Routes for Learning:
Guidance

Contents

Introduction

Context

Routes for Learning materials support practitioners in assessing learners with profound and multiple learning difficulties (PMLD) (see definition in Appendix 1). They focus on learners' communication and social interaction skills, early cognitive development and their interaction with the environment. These materials were published in their original form in 2006 and are well-regarded across Wales, the UK and internationally. They have been translated into a number of European languages, and used as far afield as Australia and Nigeria.

The Routes for Learning materials have been updated to support the wider Curriculum for Wales guidance and to reflect the latest research in the field. The purpose of assessment within Curriculum for Wales is to support each individual learner to progress along a continuum of learning at an appropriate pace, ensuring they are supported and challenged accordingly. Assessment contributes to developing a holistic picture of the learner. It helps identify their strengths, the ways in which they learn, their areas for development and any barriers to their learning in order to inform next steps in learning and teaching. Schools should use the Routes for Learning materials alongside *Supporting learner progression: Assessment guidance*[1]. They should also use these materials as appropriate in the context of the Additional Learning Needs Code[2].

The aim of this guidance is to enable practitioners to assess learners with PMLD and identify how best to support them in their learning. In addition to this guidance, the Routes for Learning suite of materials includes:

- the Routemap which provides an overview of early cognitive development, communication and social interaction, and interaction with the environment, showing the most important milestones as orange boxes[3]

- videos showing learners with PMLD whose responses exemplify Routemap boxes and milestones[4]

- the assessment booklet which provides support on how to use the Routemap through examples of assessment activities, teaching strategies and an indication of what to look for when assessing.

Although practitioners are welcome to use these materials to support other learners if they feel they are appropriate for those individuals, it must be emphasised that these materials have been developed specifically for learners with PMLD.

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1 hwb.gov.wales/curriculum-for-wales/supporting-learner-progression-assessment-guidance
2 gov.wales/sites/default/files/consultations/2018-12/draft-additional-learning-needs-code-for-wales_0.pdf
3 hwb.gov.wales/curriculum-for-wales/routes-for-learning
4 Exemplification videos can be found at hwb.gov.wales/curriculum-for-wales/routes-for-learning. Unfortunately, due to the impact that the COVID-19 outbreak has had on schools, we have been unable to gather further videos to complete the suite. The full suite of videos will therefore be published as soon as possible during the 2020/21 academic year.

Routes for Learning: Routemap

The Routemap shows very clearly that, although there are certain key milestones in development (the orange boxes) through which every learner is likely to pass, there is more than one possible route between these. The route taken by an individual learner with PMLD will depend on a variety of factors including the nature of their impairments and the learning experiences which are offered to them[5].

The behaviours on the Routemap represent the earliest stages, or foundations of learning. Because it is focused on these very early stages, Routes for Learning assesses communication and cognition and the links between the two. The materials take account of typical development, but recognise that every individual will follow their own unique pathway, and that for individuals with multiple disabilities some pathways or 'routes' may be very difficult, or even impossible.

Each box on the Routemap has a number. Behaviours which are generally developmentally earlier have lower numbers. However, these numbers provide an easy way to refer to the different behaviours and do not represent an expected sequence in which behaviours are likely to be learned or in which they should be taught. Development isn't linear and insisting on all learners following the same route despite their different abilities and disabilities is likely to be a barrier to progress for some. For a further explanation of the Routemap, please see the explanatory note[6].

Routes for Learning principles

The Routes for Learning materials have been developed with the following principles in mind.

- The focus is on the learner – on their abilities rather than disabilities.

- The main purpose of assessing a learner is to enable them to make the best possible progress in the development of skills, knowledge and understanding.

- Assessment is process-based and looks at the relationship between the learner and their environment.

- Learners should play an active part in the assessment process with the involvement of families and all professionals working within the support team.

- Practitioners undertaking assessment should have a high regard for relationships, support interactive approaches and ensure a responsive learning environment.

- Assessment draws on many sources of information and is founded on research evidence.

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5 Some of the work carried out with the original version of Routes for Learning Routemap suggests that some learners, especially those with sensory impairments, may not achieve all the orange boxes in the expected order. This finding is consistent with research with learners with visual impairments which shows that these learners have particular difficulties with 'Object permanence' (Routemap milestone 34) (Bruce and Vargas, 2012).

6 hwb.gov.wales/curriculum-for-wales/routes-for-learning

Assessment should:

- empower practitioners and parents/carers to value all sources of knowledge about a learner and to share and feed back information in a clear and helpful format, including the learner if possible, to promote consistency between practitioners and others assessing the learner

- support practitioners and others in seeking evidence of learner progression, and help them to focus on next steps and priorities for future learning

- provide a holistic picture of the learner and the learning process.

The learner is at the centre of the assessment process which suggests the following elements should be considered:

- general information about the learner, e.g. how they react to parents, carers, and familiar or unfamiliar people

- specific information regarding the learner, e.g. their preferred language, barriers to learning such as medical conditions, sensory impairments, current level of cognitive development

- the type of environment the learner prefers, e.g. a quiet environment or a group situation

- tasks and learning activities, e.g. how the learner reacts to different tasks or activities, the learner's preferred channel of processing and means of expression

- teaching methods/resources and social teaching relationships, e.g. teaching methods that best suit the learner and the impact of relationships (i.e. does the learner respond more positively to certain practitioners?).

Assessment in the context of Curriculum for Wales

Assessment has been usefully described as 'a process of on-going problem solving which increases participation and self-determination' (Kefallinou and Donnelly, 2016). As such, assessment is central to responsive teaching. Learners should be involved in their learning and they should be provided with motivating experiences and opportunities to demonstrate preferences. This will help to enhance their self-esteem, to support increasing independence and to empower them to gain more control over their further learning and their lives. High-quality assessment processes depend on learner participation and activity by practitioners who are well-informed and capable of taking professional decisions to meet the needs of their learners.

Assessment is intrinsic to curriculum design and its overarching purpose in Curriculum for Wales is to support every learner to make progress. It is the set of processes through which progression in learning is recognised and supported on an ongoing basis. It is integral to learning and teaching and it requires partnerships among all those involved, including the learner, practitioners, parents/carers and external partners such as health professionals.

Assessment should focus on consolidating and moving learning forward by identifying and understanding the learning which has already taken place and using this to ensure that each learner is challenged and supported appropriately, according to their individual needs. However, it must be acknowledged that some learners have life-limiting conditions, which may be regressive, leading to them losing skills they had previously gained. This is unfortunately the case for some learners with PMLD. For these learners, assessment might more appropriately focus on identifying those competences which are most important to the individual, compensating as far as possible for the consequences of loss of skills.

Assessment is not a 'one-off' event but a continuous process, which involves a series of observations. It requires a range of information to be gathered about a learner's progression over time, in different situations, with a variety of adults and peers. It is an integral part of an interactive learning process. Assessment processes involve:

- observing and collecting evidence of learning (what has been learned, how it has been learned, and any learning approaches that haven't been successful)

- reflecting on and interpreting this evidence

- making, sharing and reporting on conclusions which reflect the broad range of curricular experiences

- planning the next steps in learning and how they might be taught.

Assessment guidance within Curriculum for Wales

The Curriculum for Wales guidance supports schools in designing a curriculum which is appropriate to their learners and reflects their local context. Assessment forms a fundamental part of this process. As schools design their curriculum, they will also develop assessment arrangements to demonstrate the progress made by all learners across the whole curriculum. Where reference is made within this guidance to either 'curriculum', 'learning and teaching' or 'planning for learning', assessment is seen as implicit.

The Routes for Learning materials support practitioners and schools in assessing learners with PMLD. Schools can build these materials into their assessment arrangements. For more information on Curriculum for Wales, please see pages 27–29.

Supporting learner progression: Assessment guidance[7] is a key strand of the Curriculum for Wales guidance. To support the progression of each learner, it identifies three main roles for assessment for learners aged 3 to 16:

- supporting individual learners on an ongoing, day-to-day basis

- identifying, capturing and reflecting on individual learner progress over time

- understanding group progress in order to reflect on practice.

Supporting individual learner progress on an ongoing, day-to-day basis

The purpose of assessment within Curriculum for Wales is to support the progression of each individual learner. This is achieved through ongoing assessment embedded in day-to-day classroom practice and in the processes of learning.

Assessment to inform planning will involve:

- reviewing prior learning

- identifying intended learning outcomes

- developing stimulating learning activities

- identifying optimal contexts for learning

- considering how to gather evidence of learning.

Used effectively, this information, which reflects the three key processes in learning identified by Wiliam (2013), will enable practitioners to identify areas for development, next steps and the means by which these can be achieved. Practitioners will also need to take account of any barriers to learning and the support needed to overcome these and consolidate learning.

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7 hwb.gov.wales/curriculum-for-wales/supporting-learner-progression-assessment-guidance

The Routes for Learning materials are designed to support learning by helping practitioners to identify and gather evidence which will enable them to support each learner to move through a developmental pattern appropriate for that learner. As they plan learning activities, practitioners will support learners to become more actively involved in their learning by clearly identifying specific learning intentions and focusing on how they provide prompt, consistent and responsive feedback. They should take into account each learner's preferred sensory channels and means of communication.

Identifying, capturing and reflecting on individual learner progress over time

Practitioners will collate, summarise, share and report what each learner has learned over a period of time, and this will further support individuals' learning and progression. Records will note how they have learned, and will include outcomes, processes of learning and support afforded/provided. This will help practitioners to identify the progress being made by an individual learner over time and will, as appropriate, incorporate information which is indicative of:

- the learner's experience of particular learning contexts
- learner interests and motivation
- frequency and typicality of the learner's responses
- the learning preferences and strategies of each learner
- optimum teaching approaches and contexts
- the types and forms of support needed by each learner.

Identifying and capturing progression in learning shouldn't focus solely on the steps related to a single task but should look at how learning fits more holistically into the learner's development and its relevance to their whole life. Evidence can therefore be drawn from a learner's experiences within and beyond the school environment, for example social, play and leisure activities with peers and/or family, which can contribute to learner development.

This process will provide practitioners with the opportunity to 'stand back' and gather, evaluate and use evidence provided across a number of occasions and contexts to capture how the learner has progressed. This will inform longer term effective planning. The learner should, as far as possible, be engaged in identifying and selecting evidence of learning.

Summarising and reporting on learning is central to communicating and engaging with parents or carers and, where appropriate, advocates. This engagement through the provision of information is both an end in itself and a powerful tool for supporting progression through activities at home and in other contexts outside of school. It is, therefore, important that this engagement is well-informed.

