase. By five years of age, most children can switch rules when instructed to do so.

- The **Measuring Early Learning Quality and Outcomes (MELQO) Measure of Development and Early Learning (MODEL)** (UNESCO et al. 2017) contains items that measure working memory and inhibitory control, short-term auditory memory, sequencing and simple verbal expression, and short-term verbal memory.

How can early childhood professionals use assessment of executive function?

This brief review of the literature shows that executive function is an important construct for children's learning, but also highly complex. Early childhood professionals are not expected to adopt the same practices in assessing executive function as have been applied in scientific research settings. There are nevertheless some useful lessons early childhood professionals might take from this review to inform their practice:

- The definition of executive function identifies some important skills that help to prepare children for later learning. Recognising these skills can help early childhood professionals to intentionally support children to develop them, rather than attributing difficulties in learning to personality or other factors.
- The tools used to assess executive function can help early childhood professionals recognise children's development in these areas. Whether or not early childhood professionals choose to use the tools themselves, they may help educators know what to look for in observing children's learning through play. For example, how well can a child switch between one 'rule' in a game and another? Can they remember sequences of numbers or words, and present them in a different order? Can they ignore distractions?

2. Problem-solving

What is problem-solving?

Problem-solving (also called fluid reasoning) is the ability to apply knowledge across contexts, the awareness of cause and effect, and the ability to use prior knowledge to build new knowledge. It includes the ability to experiment using different strategies, and to interpret and generalise. In the VEYLDF, problem-solving is evident when children 'invent, investigate and discover', when they are 'hypothesising, experimenting, researching and investigating', and when they 'brainstorm', 'reflect' or 'reason' (VEYLDF, p. 21). Providing children with 'clear and predictable' sequences and procedures, as well as opportunities for challenge and change, can help them apply their existing knowledge to new situations.

Like executive function, problem-solving contains multiple components. It includes skills known as induction (relating cause and effect), sequential reasoning (following steps to reach a solution) and quantitative reasoning (reasoning using mathematical ideas). Although problem-solving is a domain-general skill, it may be enhanced by knowledge

about a specific domain, as children may solve problems more readily when the area they are exploring is familiar to them (Gopnik et al. 2001).

Why is problem-solving important?

There are clear links between domain-general problem-solving skills and subsequent learning in specific academic domains. Problem-solving is closely connected with early years mathematics frameworks in areas such as representational thought, mathematical reasoning, and fluency in conceptual understanding (Stokes et al. 2018, p. 30). Problem-solving is also related to science, particularly scientific inquiry and reasoning. Problem-solving promotes children's sense of autonomy and agency, so has benefits for young children and their families in the here-and-now, as well as for longer-term learning.

Tools for assessing problem-solving in early years

Problem-solving is considered a difficult domain to assess in the early years, and there are limited assessments. This review identified the Ages & Stages Questionnaires, Third Edition (ASQ-3) (Squires et al. 2009), which includes a section called 'problem-solving' in questionnaires assessing children from two months of age. At this earliest stage, the ASQ-3 parent questionnaire asks six questions, including, 'When you dangle a toy above your baby while they are lying on their back, do they wave their arms toward the toy?' The parent responds to each question with 'yes', 'no' or 'not yet'. At 60 months (five years), problem-solving questions include, 'Which circle is smaller?' and 'Finish the following sentence using a word that means the opposite'.

How can early childhood professionals use assessment of problem-solving?

While problem-solving may seem to be a simpler construct than executive function, this brief review of the research may challenge early childhood professionals to think about it in new ways:

- Problem-solving may be supported by routines and everyday interactions. In a stimulating, secure environment, 'children construct knowledge of patterns and relations, cause and effect, and methods of solving problems in everyday life' (Kagan, Moore & Bredekamp 1995, p. 4). Early childhood professionals may observe how children apply known routines or sequences to new contexts and challenges.
- Research indicates that early childhood professionals seldom focus on solving applied problems in early years assessments, preferring to focus on skills such as counting and naming numbers (Mashburn & Henry 2005). Being aware of this tendency, educators can broaden the range of skills they look for, and can prompt children to articulate problems and talk through alternative solutions.

- The ASQ-3 proves that problem-solving can be demonstrated from early infancy. This challenges educators to sharpen their observations of problem-solving skills among the youngest children.

3. Social skills

What are social skills?

Social skills include relating well to others, collaboration and conflict resolution. They are defined in the research as being deeply situated in children's relationships, community and culture:

The ability of young children to form close and secure adult and peer relationships; experience, regulate, and express emotions in socially and culturally appropriate ways; and explore the environment and learn – all in the context of family, community, and culture (Yates et al. 2008, p. 2).

The VEYLF outlines extensive examples of social skills children develop in the early years, from basic hygiene practices to learning to constructively resolve conflicts, naming emotions and expressing their views (p. 20). In relation to Outcome 4, social skills appear in children's 'active engagement with others who speak and respond to their interests'; when they 'learn from demonstration and modelling by others'; when they realise that 'listening to the responses of others can help them understand and make new meaning of experience'; and as they 'become more skilled at seeking help when they need it'. Another example occurs in children's ability to 'contribute positively and effectively to other children's learning' (p. 21), demonstrating the importance of social skills to both group and individual learning.

In the research literature, the skills that are encompassed in 'social skills' are many and varied. Researchers include terms such as emotion expression and management, perspective taking, empathy, inhibitory control (also part of executive function), self-confidence, perseverance, sociability and the ability to develop and support relationships with others (Darling-Churchill & Lippman 2016; Denham 2006; Yoder 2014). *The International Early Learning and Child Well-being Study* by the OECD (2016) uses a domain called empathy and trust, measuring trust, empathy and prosocial behaviours. Jones and Yudron (2016) map the subdomain of social competence to three constructs: understanding social cues, resolving conflict and cooperating. They also refer to 'positive relationships with others, communicating actions and feelings with social partners and recognising and regulating emotions and actions' (p. 20).

There is no agreement among researchers on exactly which skills make up the construct of social skills, with some lamenting the wide variation in definitions. The main focus in the research tends to be on behaviours rather than skills, particularly problem behaviours such as hyperactivity and conduct behaviours, or prosocial behaviours such as helping and motivation.

Why are social skills important?

Social competency is critical to children's success from their early years and through life. Children require social skills to be aware of self, family and community, and to be accepted and experience positive reciprocal relationships. Understanding and trusting others leads to the development of empathy. Controlling impulses and cooperation are two important prosocial behaviour traits for success in group situations. Conversely, maladjustment in the social and emotional domain may impede children's ability to function in family, school or other contexts (Darling-Churchill & Lippman 2016). Raver (2002) notes that:

[there is] accumulating evidence that when young children are able to develop prosocial relationships, feel confident in themselves, and express and manage their emotions, they are more likely to be prepared to learn and succeed in school.

There is also an obvious connection between social skills and language development.

Tools for assessing social skills in the early years

Social and emotional skills are widely measured in the early years. Most measures rely on teacher or parent questionnaires. There is a concern about a lack of conceptual and definitional clarity about how social and emotional development relates to cognitive development. Researchers note that:

problems and strengths do not fall neatly on a single continuum, and the absence of problems does not guarantee the presence of competencies; thus, it is important to measure both (Darling-Churchill & Lippmann 2016, p. 3).

This is therefore an area in which measurement practices are still developing.

Two of the measurement tools already mentioned in this review include social skills in their suite of assessment questions: ASQ-3 and MELQO MODEL. Two dedicated social skills assessments were also reviewed, the Social Skills Improvement System (SSIS) (Gresham & Elliott 2008) and Early Abilities Based Learning and Education Support (Early ABLES). In the SSIS, parents and teachers rate the frequency with which various behaviours are exhibited by a child from three years of age, on a four-point scale of 'never', 'seldom', 'often' and 'almost always'. They also rate the importance of these behaviours. The frequency and importance ratings from the SSIS point to behaviours that may require intervention. Early ABLES is a tool designed for children with additional needs and is also rated by an educator.

How can early childhood professionals use assessment of social skills?