Valid and reliable summaries of learning and development will also play an important role in discussions and collaborative planning with colleagues in other professions to provide the range of support appropriate to the learner. Such information will also support transition whether from school-to-home, class-to-class, school-to-school, school-to-college or to other forms of supported living.

Understanding group progress in order to reflect on practice

Reviewing and reflecting on evidence gathered to report on individual progress should enable practitioners and leaders within the school to understand the progress made by different groups of learners. This should be used to identify strengths and areas for improvement in the school curriculum, school/class organisation and planning, learner support and pedagogy.

Such consideration and review can:

- support professional learning

- inform refinement and further development of resources, tasks and teaching approaches

- improve the timing and pace of learning

- extend the range of methods and evidence used to assess learning

- enrich the means by which feedback is provided to learners

- further inform the ways in which learners' responses are ascribed meaning.

Professional dialogue between schools can usefully build upon the reflection and collaborative practice that has taken place within schools. Such processes should enable schools to learn from each other and can be particularly valuable where schools have only a few learners with PMLD, e.g. where learners with PMLD are included in mainstream settings.

Assessment in the context of Routes for Learning

The Routes for Learning assessment materials cover the key learning priorities for learners with PMLD (i.e. communication and social interaction, early cognitive development, and interaction with the environment).

For learners working at very early stages of development, a holistic approach to learning is particularly important. As part of the ongoing assessment process, developmentally appropriate objectives can be set within the context of functional and meaningful activities. Development in the essential areas of communication and early cognitive development will also contribute to the learner's health and well-being.

The areas of learning and experience within Curriculum for Wales provide vehicles to achieve these objectives in the context of a broad and balanced curriculum, appropriate to

the setting in which learners are being taught. The key focus must be on developing essential skills for learning and for life. Next steps and individual learner objectives should be regularly monitored, evaluated, reviewed and refined to ensure that they remain relevant as the learner makes evident progress. These monitoring and review processes should also highlight if a learner requires further support to achieve the objectives set, or if they are regressing in one or more aspects of their learning. Consideration should be given to how to maintain progress and, where a learner is regressing, how to compensate for the consequences of loss of skills as well as how to support further progression in learning. Practitioners working with learners who are regressing will need support from the multidisciplinary team and from senior colleagues.

This approach represents a continuum of possibility rather than a simple linear process; learners may follow different pathways, make detours, proceed quickly in a spurt or regress in one or all aspects of learning. Regression may indicate a deterioration in physical or mental health or in the learner's daily life and relationships. This approach will also support practitioners in drawing appropriate conclusions about learners' progress contextually on a day-to-day basis. This should inform the planning of the most appropriate learning experiences for the learner at that time.

Many learners with PMLD who show awareness of and begin to respond to stimuli as these become familiar to them may need time, when presented with a new experience, to become familiar with this before showing the same level of response. For this reason, there may be a delay before they appear to make further progress in learning.

Over time, learners may show increasingly consistent responses and begin to generalise these in a wider range of situations and/or with different people, although fluctuations in performance are likely to continue. Extrapolating from any conclusions drawn about the achievement of a single small step within a sequence may be misleading; the learner may show some characteristics of performance on several different levels, which vary widely at different times and in different situations.

Evidence of progress

While the information gathered for learners with PMLD will have a different learning focus from that gathered for many other learners, the same principles and purposes apply.

For learners with PMLD, the range of information gathered and analysed to establish progression in learners' skills and capabilities will relate clearly to their development and priorities agreed for their learning.

Among other sources, progress may be evidenced:

- through increased awareness and a greater range of responses leading to a higher level of engagement and participation
- by moving from use of near senses (tactile, proprioceptive, olfactory) and learning through sensation and movement to increasing use of more distance senses (visual, auditory)

- by movement through the communication continuum – from behaviours which are non-intentional (involuntary/reflex responses) through voluntary and unconventional communication (e.g. body movements) to more conventional means (e.g. vocalisation, gestures, pictures) (See Table 2 on page 48)

- by movement through the interactive sequence – from resisting contact with others through tolerance, passive cooperation and supported involvement to enjoying social interactions and experiences

- through a reduced need for support – moving from coactive involvement, physical guidance through gestural or verbal prompts towards naturally occurring cues and independence

- by extending the repertoire of learning positions (e.g. face to face, sitting, standing in frame)

- by a reduced need for 'artificial' reinforcement as learners become motivated by naturally occurring events and consequences

- by a move from dependence on a secure and predictable routine to a greater degree of autonomy

- by a reduction in frequency and/or severity of behaviour that inhibits learning and an increase in more appropriate behaviour which promotes learning

- by extending the ability/strategies for coping with frustration or failure

- by extending the ways of learning in response to new and challenging situations

- as learners follow the same pattern as for other learners but take longer

- when learning is transferred between different contexts or use and combines skills in different ways

- when the same achievement is demonstrated on more than one occasion, refining skills in a range of circumstances, situations and settings

- when there is a decision not to respond.

Using Routes for Learning to support assessment

Assessment is integral to learning and teaching. It should take place in an environment that is familiar to the learner and be carried out by familiar practitioners. The involvement of parents, carers and other family members should be encouraged at all stages because the behaviour of learners may vary at home or in the presence of family members. The family will know more about their child's development than can be ascertained from observations in school. Their input will be essential, as will contributions from the multidisciplinary team supporting the learner. This engagement will also help parents/carers to respond actively to information provided about their child's learning and, in collaboration with the school, plan ways of supporting that learning within and outside school.

Assessment will reflect careful observation of the learner in a wide range of contexts in school. Practitioners will note a learner's responses to the planned activities of the class, recording and then reflecting as a team on responses which seem significant when considered against the specific boxes and milestones of the Routemap. The aim should be to build up a short narrative summarising evidence about the range of responses observed to date in order to identify next steps in learning.

There will inevitably be more evidence for some boxes and milestones than for others and the process of gathering evidence may need to become more focused. Starting at a box known to be within the learner's capability, practitioners should set up appropriate activities, moving through the pathways until well beyond the point at which the learner appears not to respond (while remembering that not all boxes and milestones need to be achieved in a hierarchical sequence). Decisions about whether a particular Routemap box has been achieved securely or not should remain tentative and open to adjustment until evidence is clear and robust.

This process will help practitioners to identify realistic 'next steps' for the learner. These may then be addressed as targets in individual learners' plans. A target might be set for both 'communication' (boxes on the left of the Routemap) and 'cognition' (boxes on the right and centre of the Routemap) and may specify contexts. To the extent that evidence shows a learner is progressing, targets and next steps can be adjusted after a period to encourage more independent learning and to reflect new curriculum contexts.

The learner should be encouraged to achieve each box and milestone in at least four different contexts to ensure that learning is secure. This means that the learner will not just demonstrate a skill in one curriculum area which will then be deemed 'achieved', but will also be encouraged to generalise the new skill across the curriculum. This allows practitioners to develop a fuller understanding of how a learner is progressing, which will help them to identify appropriate next steps to move learning forward. This will also ensure that a learner's progress does not 'plateau', that they continue to achieve in new contexts and that skills are fully embedded.

As noted, there will be times when it is appropriate to stand back and identify and record a learner's progress over time. It isn't possible to do this by providing a summary score; the Routes for Learning materials recognise that the complex behaviours of a learner with PMLD cannot be adequately described in this way. A number of schools have developed approaches to identifying and recording assessment using Routes for Learning. One such approach is shown in the case study on page 13.

Case study 1

At Ysgol Crug Glas in Swansea, practitioners update every learner's achievement on the Routemap at the end of each school year and, after the school has carefully checked underlying evidence, these annual records are compared in order to demonstrate progress over time.

The EnRoute Database has been used for more than a decade at this special school for learners aged 3 to 19. There is space for approximately 100 words for practitioners to record a narrative describing how a learner has achieved any Routemap boxes and milestones. It is also possible to link video as further evidence.

The narrative of a learner's achievement across the Routemap can be recorded on sheets of A4 paper and is particularly valued as a report for parents and carers. An annually highlighted Routemap shows a snapshot of progress.

The database also allows practitioners to share ideas of how they provided experiences for learners, assisting colleagues when they plan activities for their own learners. The progress of all learners can be easily viewed in various formats and used to inform evaluation of the curriculum, learner grouping, levels of support and suitability of resources.

Assessments to supplement Routes for Learning

Few published assessments provide detailed information for children at this early level of development. One that is appropriate is the Communication Matrix (Rowland, 2013) which assesses expressive communication of typical development from 0 to 24 months. It works by asking how the learner expresses each of four communicative functions – refusing things, obtaining things, engaging in social interaction, and giving or seeking information. From this, the learner's communication is described according to seven levels from 'Pre-intentional behaviour' to 'Language'.

Although originally published more than 30 years ago the Affective Communication Assessment (ACA) (Coupe et al., 1985) can also provide useful information to supplement that gathered from parents, carers and others who know the learner well. The ACA was developed by Coupe et al. in a school context to fulfil the need for an assessment for learners at early stages of communicative development. Through observation, they felt that sensitive communication partners could identify consistently occurring patterns of behaviour as a basis for programmes of intervention. This would lead learners to extend their affective communication (i.e. where adults interpret and place communicative meaning on the learner's responses to the environment) and move towards intentional communication. Stimuli that elicit strong positive or negative responses from the learner can be observed to determine their pattern, frequency and consistency. This observation can then be used as a basis for extending affective communication. Video or joint observation may be used and stimuli may need to be presented twice in succession with a

pause in between to establish the consistency of the learner's response. Following these initial observations, the strongest responses of like, dislike, want and rejection can be noted. Stimuli can then be re-presented and behaviours further analysed. It may be possible to identify clusters of behaviours which are reliably linked to one specific interpretation of the learner's response (e.g. dislike). Situations can then be planned to allow the learner to communicate with practitioners who are alert to the behaviours and able to respond in appropriate ways. This will increase the frequency and quality of the learner's responses and shape the development of intentional communication.

Although not designed specifically for learners with PMLD, the Eye-Pointing Classification Scale (University College London and Great Ormond Street Hospital) provides a useful tool for assessing looking behaviours in non-speaking children with cerebral palsy affecting their whole body. The eyePoint scale describes looking behaviours in five levels.

With regard to the use of assistive technology, the Switch Progression Road Map (Bean, 2011) is a useful resource. It suggests ways in which technology can be used to support learners from the earliest stages of noticing stimuli to making independent choices using switches. It has particularly useful sections on assessing where the learner is in their understanding of cause and effect and on selecting switches to ensure that learners receive consistent responses to their actions.

In using any of these assessments, practitioners should continue to be guided by the principles of Routes for Learning (see pages 4–5).