For many early childhood professionals, the development of social skills and secure, responsive relationships is already a priority in their practice. Potential new ideas arising from this review include:

- The research has shown that social development underpins other areas of development (Barblett & Maloney 2010; Denham, Brown & Domitrovich 2010; Konold & Pianta 2005). The social and emotional experiences young children have with their earliest caregivers sets the foundation for their social development, interactions with others and academic outcomes. Assessment of social skills is therefore a key component of assessment of learning.
- Social skills are not only important during early childhood, but as a basis for future learning and development. Failure to develop secure attachments with caregivers may lead to later difficulties communicating or managing emotions, or developing positive relationships with peers (Sroufe 2016).
- In terms of social skills, it is important to be alert to the contribution of culture and language to learning, and the reality of unconscious bias and subjectivity. Understanding that 'children bring their own cultural lens to experiences, which plays a major role in their interactions with others' (Barblett & Maloney 2010, p. 16) will help early childhood professionals to take care when assessing social skills. While many differences may be well known and obvious, there will be other unexpected areas of divergence.

4. Motor skills

What are motor skills?

Motor skills encompass physical exploration and active engagement with the environment using both gross and fine motor skills. The VEYLDF (p. 36) describes motor skills as:

the ability to create body movements that result from the interplay of the brain, nervous system and muscles. Motor skills are generally divided into fine motor skills (for example, movements of the smaller joints of the hands and fingers) and gross motor skills (for example, rolling, moving from sitting to standing, walking, running).

In the past, motor development was regarded as a largely innate, maturational process. Recent research shows it is also affected by experience (Hadders-Algra 2010).

Why are motor skills important?

Physical development relates to children's physical growth, skills and health, including physical exploration and active engagement with their environment using both gross and fine motor skills. Movement prepares children

for school and for life by building children's confidence and social skills. The child's brain 'develops rapidly through physical explorations' (VEYLDF, p. 21), with active learners exploring the world through touch, sight, sound, taste, smell and movement. Motor skills are therefore essential for cognitive development and exploratory learning, including for the youngest children.

Tools for assessing motor skills in the early years

Assessment of motor skills may focus on a particular aspect of physical development, such as fine motor skills, or gross motor activity, such as active outdoor play. Unlike the cognitive components of learning, there are relatively few psychometric or computerised assessment tools used in the research literature to measure children's motor skills. Those tools that are available tend to 'rely heavily on proxy reporting' (Gershon et al. 2013, p. 2); that is, observation of children's skills rather than direct testing.

The ASQ-3 includes observation checklists for both gross and fine motor skills from two months of age, focusing on kicking, grasping and head movement. At 33 months, gross motor questions relate to jumping, kicking and standing on one foot. The ASQ-3 has six fine motor tasks at this stage related to drawing, threading and turning pages.

The MELQO MODEL assessment includes both a teacher or caregiver report and direct assessment of the child by an observer. It includes one fine motor question related to whether the child can write their own name, and another related to drawing a square from an example.

Who Am I? is another assessment that focuses on fine motor skills, including the child's ability to copy shapes and symbols, plus draw a picture of themselves.

How can early childhood professionals use assessment of motor skills?

Of interest to this review is the contribution of physical or motor skills to learning. In particular:

- Parents and early childhood professionals can observe considerable variation in the ages at which young children achieve motor skill milestones. Researchers imply that delay in one area of motor development is not likely to be significant, as compared to general delay across multiple skills (Hadders-Algra 2010).
- There is a set of systematic review literature that investigates the relationship between children's physical activity and their cognitive development (Carson et al. 2016). This research evidence shows that greater physical activity is associated with more confident and engaged learners (Becker et al. 2014; Sibley & Etnier 2003). This may lead early childhood professionals to consider how they can recognise and support this relationship in their work. For example, it may provoke reflection not only on the movement that a child can do, but the learning that results from it.

- There is a concern that in a push to improve ‘academic’ skills, preschool educators may have ended up limiting children’s movement. Gehris, Gooze and Whitaker (2015) studied teachers’ perceptions about children’s movement and learning in early childhood education programs, and found that while teachers did respond to young children’s need to move, they wanted more training in this area.

Confidence as a learner

What is confidence as a learner?

In this review, confidence as a learner refers to a child’s belief in their ability to learn. Descriptions of confidence in the research literature include terms such as academic self-concept, academic self-efficacy, self-perception, self-esteem, metacognition, competence perceptions, cognitive self-regulation, and motivation (Marsh 2007). In the VEYLD, confidence as a learner appears when children ‘realise that learning is exploratory’, ‘reflect on their own thinking processes and approaches to learning’ and ‘understand that failure is a valuable part of learning’ (p. 21). The VEYLD also recognises the importance of ‘warmth and support from others around them’ to help children’s confidence to grow.

Why is confidence as a learner important?

This construct recognises that children learn best if they believe that they can, and if they understand the iterative, potentially frustrating but ultimately rewarding nature of the learning process. The VEYLD’s description of Outcome 4 stresses the importance of dispositions for learning, listing examples such as curiosity, cooperation, confidence, creativity, commitment, enthusiasm, persistence, imagination and reflexivity (p. 3). It is important that children develop confidence as learners, or a positive view of their ability to learn, as well as an awareness of learning processes and themselves as learners.

There is a close connection between children’s confidence in their abilities and the concept of temperament. Some researchers have even argued that confidence is innate, rather than acquired (Greven et al. 2009). There is nevertheless strong evidence that confidence in learning can be actively developed in young children (Morris 2002), leading to improved outcomes in childhood and beyond.

Tools for assessing confidence as a learner in the early years

There are limited scales available for assessing confidence or academic self-efficacy in young children. While some validated scales exist based on children’s self-reported responses, these are for children older than the VEYLD range of birth to eight years. The Children’s Independent Learning Development 3–5 (CHILD 3–5) assessment tool (Whitebread et al. 2009) was the most appropriate assessment tool identified in this review that has a motivation subscale in its metacognition domain.

How can early childhood professionals use assessment of confidence as a learner?

Despite its importance to learning, children’s confidence in their ability to learn has been given relatively little attention in assessment research. This might provoke reflection among early childhood professionals:

- Even if few formal assessment tools are available, early childhood professionals may consider how they might assess children’s confidence in learning, as part of their regular observations. How do children talk about themselves as learners? How do they cope with failure and learn from their mistakes?
- Early childhood professionals might give additional attention to the role that children’s confidence may play in their ability to demonstrate other forms of learning. They may take care to provide interim steps towards mastery of a particular skill, so that children can take pride in their progress, not just their successes.

Involvement in learning

What is involvement in learning?

While confidence refers to children’s beliefs about their abilities, involvement refers to their motivation for learning, and absorption in the learning task. Involvement in learning is about engagement in the learning process. Drawing on Laevers’ (1994) work, involvement is described in the VEYLD as:

A state of intense, wholehearted mental activity, characterised by sustained concentration and intrinsic motivation. Highly involved children (and adults) operate at the limit of their capacities, learning to change ways of responding and understanding, leading to deep-level learning (VEYLD, p. 36).

The constructs of curiosity (Kidd & Hayden 2015; Litman 2005) and motivation (Ainley & Ainley 2019; Lai 2011) also contribute to involvement in learning. Motivation is defined as ‘the attribute that moves us to do or not to do something’ (Broussard & Garrison 2004). Motivation for learning is described as the enjoyment of learning of challenging, difficult and different things.

Why is involvement in learning important?

Children’s involvement, or engagement, in the learning process is fundamental and relates directly to learning outcomes. A significant amount of research highlights the link between motivation and metacognition; that is, that motivation for learning leads to higher-order thinking (Whitebread et al. 2009). In order to be involved, children need to ‘feel included and respected, find learning relevant, interesting, engaging and challenging and become effective in learning what they value’ (Ginsberg 2011).

Tools for assessing involvement in learning in the early years

This review identified three assessment tools for measuring involvement in learning. The Leuven Involvement Scale for Young Children (LIS-YC) (Laevers, Declercq & Stanton 2010) is a five-point rating scale. The scale is from level 1, where there is no activity by the child, through to level 5, where the child is demonstrating total concentration in learning. The Preschool Learning Behaviors Scale (PLBS) (McDermott et al. 2000) asks teachers 29 questions about what they observe in terms of children's behaviours related to learning. Similarly, the Individualized Classroom Assessment Scoring System (inCLASS) (Downer et al. 2010) is an observational tool designed for observing and assessing children's interactions with their teachers, peers and the tasks they are undertaking.

How can early childhood professionals use assessment of involvement in learning?

Children's involvement in learning underpins all other components of Outcome 4 described in this review. It is therefore a high priority in monitoring the effectiveness of play-based early learning programs:

- Early childhood professionals can be alert to signs of children's involvement, including during routines. This can be recognised by their facial, vocal and emotional expressions, the energy, attention and care they apply, and the creativity and complexity they bring to the situation (Department of Education and Children's Services 2008).
- Early childhood professionals can prioritise involvement when planning early learning programs. By allowing time and space for children to immerse themselves in learning experiences that relate to their interests, early childhood professionals can create opportunities for involvement in learning to be demonstrated.
- Involvement in learning is closely related to the establishment of warm, reciprocal relationships between early childhood professionals and children. Building attachment increases the likelihood of high levels of mutual involvement in adult-child interactions, creating rich opportunities for learning.

While it is useful to analyse each of these elements of assessing Outcome 4: Children are confident and involved learners in some depth, it is also important to consider the ways that these elements develop together, and over time.

What are children's trajectories of learning in early childhood?

Different domains develop in different ways, and current learning theory can shed light on major developmental steps in the early childhood learner's journey. Transition to school is one of the significant milestones within the learning life of children in the early childhood age range. School readiness is a concept often used in discussion

of early childhood education and development. As confidence and involvement in learning develop in early childhood, these deserve careful attention well before a child is involved in formal academic learning.

A mapping of development and research studies provides an understanding about the ways that different elements of executive function domains develop. Attentional control appears to emerge in infancy and develop rapidly in early childhood. In contrast, cognitive flexibility, goal setting and information-processing experience a critical period later on in development between seven and nine years of age, and are relatively mature by 12 years of age. A transitional period is thought to occur at the beginning of adolescence, and shortly after 'executive control' is likely to emerge (Anderson 2002).

Variation in trajectories of learning can be seen between individual children, and between groups of children. A study of children attending early childhood education and care (ECEC) programs in Australia observed greater variability in cognitive growth within children with low baseline scores on cognitive assessments, which 'suggests that there are multiple trajectories being observed ... that interact to produce different outcomes over time' (Tayler, Cloney & Niklas 2015, p. 58).

How do children's skills and dispositions for learning develop over time?

Learning is change, and to recognise that change requires that an earlier level of knowledge is captured and can be compared with a later level of knowledge. In the literature on how the skill sets listed above develop over time, including from early childhood into the school years, there is an important difference between unconstrained skills, or skills that increase indefinitely, and constrained skills, such as letter recognition in reading, which cannot be improved once they are mastered. Unconstrained skills become increasingly complex across all years of development and across domains, and are never described as fully mastered. Most domain-general skills are thought to be unconstrained (Paris 2005).

The current understanding of the relationship between domain-general and domain-specific skills over time is that the general skills emerge first, and support the emergence of specific skills. There is nevertheless a strong overlap between general and specific skills in the early years, because of the nature of the lowest levels of domain-specific skills. For example, early domain-specific reading skills assume the ability to focus attention, hold a narrative in memory, and recall simple pieces of information, which overlap with components of the domain-general skill of executive function. Greater differentiation appears over time, as domain-specific knowledge, skills and abilities become more complex and abstract.

How do the different skills that children learn relate to one another?

The domain-general skills above also relate to one another, and their acquisition in early childhood provides the basis for later learning in specific domains.

In terms of problem-solving, a study of three- to six-year-old children showed inhibition and working memory tasks contributed to their performance:

Inhibition was found to contribute to problem-solving ability more than working memory in younger children, while working memory was found to contribute to problem-solving ability more than inhibition in older children (Senn, Espy & Kaufman 2004, p. 445).

Recent research has shown the link between social skills and academic learning. For instance, as children develop social and emotional skills, they gain the confidence and competence needed to build relationships, problem-solve and cope with emotions (National Research Council 2000). Social skills and associated skills such as attention and approaches to learning, that are evident at school-entry age, are the best predictors of later social and emotional competencies, such as managing behaviour, making social connections and tolerating frustration with peers (Halle et al. 2012; Konold & Pianta 2005).

One of the key insights from research on executive function is that 'executive function interacts with more bottom-up processes such as arousal, motivation, and stress' (Zelazo et al. 2016, p. 7). While executive function is defined as a neurocognitive skill, it is also associated with other characteristics such as temperament, personality (effortful control, conscientiousness, openness and grit) and goal-directed behaviour (self-control, reflective learning, deliberate problem-solving, emotion regulation, persistence and planning) (Zelazo et al. 2016).

Having defined the elements of learning in early childhood and established the value of using assessments of confidence and involvement in learning, there emerges the question of how to identify and select appropriate assessment tools. The following section provides a set of principles to guide assessment decisions.

Section 2: Principles for assessing children as confident and involved learners

This section sets out principles for the assessment of confidence and involvement in learning. It is informed by the overriding principles of the Victorian Early Years Learning and Development Framework (VEYLDF):

All children benefit when assessment reflects a whole-child approach that may include their health and wellbeing, reveals their strengths, and shows what might next be learnt (p. 13).

In assessing children as confident and involved learners, educators face questions about how to select appropriate measures across phases of development, how to administer assessments, how to interpret the results, and how to translate their findings into planning and communication to parents.

The first principle of any assessment is ensuring that it does in fact measure established components of children's learning. As well as considering learning, knowledge and skills in the context of the whole child when developing assessments, it is important to acknowledge that early childhood is a time of the most rapid developmental changes in a person's life. Of course, assessments at any age must be reliable, valid and fair. In the early years it is particularly important that assessments are conducted in a way that enhances relationships. Choosing the most appropriate time and place to assess this development is a key consideration, and seeking information about child development over time should occur wherever possible in a natural setting (Early Childhood Education Assessment State Collaborative on Assessment and Student Standards 2004).

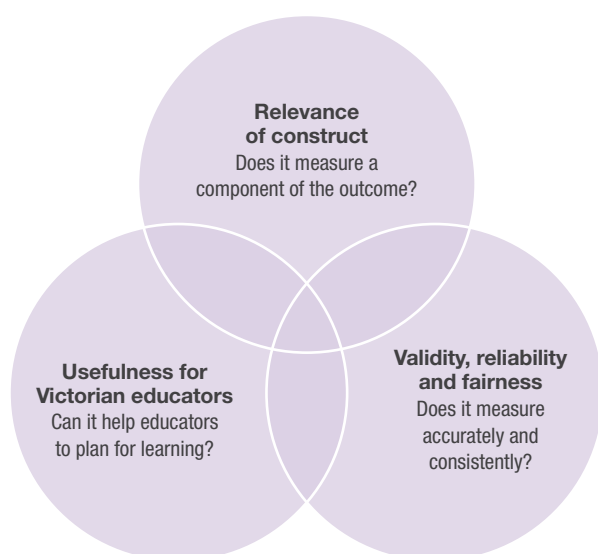


Figure 2: Overview of assessment principles

The priority for this review is to identify tools that Victorian educators can use in early childhood education and care (ECEC) services. This usefulness is based on factors such as: the cost and resources needed for access and application; the training required to use them well; and the availability of support resources to help teachers use results from the assessment to plan experiences that build children's learning.

Figure 2 illustrates the intersection of criteria that guide the evaluation, selection and use of an assessment. The principles below are specifically related to assessments for use by early childhood professionals for determining and tracking an individual child's level of functioning to inform planning, and to a lesser degree, to act as an alert to potential issues that might indicate a need for referral to other professionals. Different principles may apply to assessment tools being used for large-scale, standardised assessments for the purposes of policymaking or program evaluation.

Assessment addresses established components of children's learning

The first criterion is that the assessment instrument must measure a construct that is relevant to the outcome. Any kind of assessment of children's learning must address constructs that have been established in the literature as valid components of children's learning. These components are sometimes called domains and while they are distinct and coherent aspects of learning, they may also be related (overlapping or correlated) to other domains. For example, mathematical ability is a distinct domain, but it has overlap with aspects of executive function (such as working memory) and problem-solving (such as induction and reasoning). This is, in part, because lower-order domain-general abilities support and facilitate higher-order domain-specific abilities.