Approaches to teaching

This section provides an overview of some of the theories and perspectives that have informed the ways in which learners with PMLD are taught. These are not mutually exclusive and can be regarded as different lenses through which to think about learners, observe their responses and plan their educational experience. Following Burton and Sanderson (1998), the focus is on developmental, behavioural and functional perspectives. As this guidance is primarily for early years settings and schools, their 'ordinary living' perspective will not be considered here, but in line with much work in the years since Burton and Sanderson's paper, the interaction approach will be included.

These perspectives generate different ideas for both what to teach and how to teach. In the next few sections, each of these approaches is considered in turn, exploring how they help practitioners to understand and plan for learners with PMLD.

Developmental approaches

Developmental approaches assume that all learners progress through roughly the same sequence of stages towards an end point. Many developmental theorists draw on and extend the stages and processes described by Piaget[8].

Routes for Learning, as an assessment tool, can therefore be seen as 'developmental' as it assumes progression through a series of stages. So, assessment enables practitioners to identify developmentally appropriate targets and objectives for a learner.

Developmental approaches have some key principles that underpin how assessing and teaching should be carried out (adapted from Hodapp et al., 1990).

- Learners must be active participants in their learning.

- Learners' behaviour is evidence of underlying cognitive schemes so learners' behaviour gives insight into their underlying thinking and understanding.

- Developmental changes can be both quantitative (e.g. fixating for longer) and qualitative (e.g. approaching a task differently).

If adhering very closely to a developmental approach, practitioners would not attempt to teach a particular concept or behaviour until they were sure the learner had mastered all behaviours that proceed it in the developmental sequence. Sticking to this concept of developmental readiness too closely may prevent practitioners from trying to teach a 'next step' that the learner could achieve with creative approaches (e.g. teaching, use of technology, changes to the environment). Therefore, as with all the approaches described in this guidance, practitioners' judgement is important.

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8 A readable description of Piaget's theory of child development can be found at www.simplypsychology.org/piaget.html or in Bates (2019).

The emphasis on learners being active in (as opposed to passive receivers of) their own development encourages us to consider the learner's interests and preferences in learning activities and the context for learning. Playful activities can be 'powerful motivators in learning' (Nind and Hewett, 2005, p. 73), especially for learners with PMLD for whom a large proportion of the school day often needs to be devoted to meeting personal, medical and care needs (Corke, 2011).

Interactive approaches

Interactive approaches are based on the idea that much of our learning takes place in a social context, in interaction with a person (parent, carer, practitioner, sibling, peer) who is at least a little more advanced than the learner. This concept comes from the work of Vygotsky[9].

Vygotsky, like Piaget, thought about children from a developmental perspective, but with the additional concept that learning was fundamentally social.

Vygotsky first proposed the idea of a zone of proximal development (ZPD). This is the zone of learning beyond which the child cannot succeed independently, but where they can progress with facilitation from the more advanced person. This might involve active support from this other person, or could involve changes in the environment, or support from technology. For Vygotsky, and later researchers like Bruner, play is a very important context for learning; play is a way to tempt the child into that zone of proximal development.

Vygotsky's ideas have been developed by more recent educationalists, most notably Bruner[10], whose concept of scaffolding is very similar to the ZPD. It involves a structured interaction between a 'practitioner' and a learner with the aim of enabling the learner to achieve a particular goal.

According to interactive approaches, learning can successfully be achieved 'in the context of an affectively rich and engaging interaction' (Rogers and Dawson, 2009, pp. 25–26). The theory of inter-subjectivity as the way people understand and relate to one another can be relevant here. Trevarthen (2011) studied successful interactions between newborn infants and their primary caregivers and found that the caregivers' responsiveness to babies' initiatives developed shared understanding (inter-subjectivity), which he regarded as the basis of all effective communication, interaction and learning.

Interactive approaches can provide a broad framework for learning and encourage practitioners to move away from the teaching of small sequential steps. Over-reliance on predetermined small steps (such as those that may typically be part of a programme devised around developmental or behavioural principles) may distort individual priorities and narrow the curriculum taught. The main principles of interactive approaches are summarised on page 17.

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9   www.simplypsychology.org/vygotsky.html or see Bates (2019).
10   www.simplypsychology.org/bruner.html or see Bates (2019).

- Learning depends on good interpersonal relationships with sensitivity to feedback from the learner.

- The emphasis is on respect, negotiation and participation to motivate learners without the need for extrinsic (external or artificial) rewards. As with the developmental approach, this implies understanding the learner's interests and preferences as motivating factors.

- Teaching adopts a more holistic approach which often challenges breaking skills and content into small steps. Holistic approaches view the person with PMLD in their entirety (i.e. they have a range of needs to be met, e.g. physical, communication, cognition, mental health) and they have been reported to be more effective than fragmentary approaches (e.g. targeting one area of development/needs) (Nind, 2008).

- The idea of 'tasklessness', as described in Nind and Hewitt (2006), suggests that the teaching process is as important as the learning outcome and that open-ended and experiential activities should be scaffolded and extended.

Behavioural approaches

Behavioural approaches have a long history in special education (Bates, 2019), with their origins in classical and operant conditioning[11].

Some key principles include the following.

- Practitioners should focus on observable behaviour rather than internal processes (note the contrast with the developmental approach).

- Learners' behaviour is understood as a function of reinforcement. Reinforcement increases the likelihood of a behaviour occurring. It can be both positive (adding something pleasant) and negative (removal of something unpleasant). In contrast, punishment decreases the likelihood of a behaviour occurring. Approaches based on punishment should not be used.

'Reinforcement' means that behaviours that are followed by something pleasant happening or which avoid something unpleasant happening are more likely to be repeated. Consider the following situation. A child stops what they are working on in the classroom and starts to cry. As a result, the practitioner comes over and helps the child. The child stops crying. What is happening here in terms of reinforcement? The child's behaviour (the crying) is being positively reinforced as they gained help from the practitioner as a consequence of crying. Therefore, the child is more likely to cry the next time they need help with their work. At the same time, the practitioner's behaviour (helping the child) is being negatively reinforced (the practitioner's behaviour resulted in the avoidance of the unpleasant crying) and therefore the practitioner is more likely to come over to the child and provide help the next time they cry. It is important to remember that learning through conditioning happens for both the 'learner' and the 'practitioner'.

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11 www.simplypsychology.org/operant-conditioning.html or see also Bates (2019).

Strict adherence to a behavioural approach can risk a mechanistic view of learning and teaching, with the questionable assumption that anything can be taught if we can break tasks into small enough steps and find the right reinforcer. Behaviourism has often been criticised for teaching context-limited skills in highly structured and often non-naturalistic environments, using unethical principles (e.g. very intensive intervention or punishment) and off-putting, dehumanising language (e.g. aberrant/maladaptive behaviours), but current approaches to behaviourism have moved away from such practices.

Behavioural approaches provide us with several techniques for teaching, such as reinforcement, task analysis, prompting, modelling and shaping (Browder et al., 2014; Cooper, Heron and Heward, 2007; Richman, 2001). It is very important that any teaching targets are functional and relevant to the learner.

Behaviourism also underpins two approaches which are widely used with children whose behaviour is challenging.

- Early Intensive Behavior Intervention (EIBI) often known as Applied Behavioural Analysis (ABA), which is its underpinning theory.

- Positive Behaviour Support (PBS).

EIBI is used particularly with autistic children, and involves highly trained practitioners delivering individualised function-based behaviour plans. PBS focuses on creating supportive environments, improving quality of life and teaching new skills to replace the behaviours that challenge. This positive approach has led PBS to be considered for some learners with PMLD who have behaviours that challenge.

Functional approach

The functional approach is much more practical and less theoretically based than the three approaches described above. This approach emerged as an alternative to a strong developmental approach, which implies that we have to wait for learners to be developmentally ready to learn next steps.

A functional approach suggests a focus on:

- practical support for activities that are relevant and meaningful for the learner

- teaching activities that are functional (have some use) for the individual

- all teaching, therapy or intervention taking place in a real-world (ecologically valid) setting.

At early stages of learning, practitioners might want to give learners experience of trying activities in a safe, carefully managed version of a real-world setting, in the way we might role-play activities before trying them in a real context. The focus is often on working out what practitioners need to do to ensure success in that moment and the role of the practitioner (or of assistive technology) is to 'bridge the gap' between what the person can currently do and the skills that are 'necessary' for the task (Beadle-Brown, Murphy and Bradshaw, 2017).

This approach suggests that, when identifying an objective or a target for teaching, we should always ask whether it has some value or use for the learner. For young children, 'real-world' activities would include play and would be informed by learners' interests and, where possible, choices.

Summary

These four approaches to teaching – developmental, interactive, behavioural and functional – are all part of the practitioner's 'toolkit'. Each has strengths which support different contexts and demands, and can be used in a complementary way.

The following key points derived from these approaches are all important to consider.

- Learners' active engagement is important, emphasising the importance of practitioners knowing what interests and motivates learners.

- Responsive relationships between the learner and the practitioner support learning.

- Teaching approaches should maximise feelings of success.

- Teaching objectives or targets should have use or value for the learner, remembering that play and interaction with others may not have extrinsic 'value' but are likely to be important to the learner.

- The learner and their preferences should be at the centre of every approach followed.

Use of assistive technology in teaching

The importance of ensuring that all learning targets and objectives are of value for the learner also applies to the use of technology. Any technology should be selected and used for supporting the learner.

Assistive technology can be defined in many ways. The British Assistive Technology Association says:

> "Assistive technology is any product or service that maintains or improves the ability of individuals with disabilities or impairments to communicate, learn and live independent, fulfilling and productive lives."

This definition links assistive technology to broader issues in the lives of learners including those with PMLD. In this case, the aim of assistive technology should be to help learners participate more actively and contribute to the communities in which they live. Assistive technologies, therefore, play an important role in widening access and offering opportunities for inclusion.

When using assistive technologies to address the needs of learners '[assistive] technological devices are expected to promote forms of adaptive responding (e.g. control of environmental events/stimulation, communication, indoor travel, and constructive activities) by bridging the gap between the person's behavioural repertoire and the abilities required for the adaptive responding being targeted' (Lancioni et al., 2013).

Importantly, technology should be assistive and allow greater access for each individual learner to achieve educational and curricular goals. This may be through the use of well-designed support programmes that focus on the use of the technology to allow progress along a curricular path or through the training of practitioners and facilitators to design lessons that use assistive technology to achieve clear curricular goals.

One example of this within the context of Routes for Learning is the use of switches, or, where appropriate, eye-tracking devices, to enable a learner to operate a motivating toy or other item, and so make progress towards Routemap milestone 23 (Responds to cause and effect) and Routemap milestone 26 (Shows understanding that their action causes a specific effect).

Along with literacy and numeracy, digital competence is a cross-curricular skill that is embedded across Curriculum for Wales[12]. In light of this, the role of assistive technology for learners should allow meaningful engagement with the curriculum as a whole. Techniques required in order to use the technology itself shouldn't become the sole focus of the learning (Hayhoe, 2014; Lancioni et al., 2013).

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12 The Literacy and Numeracy Framework and the Digital Competence Framework are available as guidance to support schools when planning opportunities to develop these skills across the curriculum. hwb.gov.wales/curriculum-for-wales/cross-curricular-skills-frameworks

Some researchers suggest that assistive technology and devices should be used alongside more traditional educational resources, rather than as a replacement for them. For example, if the learner's motor skills allow for actions such as banging on a drum, this should be used as well as generating an electronic noise of a drum by pressing a switch.

Practitioners will be aware of the need to consider the accessibility of all such devices to learners, and will plan for a variety of means by which the learners can use them. This may include the use of feet rather than hands, tilting plasma screens to allow for head movement as a means of activating device features or by the use of sound bars in order to facilitate the progress of visually impaired learners.

The Switch Progression Road Map (Bean, 2011) can support learners in making choices (see page 14).

Different forms of assistive technology can be used to support learners. Examples of devices that may be used within schools to support cognition and communication are given below.

Cognition

The use of switches or micro-switches and micro-switch clusters help learners to influence aspects of their environments through small actions, allowing development of cause and effect and interaction in the form of noticing and reacting to cause and effect.

- Devices that guide exploration of the learners' environment (e.g. interactive tiles in sensory rooms) can help learners to develop their spatial awareness.

- Devices that can display pictures and sounds (e.g. via touchscreens) can be used in supporting decision-making and completing multi-step activities.

- Mobile devices (e.g. tablets) can offer opportunities for learners to interact with a screen from a variety of positions (e.g. when sitting or lying down).

Communication

A range of assistive technology devices can support learners in developing communication by providing increased opportunities for them to take part in communicative exchanges. Assistive technology devices can increase the likelihood that others will notice and respond to learners' communicative attempts.

- A simple single message device can be used by the learner to attract other people's attention for social interaction ("Hi, I'm Jenny. Talk to me.").

- Lines from a story can be recorded on a similar device to allow a learner to take part in a story ("We're all going on a bear hunt").

- Simple 'light tech' voice output devices with a small number of message options indicated by pictures or symbols.

- More complex, 'hi-tech' computer-based speech-generating devices that can translate actions into a wide variety of verbal expressions and requests (voice output communication aids (VOCAS)).

- Resources that focus on access and support motor function skills and communication, including modified keyboards, electronic pointing instruments (including eye-tracking devices) and on-screen keyboards.

- Text-to-speech devices and apps/software that can help to raise learners' awareness of written text and can support the development of literacy skills.

More information on communication aids is available at https://acecentre.org.uk/getting-started/more-about-communication-aids.

The above examples are not exhaustive and, due to the rapidly changing nature and availability of technology, may constantly be replaced by newer, cheaper and more accessible hardware, software and supporting educational programmes. Advances in mobile technology have greatly expanded opportunities for inclusion offered by mobile devices and tablets (Hayhoe, 2014).

Some of the transformative effects of using assistive technology in supporting progress towards specific learning goals can be seen in the following case studies.

Case study 2

Ysgol y Deri in Penarth has two key assistive technology documents – an Assistive Technology Policy and an Assessment Procedure Pathway. The purpose of these documents is to maintain consistency in the assistive technology service delivery in the school, potentially avoiding the challenges which can lead to discontinued use of assistive technology allocation. The team have been working on developing these documents to form the foundations on which to build and develop effective service delivery.

Currently, there is a large team of education and health practitioners involved in identifying and providing the most appropriate forms of assistive technology to support learners with PMLD in their learning. This team consists of a dedicated teacher for assistive technology, a design technology teaching assistant (responsible for modifying equipment for access), a leader of learning: communication, and a leader of learning: sensory. The size of the team highlights the importance of having clear guidelines to manage a consistent service delivery. Managers have a significant role in the department, both supporting the team's development and providing financial support. Learners who have dedicated Augmentative and Alternative Communication devices/assistive technology equipment allocated to them, each have a key teaching assistant who receives ongoing training to support the learner. There is also a behaviour team at the school, as well as access to a teacher of visually impaired (VI) (the assistive technology teacher is also VI trained). Parents/carers are seen as key to success in all areas of assistive technology.

It is essential to have a clear assistive technology policy for the school which is understood by all members of the team as it establishes exactly how the team must function and ensures a consistent approach to supporting learners. When combined with approaches such as IPAACKS (Informing and Profiling Augmentative and Alternative Communication (AAC) Knowledge and Skills) (NHS Education for Scotland, 2014), staff skills can be addressed and the team can work towards an even more fluid collaborative approach. For clarity, it is essential to address the terminology used and establish a common language to avoid ambiguity and unnecessary confusion, ensuring the assistive technology documents can be clearly understood by the target audience.

Learner involvement in decision-making is central to the learning process and this is key to both documents to ensure consistency for all learners. It is vital that the documents reflect the value the team place on individuals and to ensure the learner and their families are clear that they are central to the entire process.

Consideration of appropriate ways of gathering data about the individual learner and the technology inform decisions and is also a critical element of the documents. This data should be reviewed and interpreted in order to make an informed decision about assistive technology needs and outcomes. The team are working on a joint system to establish effective shared data gathering which is not time consuming and focuses on being specific to the individual's actual need.

The team currently strives to offer the best service possible. With an improved policy and assessment procedure the service will have a solid foundation on which to develop and this should, therefore, significantly impact on the delivery and the provision for the learners.

An example of the use of assistive technology to support a learner

B has significantly delayed development in all modalities. He has corpus callosum agenesis and bilateral optic nerve hypoplasia, as well as complex medical and health needs. He has a curvature of the spine, left hip dislocation and severe sleep apnoea. He has limited movement in all limbs and is non-verbal. B is dependent on adults for all of his needs. He is registered as severely visually impaired and his hearing is said to be normal. He is non-verbal but uses facial expressions (smiling, laughing and showing frustration). B uses a wheelchair and a range of postural supportive equipment in school and at home.

B has always had a definite 'yes' and 'no'. Choices were presented to B by the practitioner touching his left arm for one choice and his right arm for a second choice. He would then raise his arm for the choice or answer he wanted to give. This was assessed using multiple questions to which there was a right and wrong answer, and B frequently gave the right answer. The team wanted to provide B with more access to communication and control of his environment and looked at the options available to him based on his needs (switches were the only obvious access choice).

The multidisciplinary team had followed the assistive technology pathway to help make decisions to allocate a communication aid to B. Involved in this decision-making process were the class teacher, the assistive technology teacher, the speech and language therapist, the occupational therapist and physiotherapists, as well as the nursing team to advise on the impact of changes to medication, which were significantly impacting on his arousal levels during the day.

Once the team had established that he could control switches, they needed to ensure that these could be accessed from different seating positions and that the communication aid could be attached to his chair. For this, support was needed from the physiotherapy team.

Trials were conducted to establish the most suitable positioning and angle for the switches in order to ensure that not too much demand was placed on B's physical effort enabling him to have access for periods of time.

The team established the vocabulary for the device based on B's preferences, with data being gathered from those who know him the best (parents and class staff) and multiple observations of his responses to these preferences over a period of time. The assistive technology teacher then worked on his access and understanding of scanning and selecting (running trials of automated scanning as well as scanning and selecting).

B demonstrated on multiple occasions that he was capable of using the switches to make choices using both access methods. However, it was very slow for B and obvious that he was becoming frustrated with the process. Over the period of time knowing B, his arm movements have significantly reduced and switch access was becoming more challenging for him. It was decided that it was much quicker and more efficient for him to use his arms as a means of communication.

However, the team did not want to take away the independence B had gained in environmental control as they knew he had good understanding of cause and effect (see Routemap milestone 26 (Shows understanding that their action causes a specific effect)). The team once again used the assistive technology pathway to review his access and current needs to be able to provide access to a range of motivating activities which gave instant feedback, maintained his interest and gave him control. The team found a better position for him to be in when using the switches and the importance of B being with an adult who understands how to communicate effectively with him was highlighted.

These activities currently include controlling his favourite music. This requires adult support to communicate with B over his choices of artists but he controls when to play or stop the track, or skip to the next track. He is still able to access two switches but the physical demands for using them are not as high, and the most important thing is that he has independent control of something he enjoys.

It is vital the team maintain their joint support for B in order to monitor any changes and respond to them appropriately.

Case study 3

At Ysgol Hafod Lon in Pwllheli the needs of learners are very broad. In order to meet these needs, the school has a flexible approach and adapts provision to cater for each individual learner. The school believes learning is best achieved by natural means. Learner targets are integrated as part of play activities and the school includes learners' interests as far as possible within learning activities. In planning for learners with PMLD, there is a great deal to consider, including how assistive technology incorporated into the learning process can support learners to progress. The school works with other practitioners who come into the school each week, such as physiotherapists and speech and language therapists. Very often, these practitioners will help in setting targets for learners by means of individual assessments or a review when education and health practitioners and parents/carers come together.

For example, one learner was provided with a walking frame by the physiotherapist in cooperation with the speech and language therapist. A switch was attached to the walking frame, to be pressed when the learner needed the attention of one of the staff. This enabled the learner to work towards, and achieve, Routemap box 39 (Deliberately attracts attention of another person in order to communicate need). The learner was able to hit the switch independently and having seen the effect, i.e. that staff responded to her needs, she repeated the action in order to attract the attention of staff in several different situations and contexts.

Further examples of practical suggestions for the use of assistive technology within classrooms include the following.

- To enable learners to explore cause and effect relationships (linked with Routemap milestone 23 (Responds to cause and effect) and Routemap milestone 26 (Shows understanding that their action causes a specific effect)), technologies such as switches, touchscreens, tablets, sound beams and eye-tracking devices, can be used to encourage learners' interaction with and effect upon the environment.

- To support learners' understanding of cause and effect as their own movements trigger interesting outcomes on interactive tiles in sensory rooms or on sensory flooring.

- To enable learners to show clear choices between two or more options (Routemap box 36 (Selects from two or more items)), switches can be positioned on the learner's tray, or, for learners with mobility issues, alongside each cheek so that head turning or movement can activate the switch.

The intention when using assistive technology in classrooms should be to move towards a greater degree of autonomy by learners and reduce reliance on practitioners and supporting adults for care and stimulation. This can be gained through the use of devices that allow learners to influence their environment, e.g. by controlling some features of their input into interactions, by exercising decision-making, and by enhancing and adapting communication (Lancioni et al., 2013). Use of the Routemap to support specific planning of the use of these technologies, and for the subsequent recording of achievements facilitated by these devices, allows learners to make progress in their learning.