As well as knowing what components of learning are outlined in the VEYLDF, it is helpful for early childhood professionals to become familiar with how these components are described in the research. When evaluating an assessment instrument, a key question to be asked is how do the constructs underlying a particular assessment relate to the constructs of interest in the VEYLDF? In selecting assessments there is a decision to be made between specific and broad coverage of these constructs. While many high-quality tools may exist to measure a single construct, there may be occasions when a tool that assesses other constructs as well may be more practical. A core principle is that assessment is designed to support learning, and must be grounded in an adequate, research-based theory of learning (Shepard & Penuel 2018, p. 52).

Assessment enables early childhood professionals to describe a continuum of learning

The fundamental purpose of assessment is to inform decision-making about the next steps for that child's program. Effective assessment describes children's progress on a continuum of learning, enabling early childhood professionals to collect evidence of current knowledge, skills and abilities, and to plan for the next stage of learning. Assessment is not only descriptive, but must contribute to advancing teaching and learning. The use of learning progressions was promoted in the second Gonski report (Gonski et al. 2018). Corcoran, Mosher and Rogat (2009, p. 37) explained that:

Learning progressions are descriptions of the successively more sophisticated ways of thinking about an important domain of knowledge and practice that can follow one another as children learn about and investigate a topic over a broad span of time. They are crucially dependent on instructional practices if they are to occur.

Understanding about progression in the development of key skills informs teaching programs and teaching practices (Australian Council for Educational Research 2019). Learning progressions can be approached from the point of view of learning theory, and also from a social and cultural perspective that takes into account children's interests and prior community experiences (Brookhart 2018). According to Wilson (2018, p. 9) a well-thought-out and evidence-based learning progression can:

- provide the essential basis for the setting of a teacher's strategic aims, and for the planning of instruction
- serve as a guide for the on-the-fly decisions that have to be taken while in the midst of teaching and assessing
- provide the criteria on which formative and summative assessment should be based.

Assessment is valid, reliable and fair

Poor-quality assessments lead to misleading claims about children's achievements. Early childhood assessment has progressed since a 1991 study of the psychometric characteristics of four well-used standardised readiness assessments for kindergarten children found the tests were no more accurate than the flip of a coin (Ellwein et al. 1991). 'As a result, the practice of assessing young children began to be viewed with scepticism and distrust, especially among early childhood education professionals' (Mashburn & Henry 2005, p. 17).

Validity refers to whether the instrument truly measures what it claims to measure. Reliability refers to its ability to produce valid results consistently, across contexts. The tools must have demonstrated both validity and reliability to appropriate standards of rigour. Definitions

of validity and reliability may vary for different types of tools. For example, standardised tests may demonstrate validity using psychometric methods, whereas qualitative assessment tools may demonstrate validity by providing rich and valuable data that subject matter experts agree assesses the construct of interest.

There are several ways that biases can come into play in assessments of children's learning and thus compromise the validity of the assessment. Assessors may assign ratings of children's performance that are overly generous or too severe. They may generalise and overuse an average rating category, or a halo effect can see assessors 'assign the same ratings for different aspects of children's performance that are independent of one another' (Mashburn & Henry 2005, p. 17). The existence of systemic bias in assessment is of particular concern when it influences early childhood professionals' expectations for the performance of certain children. It is possible to meet the Practice Principle of having high expectations for all children while also maintaining a dispassionate and consistent approach to assessment (standardised practice) that yields unbiased information.

Work by the US National Research Council (1999) looks at principles for determining whether an assessment is being used appropriately, including measurement validity – whether an assessment is valid for a particular purpose, and whether it accurately measures the child's knowledge in the content area being tested. The important thing about an assessment is its validity when used for a specific purpose. Assessment may be intended for influencing classroom practice, and not for screening or placement purposes. Decisions about an individual child's development should consider alignment with each child's context, carers and the curriculum. The criteria for assessments set by Gershon et al. (2013) include that they are dynamic and allow for adaptation over time in response to changes in context (p. S2). Resolving discrepancies between questionnaire- and performance-based assessments is also important, particularly in the context of executive function assessment (Zelazo 2016, p. 78).

Assessment is conducted in a way that enhances engagement and relationships

This principle should address any concerns that early childhood professionals may have about assessment of learning being incompatible with warm, responsive relationships and child-centred play-based programs. It explains that effective learning assessments are engaging for children, whether they are conducted independently by the child or with assistance from a practitioner, and flexible enough to be integrated seamlessly into a wide range of ECEC programs.

The developmental status of young children, including their level of attention and self-regulation ability, is seen as a challenge in terms of assessment (National Research Council 2000, p. 235). Brevity is important to minimise any burden on children and carers (Gershon et al. 2013). Research on early years development stresses the important role of a supportive context for learning:

A defining feature of a supportive environment is a responsible and responsive adult. Parents, teachers, and caregivers promote development when they create learning experiences that build on and extend the child's competence – experiences that are challenging, but within reach. To do so, these adults must be sensitive to individual and developmental characteristics of the child (Palermo et al. 2007).

Assessment includes children's self-assessment

Self-assessment can be a key motivator for each child to continue along a pathway toward new challenges and further success, especially if they are encouraged and supported in this practice (VEYLDF, p. 13).

Giving children opportunities to inform adults about their skills and learning is a key principle of assessment in the early years. The assessment of children's skills through self-report is a valuable tool (Danielson & Phelps 2003). Early childhood professionals who are receptive to, and include, children's views of their own learning will look at what children are indicating that they are learning. This is different from describing what children are doing. The evidence of babies' and toddlers' learning is often subtle and is seen in everyday routines and experiences.

Warash and Workman (2016, p. 97) conclude that 'young children have the capability of making decisions, informed choices, and self-assessing their progress on their choices'. In their research with four- and five-year-olds, they had children using pictorial contracts, rubrics and other techniques as a method for continuous assessing. Gathering and reflecting on their own evidence about their accomplishments creates a reflective loop by which the child evaluates their work, makes revisions and ultimately applies the criteria to other conditions. Children learn to reflect on their own knowledge. Self-assessment is not only intrinsically motivating but offers young children a systematic approach to further their involvement in their learning in a developmentally appropriate and engaging environment.

Assessment involves the child's community and informs professional partnerships

Collecting information on children's outcomes from a wide variety of sources can help educators assess and plan more effectively. The child's community, particularly their immediate family, plays a vital role in children's learning and development. In addition to giving children opportunities to inform adults about their skills, families can respond to questionnaires or interview questions about their child. The context, including the health and wellbeing of the family and community in which the child is situated, is an important consideration when assessing a child's learning. Early childhood professionals assess children in ways that:

- include the perspectives, knowledge, experiences and expectations of families
- provide families with information and ideas to support the child's learning at home and in other services
- value the culturally specific knowledge about children and their identity, wellbeing, learning and development that is embedded in their communities
- are transparent, giving all adults close to the child access to best 'next steps' in promoting a child's learning and development (VEYLDF, p. 13).

An important principle of assessment of learning is that it helps to strengthen collaborative partnerships and approaches to assessment for learning and development with families and children and also with other early childhood professionals working outside education settings (VCAA 2013, p. 9). Early childhood educators who work in partnership with other professionals collate and use the evidence of children's prior and current learning and development. This enables them to build continuity in learning and development across services and transition points (VEYLDF, p. 16).

These six principles guided the selection and evaluation of assessment tools for the next section, and the development of the criteria against which the tools were reviewed.

Section 3: Summary matrix of tools for assessing children as confident and involved learners from birth to eight years

This section identifies and describes a sample of 10 tools for assessing children as confident and involved learners. This sample represents a spread of tools across the key components of learning, as well as across ages, and the tools are applicable across a range of early childhood contexts. The tools selected for this literature review focus on assessment to support learning, and to a lesser extent, assessment for identification of special needs. The list avoids tools that have limited availability, or that have qualification requirements set by publishers that would make the measure unavailable to a typical educator or teacher.

Table 1 presents tools that can be accessed and/or administered by early childhood professionals to assess children’s learning.

Table 1: Learning assessment tools summary

Tool	Age range (years)			Administration			Area assessed						Australian created or normalised
	0-3	3-6	6+	Professional	Parent	Child	Executive function	Problem-solving	Social skills	Motor skills	Academic self-efficacy	Engagement in learning	
LEARNING													
Dimensional Change Card Sort (DCCS) Border version		●	●	●		●	●						
Measuring Early Learning Quality and Outcomes (MELQO) Measure of Development and Early Learning		●		●	●	●	●		●	●			
Ages & Stages Questionnaires: Third Edition (ASQ-3)	●	●		●	●			●	●	●			
Social Skills Improvement System (SSIS)		●	●	●	●				●				
Early ABLES	●	●	●	●					●				●
Who Am I? (WAI)		●		●		●				●			●

Tool	Age range (years)			Administration			Area assessed					Australian created or normalised	
	0-3	3-6	6+	Professional	Parent	Child	Executive function	Problem-solving	Social skills	Motor skills	Academic self-efficacy		Engagement in learning
CONFIDENCE													
Children's Independent Learning Development (CHILD 3-5)		●	●	●							●		
INVOLVEMENT													
Leuven Involvement Scale for Young Children (LIS-YC)	●	●		●								●	
Preschool Learning Behaviors Scale (PLBS)		●		●								●	
The Individualized Classroom Assessment Scoring System (inCLASS)		●		●								●	

Section 4: Evaluation of existing tools for assessing children’s learning

Dimensional Change Card Sort (DCCS) Border Version

Overview

The Dimensional Change Card Sort (DCCS) (Zelazo 2006) is a simple tool to measure executive function. It can be used with children from three years of age. Children sort a series of test cards, first according to one dimension (for example, colour) and then according to the other (for example, shape).

Instrument description

The DCCS takes five minutes to administer using a set of locally made cards. There are two types of cards, each of which contains a simple drawing of two familiar objects (such as a truck and a star) in two colours for each object (for example, a red and a blue star, and a red and a blue truck). Fifty per cent of cards should have a black border and the rest should not.

The assessor sets up two sorting boxes displaying cards representing the two different objects. The child is given instructions for sorting the set of test cards: that cards should be sorted according to one trait (for example, ‘We’re playing the shape game, trucks go in this box, and stars go in this other box’). Usually a practice session is held to provide corrective feedback and ensure the child understands the task.

Next the ‘switch’ phase is implemented to assess mental flexibility: the cards should be sorted according to the other trait (colour in this case). Children who can complete this task (for example, five out of six stimuli) can progress to a more difficult task, where the rule varies by the presence or absence of the border on the card (‘Cards with borders are sorted by colour, and cards without borders are sorted by shape’). Six stimuli are presented in this phase, giving a total of 12 stimuli in all. Children who correctly sort nine or more of the 12 test cards are considered to have passed the task.

A video example of a physical card sort activity is available to view online (Zelazo 2012). Several tablet-based versions of card sorts have been developed, in which both the game and the audio instructions are provided in the app (Carlson 2018; National Institutes of Health 2015).

Discussion

With the DCCS task, children who are three years of age can generally sort the cards correctly by colour or shape. When asked to switch from sorting by colour to sorting by shape (or vice versa), however, most three-year-olds do not switch; they continue to sort as they had before. This is in spite of the assessor consistently reminding the child that the game has changed, and which dimension to sort on now (‘We are playing the colour game now, and in the colour game, red ones go here and blue ones go there’) or asking the child where the red ones (or trucks) and where the blue ones (or stars) go, and the child pointing correctly.

Children of three years do not manage this switch even though they know and remember the rules. By five years of age, most children switch when instructed to do so.

The test measures cognitive flexibility or switching, that is, flexibility in the detection and use of rules that govern behaviour. This is a component of executive function. This was first observed by Zelazo and colleagues (Zelazo, Frye & Rapus 1996) and has been observed in other laboratories in the United States and several other countries, including Canada, England and Scotland (Rennie, Bull & Diamond 2004).

The DCCS is easily administered and widely used. With a five-minute duration, the assessment is suitable for three-year-olds. The DCCS Border Version is considered more challenging than the standard version of the DCCS. The DCCS is an unpublished, simplified version of the Wisconsin Card Sorting Test (WCST) (Grant & Berg 1993). The WCST should be administered by a registered psychologist, and it has a higher sensitivity for detecting and characterising aspects of executive dysfunction, for instance, in children with disorders such as attention deficit hyperactivity disorder and autism.

Early childhood professionals may use this kind of task to assess mental flexibility, but the literature takes an ‘ages-and-stages’ approach, identifying that generally three-year-old children cannot do this task, while six-year-olds can. This assessment provides information about children who are ‘on track’ in this regard and those who are not. This tool, however, does not describe the progression or acquisition of specific skills and abilities that happens between the ages of three and six years, and therefore there is limited support to develop individual plans for children at different levels of development.

Measuring Early Learning Quality and Outcomes (MELQO) Measure of Development and Early Learning (MODEL)

Overview

Measuring Early Learning Quality and Outcomes (MELQO) Measure of Development and Early Learning (MODEL) (UNESCO et al. 2017) has a direct assessment component for use with children aged 48 to 72 months (four to six years), as well as a parent and teacher questionnaire or interview. It is an omnibus assessment that includes social skills and two components of executive function (working memory and inhibitory control), as well as motor skills and pre-academic skills.

Instrument description

Appendix 1 of the MELQO manual (UNESCO et al. 2017, pp. 60–2) outlines the domains, constructs and items for MODEL, and provides detail on both the teacher/caregiver report items and the direct assessment items.

1. Executive function

MODEL contains three items that measure working memory and inhibitory control: head, toes, knees and shoulders (HTKS) (Cameron-Ponitz et al. 2008); forward digit span (measuring short-term auditory memory, sequencing and simple verbal expression); and backward digit span (measuring short-term verbal memory and working memory) (Hale, Hoepfner & Fiorello 2002). MODEL includes fine motor skills as part of the executive function domain with questions such as, ‘Can you write your name here?’ and ‘Here is a square. Can you draw a square like this one?’ (UNESCO et al. 2017, p. 61).

2. Social–emotional development

The MODEL social–emotional development domain has no direct assessment items. The teacher/caregiver items ask about self-regulation, social understanding/prosocial behaviour, social competence and emotional wellbeing.

MODEL also includes assessment of pre-academic skills such as language, pre-literacy and pre-numeracy.

Discussion

The MELQO manual was published in 2017 by UNESCO, UNICEF, the Brookings Institution and the World Bank, for use in developing country contexts. It is a free, open-source assessment (Creative Commons attribution, non-commercial share-alike licensed). Researchers using the tool agree to share their findings and any development of the tool. The MELQO initiative aims to improve early childhood education worldwide through the measurement of children’s development and learning and the quality of learning environments. The development of content for the MODEL module was guided by the following goals:

- Measure predictors of children’s later academic performance, as identified in existing literature.
- Rely on a broad definition of children’s development, with pre-academic skills, social-emotional development and contextual variables all included to ensure identification of factors associated with inequity relevant for children in low- and middle-income countries.
- Allow adaptation to align with national and cultural priorities (following the framework outlined in the technical manual).

The MELQO manual provides a detailed table of the psychometric properties of the program which shows the status of work on validity, reliability, consistency and cross-cultural relevance. Progress has been established across all properties other than predictive validity (UNESCO et al. 2017, p. 17). The MELQO modules were designed for measurement at scale, such as national assessments, and some commentators question the feasibility of using the MODEL at the classroom level, stating the modules were

not intended to make decisions about specific classrooms, teachers, or children ... perhaps it will be feasible in the future to identify a common core set of items in the MODEL that can be used at the classroom level (Anderson & Sayre 2016, p. 21).

Despite its recent development, there is an increasing amount of literature reporting use of MELQO, much of which comes from use outside Australia.

Ages & Stages Questionnaires, Third Edition (ASQ-3)

Overview

The Ages & Stages Questionnaires, Third Edition (ASQ-3) (Squires et al. 2009) pinpoint developmental progress in children between the ages of one month and 66 months (5.5 years).