Curriculum for Wales

The Curriculum for Wales Framework[13] has four purposes at its heart, designed to support all learners to develop as:

- ambitious, capable learners, ready to learn throughout their lives
- enterprising, creative contributors, ready to play a full part in life and work
- ethical, informed citizens of Wales and the world
- healthy, confident individuals, ready to lead fulfilling lives as valued members of society.

The four purposes have been elaborated in terms of their key characteristics[14].

In developing their vision for their curriculum, schools and practitioners should consider what the four purposes mean for their learners. Making progress in relation to these purposes will be a challenge to some learners, e.g. those with chronic health and/or life-limiting conditions. Therefore, schools should discuss with parents/carers and other members of the multidisciplinary team, realistic ambitions that reflect the needs, interests and aptitudes of learners.

It is important that learners are given the opportunity to overcome barriers and low expectations caused by societal attitudes and beliefs. They should be supported to take part in a range of age-appropriate activities with other learners – and with family – to achieve valued outcomes.

The Curriculum for Wales guidance supports schools in Wales to design their curriculum. This guidance, along with the proposed statutory framework, has been developed to provide broad direction at a national level, while enabling flexibility for schools' curricula that are appropriate to specific contexts and each learner. This enables schools to focus on the communication and cognitive skills and sensory abilities which are fundamental for many learners with more complex needs. The six areas of learning and experience provide the context for such learning.

The Curriculum for Wales guidance supports all learners to progress along a continuum of learning, although some may progress more slowly or quickly than others. It is recognised that learners with additional learning needs (ALN) may face particular barriers to their learning, some highly complex, which lead them to take different routes and detours in their learning journey. Some learners may be working within the Routemap for the majority or all of their curriculum learning journey.

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13 The Curriculum for Wales Framework is determined nationally and includes both the curriculum requirements, which will be set out in legislation, and a range of supporting guidance.
14 hwb.gov.wales/curriculum-for-wales/designing-your-curriculum

The progress of all learners should be shared, acknowledged and celebrated. Some learners will have conditions which mean that, for them, progress consists of maintaining skills which might otherwise be lost as their medical condition(s) changes. Success for these learners may sometimes consist of being supported to continue participating in a favourite activity, despite the loss of skills. These achievements, and the part that skilled practitioners have played in enabling them, should be acknowledged.

A school's curriculum should be based upon evidence of how learners (in particular those with multiple disabilities/sensory impairments) progress in their learning and how to move them forward, overcoming any particular barriers that they might experience.

Supporting guidance

Guidance on appropriate teaching and learning experiences to support learners leading up to Progression step 1 is currently being developed for practitioners and will be published in 2021.

Work is also underway to review and update the routes to literacy, numeracy and digital competence aspects of the Literacy and Numeracy Framework and the Digital Competence Framework. These will be published in 2021 providing additional guidance for schools in planning and delivering opportunities for learners to consolidate their literacy, numeracy and digital skills towards Progression step 1.

The guidance and frameworks can be drawn upon when schools are designing their curriculum, and planning for progression, for learners with PMLD.

Curriculum design and planning

Learners with complex needs can acquire skills that will allow them to participate in a variety of environments and activities – but they will need support and adaptations to do so. This principle has been termed 'partial participation' (Baumgart et al., 1982). Baumgart et al also point out that the following ways of planning for learners with complex needs can limit expectations and participation.

- The developmental age model when the curriculum is planned for learners as if they were much younger (see 'Approaches to teaching' (pages 15–16) for a more detailed discussion of the use of a developmental approach with learners with PMLD).

- The 'all or nothing' model when practitioners need assurance that a learner can acquire skills in an activity before undertaking instruction.

- The independent performance model which requires the teaching of 'steps' leading to a skill that should be performed independently without assistance/supervision – or simpler skills selected as the target.

- The pre-requisite skill model which says that certain skills must be mastered before others are taught or access to certain environments allowed.

Ferguson and Baumgart (1991) highlight that learners should be supported to take an active role in their learning and that decisions about their participation should consider the views of learners and their families. They note that schools should ensure that curriculum experiences are coherent and don't become fragmented. Finally, they should always be open to the unexpected. Storey and Miner (2017) provide a useful recent summary of some ways in which partial participation can be supported:

• through using or creating materials, devices or equipment – a learner who cannot apply glue and glitter independently might be enabled to participate in creating a card for a special occasion by shaking glitter from a sugar shaker

• using personal assistance – a learner who cannot hold the hairdryer themselves operates it through a switch when it is held for them by another person

• adapting skill sequences – a learner who only has the use of one hand is able to operate a massager they enjoy, when instead of holding the massager against their body with one hand and operating the switch with the other, they first operate the switch and then pick up the massager with the same hand

• adapting rules – a learner in a wheelchair joins in a game of rounders by kicking a carefully placed ball rather than attempting to hit one thrown towards them, and then having their wheelchair pushed round the bases by an assistant.

A focus on learning

Learning to learn at the earliest stages of development

Learners with PMLD working at the earliest stages of development may be using one of the following approaches to learning.

Habituation

This occurs when a regularly presented stimulus eventually fails to gain a response as the learner grows used to it. A change in the stimulus will again trigger the response. This provides evidence of learning as the learner shows sensitivity to and memory of the properties of the stimulus (e.g. sound and movement patterns). It is useful to note how quickly the learner responds again – and how the features of the stimulus were changed to recover their attention (see Routemap box 4 (Demonstrates familiarity with recently presented stimulus)).

Early associative learning

This occurs when learners learn to anticipate a significant event through an earlier cue, which can be reliably associated with it. For example, the learner hears a minibus arriving and gets excited knowing that they will be going home. This again shows sensitivity to events and indicates the possibility of prediction developing at a later stage.

Operant learning

This occurs when the consequences of an action alter the probability that it will be repeated. For example, a learner hits a toy, which plays a tune. This increases the likelihood of the learner hitting the toy again as they begin to make the link between the stimulus and the response. A learner may also stop an action to prevent an unwanted consequence (e.g. touching a toy triggers a loud noise, which frightens them, so the learner doesn't touch it again). (See 'Approaches to teaching: Behavioural approaches' (pages 17–18) for more detail.)

If learners are observed closely during these learning processes, practitioners will be able to gather evidence about the learners' level of awareness of events around them. The way learners respond can provide practitioners with further knowledge and understanding about the learner's memory, preference for different sensory stimuli, ability to associate cues with events, the ability to anticipate and predict and, the ability to influence events in their immediate environment.

Early responses may include 'stilling' (a momentary 'freeze'), a change in breathing pattern, tensing or relaxing, pupil dilation or eye movements, change in facial expression, vocalisation or movement of mouth, hands or feet. If learners are being filmed, practitioners need to ensure that these often small and barely perceptible responses are visible (Routemap milestone 1 (Notices stimuli)).

As responses become more pronounced and more consistent and learners begin to act independently in their environment, greater accuracy should be expected, as learners begin to refine their actions and become more specific in their intentions. This could, for example, be a learner moving from an accidental swipe at a toy (Routemap box 19 (Accidental actions cause effect)) to a more focused action (Routemap milestone 23 (Responds to cause and effect)).

It is important to establish:

- that a response is intentional and not reflexive, e.g. a startle

- that a response is directly linked to the stimulus and is not a response to practitioner actions

- exactly what qualities of the stimulus lead the learner to respond.

It is essential to involve learners and follow their lead. Any preference (e.g. for a certain type of music) expressed by the learner should be incorporated into the learning opportunities. It is equally important to notice and respond to behaviour that may signal rejection or the learner's wish to stop an activity (Routemap box 11 (Responds to some stimuli in a way that can be interpreted as rejection)).

Haring, Liberty and White (1981) described the following hierarchy of skill development.

- Acquisition – in which learners learn correct new responses through demonstration, modelling or physical prompting with an emphasis on developing accuracy. At this stage learners need a great deal of support.

- Fluency – in which learners, through repeated opportunities, reach a level of mastery combining speed and accuracy. The action still takes time to complete.

- Maintenance – in which learners consolidate and maintain a high level of competency and fluency over time by learning through repetition and familiarity. They will remember how to do the task after a break.

- Generalisation – in which learners develop and achieve mastery in different settings or contexts, with different stimuli or materials, or with different practitioners.

- Application or adaptation – in which learners recognise similarities and differences between key elements of new situations and select appropriate responses, adapting their established skills and understanding to new problem-solving opportunities.

The application of skills developed and consolidated in this way in different situations can support problem-solving and self-directed learning. Moreover, learners must be given carefully planned opportunities to move through this sequence with each new skill, without losing spontaneity and creativity.

Some key principles for effective learning

Work in the neurosciences (Organisation for Economic Co-operation and Development (OECD), 2007) has provided us with a clearer insight into how people of all ages learn.

Although there appears to be no neuroscientific research which specifically examines learning for learners with PMLD, some important general principles for effective learning have emerged.

- The quality of social environment including interactions, nutrition, physical exercise and sleep all contribute to the functioning of the brain.

- Learners need to be in an alert state in order to be in the best position to learn.

- There is a close link between the emotions and cognitive performance.

- Learners need to feel secure with the people around them. They must feel safe and be positioned comfortably.

The quality of the environment is important for brain functioning

The importance of the role of social interactions in the education of learners with PMLD is hard to overestimate. However, other environmental factors are also important. Learners with PMLD may experience poor sleep patterns for a variety of reasons, and physical disabilities often mean that participation in physical activity is extremely difficult. Similarly, eating difficulties may make the provision of adequate nutrition difficult for some individuals. The learners' immediate surroundings must also be considered to ensure that they are not overloaded with too many stimuli at any one time. Physical factors (e.g. thirst, hunger, fatigue) and factors affecting emotional state (e.g. attending respite care) should also be recognised so that learners are emotionally and physically ready to learn.

Learners need to be in an alert state in order to be in the best position to learn

The best times for learning are when the individual is alert or focused on the environment (Guess, Roberts and Guy, 1999; Munde et al., 2009). At times of very high or very low arousal, learning will not be effective. A wide range of factors impact on the level of arousal of the individual (Munde et al. 2009). These include internal factors (such as hunger, tiredness, discomfort and state of health) and environmental factors (such as noise, light, temperature and movement). Learners' ability to attend and learn may also differ with the time of day due to biorhythms. Levels of hormones, such as cortisol and adrenalin, vary throughout the day and affect learners' states of alertness. Blood sugar levels may also have an effect. For some tube-fed learners, it may be necessary to select optimum times for learning around feeding routines. Other learners may have conditions (e.g. epilepsy) which could require them to take medication with side-effects such as drowsiness or mood swings.

Learners' receptiveness to stimulation may depend, at least in part, on their bio-behavioural state. The term 'bio-behavioural state' refers to the level of arousal of the central nervous system. There are several different ways of talking about levels of arousal; however, those used by Vlaskamp et al. (2010) have been devised specifically for learners with PMLD.

They describe four main levels of alertness:

- active, focused on the environment
- inactive, withdrawn
- sleeping, drowsy
- agitated, discontented.

Recent research suggests that learners with PMLD may cycle through different states of alertness quite rapidly in some circumstances and that different types of stimuli (visual, tactile, auditory, vestibular) may affect learners' patterns of alertness in different ways (Munde et al., 2012). It is important to observe learners closely to determine their pattern of responses, and the factors that affect these in order to recognise and capitalise on the best times for working with each learner, and to stimulate alertness where possible.

The link between emotions and learning

An appropriate level of demand can lead to better cognition and learning, but beyond a certain level it has the opposite effect. In situations of excessive stress or intense fear both social judgment and cognitive performance suffer. On the other hand, the brain responds very well to 'the illumination which comes from the grasp of new concepts' providing strong motivation for learning (OECD, 2007, p. 2). This experience of enlightenment may be part of the reason why 'Shows understanding that their action causes a specific effect' is such a critical milestone (see Routemap milestone 26).

Over time, practitioners will begin to take all these factors into account in order to recognise and capitalise on the best times for working with each learner.

Sensory stimulation and the brain

For learners with PMLD, the level of stimulation will need to be more carefully controlled than for other learners. Some may find difficulty in responding to stimuli through competing sensory channels. For example, a learner may be unable to carry out a tactile (touch) search while listening to the practitioner talking. In the early stages of development, it may be appropriate to limit input to one sense only.

Seven major types of sensory input to the brain have been identified. In addition to auditory, visual, tactile (touch), olfactory (smell) and gustatory (taste), Rosen (1997) adds the vestibular sense (a sense of balance, speed and direction) and the proprioceptive sense (a sense of the position of the body in space). Proprioception and kinesthesis

are often used interchangeably. Proprioception describes the sensations received by proprioceptors within the body – in the muscles, tendons, joints, inner ear – which inform us about the movement of our body and relative position of individual body parts. Kinaesthesia describes how we sense the position of our body when moving through space or the movement of individual body parts in relation to one another.

Brown, McLinden and Porter (1998) also include sensory input to the homeostatic system. The homeostatic system relates to the maintenance of internal equilibrium within the body (e.g. regulation of body temperature) but it also has a role in maintaining a stable state when, for example, we are stressed, or even under-stimulated.

Stimuli to any of these senses should be carefully selected according to purpose (see section entitled 'Learners need to be in an alert state in order to be in the best position to learn' on pages 32–33). To avoid 'overload', practitioners should use simple communication strategies at the appropriate level. Environments such as light and dark rooms should be used with care and with a clear focus on the purpose and complexity of activities. Care is also needed in the use of equipment to encourage interaction with the environment, such as little rooms and resonance boards.

Input needs to be carefully structured and linked to prior learning and experience

Learners must be helped to build the concepts that are fundamental to early learning (shown in orange boxes on the Routemap). The development of the understanding of cause and effect (also referred to as contingency awareness or the development of a sense of agency) is of particular importance; on the Routemap this is divided into two stages (Routemap milestones 23 and 26).

- Routemap milestone 23 (Responds to cause and effect) (contingency responding) – the learner realises that performing a particular action causes an effect but has not yet made the 1:1 association (i.e. one switch press = one response).

- Routemap milestone 26 (Shows understanding that their action causes a specific effect) (contingency awareness) – the learner knows that one action will cause one particular response to happen.

In order to achieve 'Responds to cause and effect', learners need something that they find rewarding, an action that they can perform and an ability to repeat this action while they can still remember the effect it had on the previous occasion. At this stage, the learner's memory is likely to be shorter than seven seconds and practitioners should take this into account in their planning.

When 'Shows understanding that their action causes a specific effect' has been achieved, as stated above, the learner will associate a particular action (e.g. switch press) with a single reward. It is also likely learners who have achieved this milestone will show signs of pleasure or excitement indicating that they are aware that it is their action

which has caused the reward. For example, a learner hitting the switch more frequently in an attempt to gain more responses/rewards (and continuing to hit the switch while the reward is still operating) is probably demonstrating 'Responds to cause and effect' (Routemap milestone 23) and not 'Shows understanding that their action causes a specific effect' (Routemap milestone 26).

For learners who have achieved 'Responds to cause and effect' and who hit a switch frequently (with a physical action that they find relatively easy), the development towards 'Shows understanding that their action causes a specific effect' may be helped by using a switch that is harder to operate. This slows down the rate of responding and increases the effort or cost involved.

A further key concept is that of 'Object permanence' (Routemap milestone 34), the understanding that an object continues to exist even when it is out of reach of the learner's senses (vision, touch, hearing). Once achieved, the learner has a mental perception of the object and will, for example, search for it in places it may have fallen to if it is moved out of reach or sight.

When introducing new areas of learning, experiences should be carefully planned to build on those that are familiar to the learner. The various aspects of the learning experience can then be gradually and systematically changed or extended.

To help learners distinguish, stimuli will need to be made more salient (obvious), increasing differences between them. Ware (2003) suggests opportunities of how to provide a more responsive environment for learners with complex needs.

As these learners are often slow to respond to stimuli, parents/carers and practitioners need to allow adequate 'waiting time'. If such time has not been provided, the learner may have missed some of the experiences that foster early development.

Learners need immediate and consistent feedback on their responses

Many learners with complex needs will have had limited feedback from their activities and may be in a state of 'learned helplessness' arising from their lack of control over their lives. This in turn may lead to the development of stereotyped behaviours.

Suggestions for teaching, which include ways of sharing information with the learner, are included in the *Routes for Learning: Assessment booklet* and the Routes for Learning videos[15]. Such strategies may include using structure and cues to help prediction of regular events, providing opportunities for negative responses or a choice of whether to stop an activity. It is essential that responses which may signal rejection are responded to appropriately.

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15 Examples of these videos can be found at hwb.gov.wales/curriculum-for-wales/routes-for-learning.

Some early reflexes may still be present even in older learners

Reflexes such as the asymmetric tonic neck reflex, Moro or startle reflex may be present. Reflexes for sucking and swallowing may be affected in some learners, leading to feeding difficulties. Different approaches may be necessary to take account of these reflexes; specialist advice should be taken from physiotherapists, speech and language therapists, parents, carers and others with close knowledge of the learner. Learners will learn best when the inputs from the multidisciplinary team, parents and carers are coordinated to ensure a cohesive synthesis between education, therapy and care to meet their individual needs.

Transfer or generalisation of skills often requires specific attention

Skills taught in one setting or context or by a particular practitioner may not readily transfer to other settings or people. It may be necessary to re-teach a behaviour or skill in the same way in all settings, with various practitioners/resources to ensure that the learner is able to use the skill more widely. The ability to generalise skills will represent real progress for many learners.

Attention should be paid to early affective, spiritual and emotional development

Practitioners may notice learners responding to naturally occurring stimuli, such as sunlight shining onto their face. Learners may show 'awe and wonder' or what has been described as a 'whole-body smile'. Learners may also respond to family or community events (such as displays of lights at Christmas or the special atmosphere of celebration at Eid). It isn't always possible to plan for such responses – they occur unexpectedly – but they do show the importance of providing opportunities for inclusion and time for exploration in a range of environments, including natural environments (see 'The challenges of inclusion' on pages 42–46).

Barriers to learning

Many learners with complex needs will have difficulties with vision and hearing, or both[16]. Discussing these difficulties as secondary to a 'main presenting need' of profound learning difficulty diminishes their significance for the learner because they may indeed 'compound, exacerbate or even cause physical, cognitive or social problems' (Hodges and McLinden, 2015, p.153). For others no diagnosis may have been made. Specialist assessment and advice can help to explain the complications and mitigate the impact of sensory impairments. For learners with PMLD, vision and hearing function is also highly likely to be dependent on their internal state, and the suitability of the environment (e.g. lighting and noise), as well as fluctuating in relation to the condition itself (cerebral vision impairment, middle ear conditions). It may therefore vary widely from hour to hour and day to day.

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16 A short summary of vision and hearing impairments can be found in Appendix 2.

For all learners it is important to discover and then use their most effective learning channel. Practitioners should establish the kind of materials, activities and events to which learners are most responsive, and whether these relate to auditory, visual or tactile stimuli, or movement. For learners with sensory impairment, it isn't necessarily true that the impaired sense is the least effective; learners may still find it the most useful. Learners who have remaining vision or hearing will also need practitioners to provide structured programmes to help them learn to use their senses and experiences in a way which widens their understanding of sensory information in their daily lives. Learners with PMLD who at first appear to have no useful vision or hearing can sometimes learn to respond to new sensory input.

Learners with sensory impairments may develop in different ways to learners who have sight and hearing and they may miss certain key developments. Visually impaired learners may not be aware of the wider world, e.g. they never see things being taken out of and returned to cupboards. Things put into their hands come from 'nowhere' for them and so they may throw them back into that empty space. Specialist techniques such as tactile search may need to be introduced. Hearing impaired learners may not see adults modelling the types of communication that they use if practitioners don't consistently use symbols, signs or objects in their own communication. Sense of self and understanding of cause and effect are also slower to develop when learners cannot easily perceive the results of their own actions, e.g. they cannot hear the sound of the object they have dropped or see the movement of the toy in their hand.

Aitken and Buultjens (1992) have provided an enduring framework for levels of responsiveness to sensory stimuli.

- Awareness – an inconsistent response to a stimulus which indicates a change in the environment but no specific response to that stimulus.

- Attending – a more specific response which shows the beginnings of some ability to discriminate between stimuli and to attend to them.

- Localising – (not necessarily about being able to 'find') a consistent response to the stimulus such as turning towards it.

- Recognising – understanding some consistent features of the stimulus and having a mental representation such that this carries over from event to event.

- Understanding – recognising the stimulus and linking it to the features or activities of the event.

Tactile learning

Many learners with PMLD may find learning through touch and movement an effective and efficient learning channel, however this needs to be carefully managed. While it isn't possible to ensure that a learner 'looks' or 'listens', their hands can be manipulated, and thus it appears that they must be learning. This however isn't effective as it is extremely difficult to learn through having hands manipulated by someone else (Nielsen, 1996; Miles, 2003). Such actions can create additional barriers because learners may find this manipulation unpleasant and learn to resist or withdraw their hands ('tactile defensiveness').