Instrument description

Parents or caregivers complete the questionnaires about their child, and then professionals, paraprofessionals or clerical staff score them according to the instruction manual. Parent and teacher questionnaire items are written so not to exceed a Year 6 reading level. It takes 10 to 15 minutes for parents to complete their questionnaire, and two to three minutes for professionals to score each one.

Each age-specific questionnaire screens across five developmental domains:

- problem-solving
- communication
- social
- gross motor
- fine motor.

Discussion

The ASQ-3 captures parents' in-depth knowledge, highlights a child's strengths as well as concerns, teaches parents about child development and their own child's skills, and highlights results that fall in a 'monitoring zone' to make it easier to keep track of children at risk. Evidence shows that the earlier development is assessed, the greater the chance a child has to reach his or her potential.

The ASQ-3 is a screening tool in the strictest sense – it is about establishing which children meet a cut-off for further clinical intervention. The validity of the ASQ-3 has been studied extensively. Psychometric studies based on a normative sample of more than 18,000 questionnaires show high reliability, internal consistency, sensitivity and specificity. Two recent studies indicate that the sensitivity and specificity of the ASQ-3 across all domains may be somewhat lower in children under 12 months of age (Veldhuizen et al. 2015), and may be lower in the motor development domain for children aged three-and-a-half to five-and-a-half years (King-Dowling et al. 2016).

It can be completed by parents with relative ease, and questionnaires are available in Arabic, Chinese, English, French, Spanish and Vietnamese. It can be completed at home, in an early childhood education and care (ECEC) office space, during a home visit or as part of an in-person or phone interview. There is no specialist qualification required to access the questionnaires. An ASQ-3 starter kit costs A\$364 from regular online booksellers. There are many resources available to support the use of ASQ-3.

With modifications, the University of Melbourne used the ASQ-3 questionnaires as the base for building a more culturally appropriate version of the tool for Australian Aboriginal children (D'Aprano et al. 2016).

The brevity of the ASQ-3 (few items measuring each of the domains) makes the tool useful as a checklist of core skills. However, the tool is not designed to measure and track growth across a broad developmental domain and cannot be relied on to measure change over time within an individual.

Social Skills Improvement System (SSIS)

Overview

The Social Skills Improvement System (SSIS) (Gresham & Elliott 2008) is a rating scale designed to be used with children from three years of age through to adults. It has three scales, for social skills, problem behaviours and academic competence. It is a commercial questionnaire that can be completed on paper, or online via the publisher's assessment platform.

Instrument description

When used in an early years setting, the SSIS has a parent questionnaire and a teacher questionnaire. Each form takes 10 to 25 minutes to complete. On the parent and teacher forms, parents and teachers rate how frequently various behaviours are exhibited by the child on a four-point scale of 'never', 'seldom', 'often' and 'almost always'. In addition, teachers and parents indicate the importance of each social skill to the child's development and classroom success using a three-point scale of 'not important', 'important' and 'critical'. As shown in Table 2, there are three areas assessed: social skills, competing problem behaviours and academic competence (the latter is on the teacher form only).

Table 2: Constructs measured by SSIS

Area of Assessment	Behaviour
Social skills	Communication Cooperation Assertion Responsibility Empathy Engagement Self-control
Competing problem behaviours	Externalising Bullying Hyperactivity/inattention Internalising Autism spectrum
Academic competence (teacher form only)	Reading achievement Maths achievement Motivation to learn

Discussion

This assessment was produced by two researchers, Gresham and Elliott (2008). It is published and sold through Pearson Clinical Assessments. There are national norms for preschool level in the United States, and standardisation based on a nationwide sample of 4700 students aged between three and 18 years; 385 teachers; and 2800 parents matched to the US population estimates for race, region and socioeconomic status. Psychometric properties as provided by the publisher are rated as good for internal reliability and test-retest reliability. Reliability and validity are outlined in the paper by Gresham and Elliott (2008) and in a review by Anderson and Catroppa (2016). The manual demonstrates evidence of adequate criterion validity, and reports adequate support for the convergent and discriminant validity of the SSIS rating subscales. Correlations between the SSIS and other rating scales demonstrated low or moderate correlations.

There is a small cost to purchase the rating scales manual (US\$136) and a pack of 25 hand-scored forms is US\$56. There are samples available of the SSIS Overview, SSIS Performance Screening Guide, SSIS Intervention Guide and SSIS Classwide Intervention Program. While the assessment may be hand-scored, there is also a software platform (ASSIST) that provides computer scoring and reporting, including individual, progress and multi-rater reports, as well as a link to suggested interventions via the SSIS Intervention Guide. Note that at the time of review the system requirements did not appear to support recent operating systems such as Windows 10.

The SSIS enables targeted assessment of individuals and small groups to help evaluate social skills, problem behaviours and academic competence. The frequency and importance ratings point to behaviours that may require intervention.

Early Abilities Based Learning and Education Support (Early ABLES)

Overview

Early Abilities Based Learning and Education Support (Early ABLES; Department of Education and Training 2015) is an online assessment for learning tool to help early childhood educators provide a more tailored learning experience for children aged two to five years with disabilities or developmental delay, within the context of the ECEC setting. It can also be used to support the transition to school for children with disabilities or developmental delays.

Instrument description

The suite of Early ABLES assessments involve early childhood educator questionnaires that take 15 to 30 minutes to complete, based on the early childhood professional's existing knowledge of the child. There are five areas of the tool:

- 'Identity and community' assesses the child's skills and understandings in social interaction, autonomy, responsibility and care for others.
- 'Wellbeing – emotional' assesses the child's understanding of the experience and expression of emotions in themselves and others.
- 'Learning dispositions' looks at the child's skills related to attention, memory and independence that lead to an increased sense of confidence as a learner.
- 'Communication' focuses on the child's interactions and assesses their communication skills, including the social conventions surrounding communication, both verbal and non-verbal.
- 'Communication – symbols' focuses on the child's representation of symbols and text, and documents their use and interpretation of symbols and text as a medium for communication.

The Early ABLES assessments produce three reports:

- a learning report, which summarises the skills and abilities the child is currently developing and those that the child might learn next
- a profile report, which maps the child's learning and progress across two consecutive assessments, in all five Learning Outcomes
- a group report, which provides an opportunity to reflect on the learning of groups of children.

Discussion

Early ABLES was co-developed by the Victorian Department of Education and Training and the University of Melbourne and is a scientifically validated tool for use with young children aged two to five years with disabilities and/or developmental delays. The ABLES tools were derived from the Students with Additional Needs (SWANs) assessment and reporting materials (Coles-Janes & Griffin 2009) developed with the support of the Australian Research Council as part of a Linkage partnership.

Not surprisingly, given its development in Victoria, Early ABLES is highly relevant to the Victorian ECEC context. It addresses many of the key aspects of the VEYLDF. The 'identity and community' construct addresses Outcomes 1 and 2 of the framework; 'wellbeing – emotional' addresses Outcome 3; 'learning dispositions' addresses Outcome 4; and 'communication' and 'communication – symbols' cover aspects of Outcome 5. For early childhood educators working in Victorian settings, Early ABLES is accessible at no cost via the Department of Education and Training website, together with online professional learning modules.

The descriptions of the reports make it clear that this assessment has a strong focus on learning pathways, and the individual learning report provides early childhood professionals with data that can be used to reflect on objectives and an appropriate focus for future learning.

This tool is one of the few that has a solid history of empirical validation focused on describing a developmental progression. Although Early ABLES has not been validated in the typically developing population, it has much potential to be applied to all children and not just children with additional needs. However, new work would be needed to validate the underlying progression of knowledge and skills, and to perhaps add further items or content at higher levels of the scale for older children.

Who Am I? (WAI)

Overview

Who am I? (WAI) (De Lemos & Doig 1999) is a direct assessment designed to assess the cognitive processes that underlie early literacy and numeracy skills, primarily to gauge school readiness. The emphasis of the assessment is on the developmental level of the child, not on curriculum content acquisition.

Instrument description

WAI assesses three aspects of development in children aged four to six years:

- copying (of geometric figures)
- symbols (the child's awareness of these)
- drawing (a picture of self).