Instead, learners need to be encouraged to be tactile tolerant, taught to explore, using their own hands and provided with multiple opportunities to use their senses, including touch, to find out about the world. Using hand-under-hand techniques (Miles, 2003) is the recommended way of helping learners to develop tactile techniques at their own level, without the practitioner taking control of the learner's hands. For some learners with physical disabilities these techniques will need to be adapted to support the learner, e.g. with support at the elbow to release hands.

Learners at early stages will need to develop skills, including the tolerance of using touch in different situations, while developing discrimination between touch sensations which allows them to decide whether to touch or not.

Some learners will use their mouths to help them discriminate, as the lips and tongue have many tactile receptors. It is important to understand why the learner may put something in their mouth and not simply discourage all exploration using the mouth as 'mouthing' (of course, taking into account health and safety issues). Other learners may learn to tolerate using their feet or other body parts which are less intrusive on their control before they can use their hands.

Tactile senses are close senses and may be more developed at an early age, and so may be more accessible for learners with profound disabilities. They may be an effective way of promoting responses. Tactile perception is divided into passive touch and active touch – that is, touch learning which is based on being touched and touch learning which is based on actively touching, usually with hands (but also with feet or mouth for example).

Where a learner is able only to have an object touch them, they will get limited information about its properties, e.g. temperature, movement and whether it is wet or dry. Unsupported holding (feedback on muscles from holding or lifting an object) gives information about weight and squeezing provides information about hardness. Moving fingers over an object gives information about texture, and holding an object in a hand gives information about size. The ability to follow the contours with a hand or finger maps size and shape. The use of both hands together allows the synthesis of different sections and the ability to make a whole (McLinden, McCall and Hodges, 2019).

In order to provide meaningful touch experiences and to promote learning it is important to consider how the learner experiences touch given their current ability to manipulate objects. For example for learners who cannot move their own hands, tactile discrimination between experiences which are cold and warm, wet and dry, and moving or static will be the most appropriate while for those who have some movement, texture and size can be included. Attempts to discriminate based on shape and detail (e.g. recognising objects) will be limited to those with good independent hand movements.

To ensure good access to learning through the senses, learners need to be appropriately positioned and supported, and thus enabled to attend to using their senses. The sensory properties of the items and activities need to be matched to learners' needs, in terms of what they are able to perceive (e.g. sound levels, manipulation abilities, colour and size). The presentation of items and activities needs to be appropriate for the learner; some will need quiet to discriminate sounds, some will need items presented to their left hand for long periods to encourage response, some will need shiny, moving objects.

In the table below (Table 1), McLinden, McCall and Hodges (2019) outline the following exploratory procedures and the sensory information acquired through them.

Table 1: Exploratory procedures and sensory information acquired

Lateral motion (rubbing finger across surface of object)	Texture
Pressure (squeezing, poking)	Hardness
Static contact (fingers resting on surface)	Temperature
Enclosure (holding/grasping)	Shape/size/volume
Unsupported holding (holding in hand)	Weight
Contour following (tracing along contours of object)	Global shape, exact shape

(*Learning through touch: supporting children with visual impairment and additional difficulties (2nd edition)* Mike McLinden, Stephen McCall and Liz Hodges.
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Stereotyped behaviours

Stereotyped behaviours or repetitive gestures should be closely observed to try to find out the purpose that they serve. They may have originally been communicative or exploratory but they may have become habitual. They may also be used to block out confusing stimuli and may provide clues to the learner's emotional state.

Lee and MacWilliam (2002) suggest that when children start to use these gestures to communicate there is less likelihood of them becoming obsessive or ritualistic as they will have acquired meaning.

These behaviours may be extended and linked to similar movements or objects. For example, for a learner who waves his hands to get a visual effect from bright light, a spinning toy may be attractive; for a learner who rocks, a swing may provide similar sensory feedback. Stereotyped movements can be used as the basis for interaction as adults can join in with the movement or use the rhythm to interact by tapping the learner or using musical instruments.

Motor impairments

Many learners with PMLD will have significant motor impairments which create substantial barriers to their learning. Traditionally, early developmental checklists assume that infants' physical development will proceed smoothly enabling them to reach, grasp and manipulate objects, mobilise to explore their environment and to develop control of speech musculature. However, conditions such as cerebral palsy present enormous challenges in all of these areas.

Muscle tone in cerebral palsy may be very high, low or constantly fluctuating, making it extremely difficult for a learner to keep their head (and body) in a stable and appropriate position for learning. They may be unable to extend their arms or open or close their hands to grasp objects. Furthermore, primitive reflexes may interfere with any voluntary movements and the learner may perceive sensations as unpleasant (see the reference to tactile defensiveness in the 'Tactile learning' section on pages 38–39). Learners' interactions with their environment are therefore likely to be less predictable as well as severely limited in number. Being unable to mobilise independently further reduces their scope for learning about the world. Conceptual development relies on learners having repeated, predictable experiences and is therefore likely to be adversely affected by all of these factors.

In their communication, learners may have great difficulty controlling vocalisations, facial expressions, gestures and pointing, making their communicative attempts very difficult to interpret. Experiencing less success may in turn cause learners to make fewer attempts at communication.

A team approach to planning is essential if these barriers to learning are to be addressed. Planning should aim to ensure that equipment is always suited to the current needs of the learner and that physical and learning needs are as integrated as possible. Learners with complex physical impairments are likely to have a postural management programme involving a range of seating and other postural supports. Good team planning will ensure that a specific position prescribed in the postural programme (e.g. lying on a prone wedge) is matched to a curricular task facilitated by that position (e.g. exploring the shape and texture of tactile materials placed in a large tray and anchored in front of the wedge). It is equally important at other times to ensure that learners are positioned so as to maximise social interactions with their peers.

For any activity, issues of physical access should be carefully considered. These include:

- the number and layout of materials, ensuring that the learner is able both to scan and to reach everything without undue effort

- the fixing of materials (containers, switches, etc.) so that they always remain in a predictable position

- consistency of support and opportunities for the learner to repeat responses in a predictable way

- ensuring that plenty of time is allowed for learners to make their responses

- personalised environments constructed to bring materials close to a learner (e.g. by hanging objects above them)

- a consistent approach to communication based upon the learner's most reliable means of responding and opportunities for the learner to confirm whether they have been understood

- use of assistive technology, where appropriate, including a personalised switch or switches, a suitable method for using the switch or switches to control software, use of eye-gaze technology, and opportunities for wheelchair and environmental control.

The challenges of inclusion

One of the design principles of the term 'inclusive' incorporates a position which values and respects all people regardless of characteristics such as ability or disability, gender, ethnic group, etc. Curriculum for Wales is designed to be inclusive, encompassing an entitlement to high-quality education for every learner, which takes account of their views. This is grounded in the United Nations Convention on the Rights of People with Disabilities (UNRPD) and the related United Nations Convention on the Rights of the Child (UNCRC).

Historically, people with PMLD have been among those most at risk of exclusion from society. Many of the barriers to learning for learners with PMLD (identified in the section 'A focus on learning' on pages 36–41) are also barriers to inclusion both in the culture, curriculum and community of schools and also in society more generally. Including learners with PMLD should, therefore, be acknowledged as a particular challenge.

Being inclusive within an educational context has been interpreted in a number of different ways. One response is to define inclusion as being about everyone being involved in the endeavour to learn, as Mary Warnock did, wherever this takes place and so long as what is learned is personally relevant (Warnock, Norwich and Terzi, 2010). Another response is to ground inclusion in mainstream schools and put the onus on these schools to accommodate diversity; but this approach often fails to spell out what this means in practice or to examine the consequences of including learners in such settings. In a special school, in a related approach, inclusion for learners with PMLD may be interpreted as ensuring that these learners share activities with their (age) peers rather than being part of a special class within a special school.

A third approach is to adopt a continuum view of shared humanity and frame inclusion in terms of maximising participation while recognising that for some this participation may be partial in nature (Baumgart et al., 1982; which was also discussed in the 'Curriculum design and planning' section on pages 28–29).

These approaches are not necessarily mutually exclusive, and research suggests that each of them may have something to offer learners with PMLD, depending on the specific needs of the individual. Learners with PMLD are likely, for example, to experience more interaction with their peers in a mainstream class (Foreman et al., 2004). More able peers in either a special or a mainstream setting may be well-placed to help learners with PMLD meet some objectives and targets (see for example the study by Chalaye and Male, 2011). However, some learners need a distraction-free environment for at least part of the time, and this is more likely to be available in a specialist setting.

The case study on pages 43–44 illustrates how a common interactive music programme for learners with PMLD and those from a mainstream primary school involves relevant learning for all involved. It is notable that this inclusiveness involves an expressive arts programme which engages a diverse group of learners who benefit in their own relevant ways from their engagement. Though it takes place in a special setting, it could take place in a mainstream setting as well. It illustrates the potential for inclusion through the expressive arts that can be developed in other ways in other kinds of settings.

Case study 4

Crownbridge School runs joint music sessions for learners from the primary PMLD class and learners from the nearby mainstream Woodlands Community Primary School.

A music specialist who works in both schools developed the idea of inclusive music sessions as a means of introducing the learners to each other. All learners from the PMLD class and from Years 5 and 6 of the mainstream primary school have the opportunity to take part. Mainstream learners voluntarily visit the special school on a weekly basis with the music specialist to participate in a music and movement-based play session with seven learners from the PMLD class. The session is planned collaboratively by the music specialist and the PMLD class teacher, and led by the mainstream music specialist supported by four teaching assistants from the PMLD class.

Crownbridge School adopts the national MOVE initiative (Mobility Opportunities Via Education). Led by the Paediatric Physiotherapy Team, learners have individualised physical targets that are incorporated into their daily learning plans to promote their physical, social and emotional well-being. By hosting the music session in the special school classroom physical barriers to engagement and learning are mitigated.

Aims for the learners with PMLD focus on developing awareness and building anticipation and communication skills at pre-intentional reactive and proactive level. For the learners from the mainstream school aims focus on personal social skills, well-being and self-esteem and their attitudes towards learners with disabilities.

The session consists of musical songs represented by adapted tactile symbols that enable every learner to encounter or hold, accompanied by a range of resources – materials and tactile items to play and explore such as fabric, water, lightweight balls with bells, shaving foam and shredded paper. Learners are offered the opportunity in turn to choose a song and are encouraged to explore and scan, visually or through touch, tactile symbols that represent the song and resource. Pausing or behaviour interpreted as 'like' are considered as their choice and backed up by emphasising the tactile symbol, augmenting language with aided input and acknowledging and encouraging the development of intentional signalling. Since the start of these sessions some of the learners with PMLD have shown changes in alertness or behaviour.