The teacher leads the child, following a script, through a booklet of tasks. A rubric for each task response is provided to ensure consistent judgment. Each rubric includes clear samples and descriptions of the four levels of response. A score of zero is assigned where no attempt is made. Individual profiles and diagnostic maps can then be created to compare the child's scores with the expected scores for different groups of children on the same scale. Detailed information is provided to enable teachers to analyse each of the aspects of development and, further to this, suitable activities are suggested for children whose assessment level is below what is expected for their age.

Discussion

Rothman (2015) and the WAI manual (De Lemos & Doig 1999) provide detail about the validity and reliability of the instrument. The high level of stability of the instrument is also referred to. Both age-based norms and school-level norms are provided because both factors can influence a child's performance. Professionals are given clear instructions on how to use the statistics generated to ensure the most information is gleaned from the data. Further to this, there are instructions on how to create both individual profiles and individual diagnostic maps for each child so that teachers can create an accurate analysis of the child's performance. The developmental progression of each child can be tracked over time using the instrument.

This tool is a measure of a narrow construct and in this review it has been described as a measure of fine motor skills (drawing and copying). Some of the literature suggests it also assesses pre-literacy concepts.

Children's Independent Learning Development 3–5 (CHILD 3–5)

Overview

The Children's Independent Learning Development 3–5 (CHILD 3–5) checklist (Whitebread et al. 2009) provides early years teachers with a tool to assess the metacognitive and self-regulatory abilities of children aged three to five years, through observation. The 22 checklist statements were derived from an original 35 statements from the existing literature.

Instrument description

The CHILD 3–5 checklist includes four categories of self-regulation identified by Bronson (2000) for observation:

- emotional
- prosocial
- cognitive
- motivational.

Each category includes five to seven statements describing specific behaviours that are commonly observed and reliably understood by teachers.

A Likert scale is used by the teacher to assess the prevalence of each behaviour as 'always', 'usually', 'sometimes' or 'never'.

Discussion

The tool is sometimes referred to as the 'Checklist of Independent Learning Development'.

The CHILD 3–5 checklist strongly aligns to the Victorian Early Years Learning and Development Framework (VEYLDF) in reference to confidence and academic self-efficacy. Of the five VEYLDF Outcomes, the CHILD 3–5 checklist can be strongly linked to four. In particular, Outcome 4 highlights the relationship between confidence and positive dispositions towards learning.

The reliability of the instrument has been examined to some extent. According to the SPECTRUM database (Education Endowment Fund 2019b), the psychometric rating is 1/5. It has been shown to have a high level of internal consistency and inter-rater reliability, indicating the statements are easily interpreted. However, the CHILD 3–5 checklist requires further validation.

Leuven Involvement Scale for Young Children (LIS-YC)

Overview

The Leuven Involvement Scale for Young Children (LIS-YC) (Laevers, Declercq & Stanton 2010) is a five-point scale that focuses on children's wellbeing and involvement. This variant of the scale is appropriate for children aged three to six years.

Instrument description

The LIS-YC focuses on Laevers' two major indicators of the quality of the educational process: wellbeing and involvement. Of particular interest to this review is the involvement scale:

Involvement focuses on the extent to which pupils are operating to their full capabilities. In particular it refers to whether the child is focused, engaged and interested in various activities (Laevers 1994).

The LIS-YC is a five-point rating scale. At level 1, there is no activity. At level 5 there is total concentration and absolute involvement:

1. Low activity – Activity at this level can be simple, stereotypic, repetitive and passive. The child is absent and displays no energy. There is an absence of cognitive demand. Characteristically the child may stare into space.
2. A frequently interrupted activity – The child is engaged in an activity but half the observed period includes moments of non-activity, in which the child is not concentrating and is staring into space. There may be frequent interruptions in the child's concentration, but his/her involvement is not enough to return to the activity.
3. Mainly continuous activity – The child is busy at an activity but it is at a routine level and the real signals for involvement are missing. There is some progress but energy is lacking and concentration is at a routine level. The child can be easily distracted.
4. Continuous activity with intense moments – The child's activity has intense moments during which activities at level 3 can come to have special meaning. Level 4 is reserved for the kind of activity seen in those intense moments and can be deduced from the 'involvement signals'. This level of activity is resumed after interruptions. Stimuli from the surrounding environment, however attractive, cannot seduce the child away from the activity.
5. Sustained intense activity – The child shows continuous and intense activity, revealing the greatest involvement. In the observed period not all the signals for involvement need be there, but the essential ones must be present: concentration, creativity, energy and persistence. This intensity must be present for almost all the observation period.

Discussion

The Leuven Involvement Scale (LIS) was developed by a team based at the Research Centre for Experiential Education in Belgium (Leuven University). The developers acknowledge that involvement may seem to be a subjective property, but they believe it is possible to assess the levels of involvement in children in a reliable way. There are seven versions of the LIS for different settings and age ranges.

Research with the LIS has shown that the levels of involvement within a setting tend to be more or less stable (Laevers 1994). The levels are the result of the interactions between the context (including the way teachers handle their group) and the characteristics of the children. A large-scale project in the United Kingdom is cited that has trained more than 12,000 adults to use the scale to observe more than 60,000 children at the pre-primary level (Pascal et al. 1998).

To develop competencies and dispositions at a deeper level, 'an educational context must be constructed that brings children into the highest levels of "involvement": that is where deep-level-learning is taking place' (Laevers 2005, p. 10).

Preschool Learning Behaviors Scale (PLBS)

Overview

The Preschool Learning Behaviors Scale (PLBS) (McDermott et al. 2000) is a teacher observation scale for use with children aged 36–66 months. It assesses involvement in learning based on learning behaviours across three dimensions:

- competence motivation
- attention/persistence
- attitude toward learning.

Instrument description

The PLBS is a 29-item, teacher-completed measure of observable behaviours related to learning. The teacher is required to indicate whether the behaviour 'most often applies', 'sometimes applies' or 'doesn't apply' to describe the child's typical preschool behaviour over the past two months.

The scale focuses on ‘attentiveness, responses to novelty and correction, observed problem solving strategy, flexibility, reflectivity, initiative, self-direction, and cooperative learning’ (McDermott, Leigh & Perry 2002, p. 355). Examples of behaviours on which children are rated:

- shows a lively interest in the activities
- has enterprising ideas which often don’t work out
- follows peculiar and inflexible procedures in tackling activities
- carries out activities according to own ideas rather than in the accepted way.

Discussion

The PLBS observation scale is convenient for teachers to complete, and is unobtrusive for the children being observed. Assessment of social skills by observation in an authentic social setting is important, and a number of researchers make the point that while individual testing is appropriate for determining cognitive functioning, it is not so useful for determining behavioural and social functioning (Glutting & McDermott, 1988; Schaefer, Shur, Macri-Summers & MacDonald, 2004).

The PLBS creators’ goal was to develop a preschool scale similar to an existing scale for older children, the Learning Behaviors Scale (LBS), which was developed by Birrell, Phillips and Stott (1985). The PLBS benefitted from this earlier work in terms of item refinement, while wording of the LBS was altered to reflect less formal learning contexts (for example, ‘activities’ versus ‘tasks’). The arrangement of positive or negative forms of item wording is varied to reduce set responses.

The initial normative sample for PLBS was 100 three to five-and-a-half-year-olds in the United States, and factor analyses yielded distinct and reliable dimensions of Competence Motivation, Attention/Persistence, and Attitude toward learning (McDermott et al. 2002, p. 353). In their study confirming the validity and reliability of the PLBS scale, the developers were careful to maximise interobserver reliability to ensure consistency of results (McDermott et al. 2002, p.360).

Individualized Classroom Assessment Scoring System (inCLASS)

Overview

The Individualized Classroom Assessment Scoring System (inCLASS) (Downer et al. 2010) is an observational measure for use with children 36–60 months of age. The system is designed for observing and assessing children’s interactions with teachers, peers and with the tasks children are undertaking. InCLASS is useful as a measure of involvement, or engagement, in learning. It describes multiple dimensions of a child’s behaviour within classroom interactions.

Instrument description

The inCLASS measure collects data on children’s behaviour and interactions in several activity settings, including whole group, free choice, recess, transition/ routines, meal times, small groups and individual time. There are three main constructs: teacher interactions, peer interactions and task orientation. These constructs and associate measures are shown in Table 3. The measures of engagement (task orientation) are of greatest interest to this review, given their relevance to involvement in learning.

Table 3 Constructs in the inCLASS tool

Construct	What it measures
Teacher interaction	<ul style="list-style-type: none"> • positive engagement with the teacher – the degree to which the child is emotionally connected to teacher(s) and adults, including seeking and enjoying interactions with them, and using them as a secure base. • teacher communication – the degree to which the child initiates and maintains conversation with the teacher(s) and adults while using language as a functional tool to make needs, emotions and opinions known, such as requesting, commenting and questioning. • teacher conflict – the degree to which the child’s interactions with teacher(s) and adults are characterised by tension, resistance and negativity.
Peer interaction	<ul style="list-style-type: none"> • sociality – the degree to which the child experiences positive emotions and behaviours with other children, including the tendency to seek peer interactions, show social awareness and respond in a manner to which peers react positively. • peer communications – the degree to which the child initiates and maintains conversation with other children while using language as a functional tool to make needs, emotions and opinions known. • peer assertiveness – the degree to which the child uses positive strategies to initiate and lead interactions with other children, and the degree to which those strategies are successful. • peer conflict – the degree to which the child’s interactions with other children are characterised by tension, resistance and negativity.
Task orientation	<ul style="list-style-type: none"> • engagement within tasks – the degree to which the child is consistently and actively involved in classroom tasks and activities. This includes the amount of time the child remains focused on any given activity, the level of intensity or enthusiasm displayed, and the proportion of time the child spends on assigned activities. • self-reliance – the degree to which the child takes learning into their own hands. This includes the child seeking opportunities rather than passively waiting for teacher direction, and making best use of classroom resources (including the teacher). • behaviour control – the degree to which the child regulates movement, physical activity and verbalisations so that these match the expectations of the setting.

Discussion

InCLASS is to be used by trained observers who are trained in the inCLASS tool to assess children's behaviour in the classroom in a standardised, reliable and valid way. The observers may be researchers, teachers, educators, administrators or mental health professionals. The requisite training typically costs several thousand dollars plus travel to a training location. InCLASS is designed for use with children aged 36 to 60 months and is not validated for use with children outside this age range. It was developed at the University of Virginia prior to 2010, and was co-funded by the US Departments of Health and Human Services and Education. A benefit of the assessment for ECEC is that it describes multiple dimensions of a child's behaviour within classroom interactions. It has real potential to help new and experienced teachers individualise instruction.

InCLASS has mostly been used as a research tool, and several psychometric papers establish its reliability and validity as a predictor of academic, social and self-regulatory development during preschool. According to the inCLASS website, data has been gathered in more than 500 classrooms for over 2000 preschool and kindergarten-age children.

Summary

This review of the literature identified and defined the key components of learning development in children from birth to eight years. A list of 10 assessment tools spanning key aspects of children's learning was selected for review, and six principles for assessing children's learning were identified and described. These principles can be used by early childhood professionals to inform their decisions about assessment.

The tools selected have been validated to varying degrees, and most are accessible for administration by early childhood professionals. A key finding of this literature review is that there are relatively few validated tools available to measure Outcome 4 that are available to educators. Many tools are restricted to clinicians. Moreover, many of the tools relevant to Outcome 4 are checklist-style measures that do not capture a progression of learning appropriate for measuring growth in learning and development and describing the knowledge, skills and abilities being acquired by young people. The review concludes that there is further scope to develop tools that are fit for purpose and can be used by educators; capture a progression of learning; describe the knowledge, skills and abilities acquired along the progression; and measure growth within individual children.

The purpose of assessment, as it is understood in this review, is to enable early childhood professionals to intervene to support children's learning in evidence-based ways. Without the evidence that assessment provides, early childhood professionals may struggle to know whether their pedagogy is having an impact, or where gaps remain in children's knowledge and skills. Even if early childhood professionals do not choose to adopt these tools in their practice, it is hoped that thinking about the underlying constructs in these assessments (in Section 2) will help them to look at children's learning more deeply and purposefully. 'Cognition and general knowledge represent the accumulation and reorganisation of experiences that result from participating in a rich learning setting with skilled and appropriate adult intervention' (Shepard, Kagan & Wurtz 1998). Thus, the importance of well-informed intervention by skilled early childhood education and care (ECEC) professionals cannot be underestimated. From their experiences in ECEC settings, children construct knowledge of patterns and relations, cause and effect, and methods of solving problems in everyday life – the foundation blocks of confident and involved learning.

Early childhood professionals are one of the key identifiers of learning difficulties in early childhood. If children are experiencing learning difficulties, collaboration with and early referral to specialists is essential for maximising learning capability. This review provides early childhood professionals with the knowledge and resources to support assessment practices related to children's learning development. Early childhood professionals are well placed to provide high-quality support for children's lifelong learning and successful participation in society, and to work collaboratively in multidisciplinary networks to support children's learning.

Glossary

Agency: Having a sense of autonomy and being able to make choices and decisions, to influence events and to have an impact on one's world.

Attention-regulation: Taking responsibility for one's own direction, actions, attitudes and wellbeing. May involve using strategies such as goal setting, self-monitoring, self-correcting and soliciting feedback.

Cognitive flexibility: Human capacity to adapt mental processing strategies in the face of new conditions, to switch between different concepts, to think about multiple concepts simultaneously, or to think about something from another perspective. With working memory and inhibitory control, it is a key element of executive function.

Construct: A construct is a theoretical idea, such as a quality or attribute that, while not directly measurable, can be assessed if broken down into observable properties.

Dispositions: Specific motivational, temperamental, or emotional traits, habits or responses that contribute to a child's personality.

Early childhood professionals: The term early childhood professionals includes, but is not limited to, maternal and child health nurses, all early childhood practitioners who work directly with children in early childhood education and care settings (educators), school teachers, family support workers, preschool field officers, inclusion support facilitators, student support service officers, primary school nurses, primary welfare officers, early childhood intervention workers, play therapists, health professionals and teachers working in hospitals, and education officers in cultural organisations.

Executive attention: The ability to effectively block outside distractions while focusing on a single object or task.

Executive function: A specific set of attention-regulation skills involved in conscious goal-directed problem-solving. These skills include cognitive flexibility, working memory, and inhibitory control.

Fluid reasoning: The capacity to think logically and solve problems in novel situations, independent of acquired knowledge.

Formative assessment: Used to provide feedback during an activity or program to identify strengths and weaknesses in order to improve learning.

Inhibitory control: The process of self-control that enables a person to purposefully ignore a potential distraction, and to modify their response. With working memory and cognitive flexibility, it is a key element of executive function.

Involvement: Taking part in an activity at a level of engagement that exhibits sustained concentration, intrinsic motivation, focus and learning.

Likert scale: Used to measure how respondents rate a series of attitudinal statements on a continuum, such as strongly agree, agree, undecided, disagree, strongly disagree; named after its developer, Rensis Likert.

Motivation: The attribute that moves an individual child or a group of children to initiate, direct or sustain behaviour in order to satisfy a need or attain a goal.

Motor skills: Ability to manipulate and control limb and body movements to enable physical exploration and active engagement with the environment using both large movements, and precise hand and finger control.

Multidisciplinary network: Partnership where two or more professionals (for example, early childhood educators, community workers, allied health professionals and medical professionals) are involved in integrated and coordinated services to support positive outcomes.

School readiness: The cognitive, physical and psychosocial maturity required for learning in a school setting, and the ability of schools to positively engage with and support children and families.

Skills: A child's ability to do specific mental and/or physical activities that may require practice in order to be performed proficiently. Skills can be both taught and learnt.

Social skills: Competence that facilitates interpersonal communication and appropriate behaviours in a social setting.

Subdomains: Broad areas within a domain

Traits: Attributes that may be permanent and are often genetically influenced.

Transition: The process of moving between environments or routines, including between home and early childhood settings (VEYLDF, p. 37).

Unconstrained skills: Domain-general skills that increase indefinitely, and become increasingly complex across the years of development and across domains.

Working memory: The ability to hold and manipulate distinct pieces of information over a short period of time. With cognitive flexibility and inhibitory control, it is a key element of executive function.

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