For example, one child in the group, whose arms are normally tucked close to her body, has displayed an interest in reaching out and touching the tactile symbols and materials. Her partner will show and name the two symbol choices, presenting them in her line of sight and within reach. Over time the learner with PMLD has become more confident in scanning and locating the symbols. Given time she will look between two tactile symbols, independently reach towards and touch them, indicating her choice by fixing her gaze on one of the two. Her partner checks her choice and understanding by calling her by her name, she will respond by turning to look at her partner, a skill she does not consistently apply in other activities. Her partner will wait and then ask her 'You want [name of the song]?' to which she will smile to confirm her understanding or maintain a blank expression to reject the selection, and her peer will repeat and check preference.

This approach to inclusion where learners from a mainstream class are included within the special school class seeks to entice the child with PMLD to broaden their relationship with the wider world in an arena in which they feel settled and confident exploring. It provides the bedrock for play with their peers in routine contexts. Learners from the mainstream class are encouraged to develop a sense of maturity in their attitudes towards children with ALN, and their well-being and self-esteem improve through doing something to help others.

Learners with PMLD (or other ALN) are not the only ones for whom inclusion is a challenge. Learners for whom the language(s) and culture(s) of the school are not the language(s) or culture(s) of their home can also face particular challenges. To be fully included, learners need to feel that they belong to the school and wider community. In trying to work out what good practice in providing for this group of learners might look like, the tensions and complexities involved need to be acknowledged.

Through consideration of local, national and international contexts, Curriculum for Wales acknowledges the importance of both the languages and the cultures of the learners' homes and of the Welsh language and cultures of Wales, and the roles both have to play in enabling every learner to be fully included in a variety of communities.

There is limited evidence about how learners with ALN are impacted when they are educated through a language which isn't the language of their home, and may not be the language of the community in which they live, and none which relates specifically to learners with PMLD. Suggestions as to how to provide appropriately for these learners, therefore, have to be extrapolated from what evidence is available in relation to typically developing learners at the early stages of communication development and other groups of learners with ALN.

Research supports the view that different languages have different rhythms and use a different range of sounds. Typically developing babies are believed to be able to recognise differences between languages at a very young age, and babies who hear different languages themselves make different ranges of sounds. However, it is probably not until around 13 months of developmental age that typically developing infants become aware that speakers of different languages use different words to name the same object. It is recommended that all learners start their learning journey with their home language; and there is clear evidence, that, where possible, learners should initially, at least be supported through their first language.

Research with learners with less severe ALN suggests that learning a second language does not have a negative impact on an individual's first language, and awareness of the commonalities between languages is likely to be helpful.

However, some literature from the field of deaf education suggests that deaf children whose first language is sign language may feel marginalised/excluded, lonely and with few/no friends in mainstream environments. The fact that they don't share the same language with their peers in mainstream settings is one of the reasons for feeling that way. This research does not map directly onto the situation of learners with PMLD from Welsh-speaking homes in an English-medium school, those from English-speaking homes in a Welsh-medium school, or those with home languages other than Welsh or English. However, it does suggest that schools should provide, as far as possible, opportunities for learners to be part of a group which uses their first language, and use this as a foundation to become familiar with the language and culture of the community in which they live.

Being inclusive has become the international signal of a humane and respectful value position. Few people would be willing to argue against it, but as a complex idea and value, it has several meanings that give rise to disagreements – about what is taught and learned and how learning is assessed, and where learning takes place and with whom. These signify whether people are valued and related to respectfully. If inclusion is about all participating in the culture, curriculum and community of schools, does this imply mainstream and not specialised school, and does it mean participating in mainstream academic curricula and not basic life skills programmes? The inclusion of learners identified as having PMLD can sometimes seem tokenistic. Inclusion should always be respectful and value diversity. Putting inclusion into practice for learners identified as having PMLD needs particularly careful examination.

For learners with PMLD, the challenge of inclusion is about both curriculum design and using assessment to support learner progression. Progressing in learning requires ongoing assessment to move onto the next steps of learning. A continuum view involves realising that some move more slowly, while others more rapidly, as well as realising that what is relevant to learners varies according to their different starting points. In the same way that curriculum design can be inclusive, as Graeme Douglas has suggested, so can assessment in relation to 'who is assessed, how they are assessed and what is assessed' (Douglas et al., 2016, p. 103).

From this perspective, assessment practices can embody these three assessment features:

- including all
- being accessible and appropriate
- assessing areas of relevance.

The design of the Routes for Learning approach for learners with PMLD reflects these three features. A more detailed version of the case study on pages 43–44 is available in Appendix 3.

The communication process

When we think about learners with PMLD, it is helpful to have a definition of communication that is inclusive, taking into account the challenges these learners experience. For example, communication is about two or more people working together and coordinating their actions in an ongoing response to each other and the context (Bunning, 2009, p. 48).

The following description from the American Speech-Language-Hearing Association is also very relevant (1992, online): 'Communication may be intentional or unintentional, may involve conventional or unconventional signals, may take linguistic or non-linguistic forms, and may occur through spoken or other modes'.

Communication partners support learners' communication by close observation and sensitive responding to learners' behaviours, using the context and knowledge of the individuals (either gained directly or from others, e.g. family, therapists, respite carers) to support their understanding. Communication is a joint effort, and the cues we get from the context and our experiences of communication are very important.

Early communication: how and why we communicate

As can be seen from the Routemap, communication develops from both cognition and social interaction. Learners need to have plenty of experience of exploring objects as well as experience of positive interactions with other people. To achieve this, classroom practitioners need to plan learners' seating and other positioning during the course of the day, so learners have opportunities to interact with practitioners and other learners around them and also opportunities to engage with a wide range of objects.

The stages of development of communication are visible in the Routemap and in Table 2 on the next page.

Although it is unlikely that learners with PMLD will achieve use of abstract symbols and language, these have been included to illustrate the possible progression. In both these sources, contingency awareness and intentionality have been emphasised. This is because the learners' gradual realisation that they can make things happen can be seen as leading into the realisation that they can make things happen through other people. For example, when a piece of apple they want is too far away to get independently, the learner reaches towards the apple and looks alternately between the apple and their teaching assistant making urgent noises.

As skilled communicators, we use our interaction skills for a wide range of purposes – greeting people, requesting information, teasing, lying, entertaining and many more. The earliest of these purposes, or reasons, for communicating are social (e.g. a smile that brings other people over to interact) and functional (e.g. a look or reach towards something wanted), although at reflexive and reactive levels these actions are not yet intentional communication.

Table 2: Levels in the development of communication

Levels of communication development	Learner's communicative behaviour
1. Pre-intentional – Reflexive	The learner's limited repertoire of mainly reflex behaviours can be interpreted by familiar people. They will be predominantly reflex or other early responses to internal as much as external stimuli.
2. Pre-intentional – Reactive	A wider range of voluntary behaviours are treated as meaningful by caregivers. The range of likely interpretations widens a little and the learner is more responsive to emotional messages from the caregiver, e.g. through tone of voice.
3. Pre-intentional – Proactive	The learner's behaviours are goal directed. The behaviours act as signals to others who assign both communicative intent and meaning to them. The learner extracts meaning from other people's intonation and facial expression.
4. Intentional – Primitive	The learner has learned to affect the environment by acting on another person. Interpreting 'primitive' communicative acts relies on the context. The learner understands other's non-verbal communication and starts to show situationally cued understanding.
5. Intentional – Conventional	The learner has acquired a range of semantic roles which can now be communicated to others using more conventional forms, including single signs, symbols and words. These are easier for others to understand and less context-dependent. The range of communicative functions expands and the learner comprehends many single words.

(Adapted from *Communication before speech: development and assessment*.
Judith Coupe O'Kane and Juliet Goldbart. © Judith Coupe-O'Kane and Juliet Goldbart 1998.
David Fulton Publishers, by permission of Taylor & Francis Books UK.)

At early stages of communication, learners are likely to have some inconsistent and idiosyncratic ways of communicating. It is important that learners are given time and space to communicate within a consistent routine and that practitioners respond and give meaning to pre-intentional sounds/movements (even when it is difficult to work out intent). If practitioners consistently respond to and interpret any signal as the communication of a need or request, then the learner will have the opportunity to learn how to influence other people/the environment, using these signals. Every day and care routines can be used as opportunities to develop communication, with partners pausing and then responding to any attempt by the learner to communicate. Learners are likely to need many, many opportunities to make links between what they do and the responses of others (in a way that might feel quite repetitive for communication partners).

As learners develop a wider range of responses, practitioners could work towards becoming more selective about the behaviours they respond to thereby shaping communication about objects/people present or nearby. As often happens with learners with PMLD, communication skills and abilities are likely to fluctuate so it is always important to be guided by the interactions at that moment.

As consistent and sensitive responding is key, communication passports, which document a learner's responses and their possible meanings, can be a useful tool for sharing information with family members and all practitioners working with the learner.

Assessments to supplement Routes for Learning

When reading this section, please see the discussion regarding the Communication Matrix and the Affective Communication Assessment on pages 13–14 of this guidance.

Approaches to the process of communication that we describe below broadly align with the lenses or approaches we described earlier ('Approaches to teaching' section on pages 15–19). For example, the developmental approach leads us to establishing contingency awareness and cognitive intentionality as a precursor, or developmental step, on the way to intentional communication.

The behavioural approach explains how reinforcement strengthens the associations learners make between their actions and the consequences. It also explains the ways in which behaviours might be shaped in order to be used as a means to communicate.

The interactive approach underpins 'Intensive Interaction' and other communication approaches that are grounded in the interaction between learners with PMLD and more skilled communicators.

The functional approach informs cueing and related approaches which exploit naturally occurring associations that are meaningful to the learner in real-world settings, such as the link between smells and events.

In practice, however, the links and distinctions are not quite so clear-cut. We need to be creative and flexible and to use our knowledge from a diversity of approaches in addition to the support provided through assistive technologies.

Approaches to communication

Starting with supporting the development of intentionality, this section will outline a range of approaches to communication which build on the stages in the Routemap.

Cause and effect: Intentionality

To acquire intentionality, learners need opportunities to affect and control their environment. These can be both:

- low or no tech – playing with water or other responsive media, making a mobile move, hitting a drum or gong, etc.

- high tech – micro-switch operated toys, fan, music, etc.; piano keyboard apps; specialised software.

Cause and effect activities, including the use of assistive technology, such as switches, have a good evidence base in terms of research (Lancioni et al., 2006a and b; 2009; Roche et al., 2015) but seem to be used less in practice, so it can be difficult to know how well these approaches work in classrooms and other everyday settings. Switches, which can be activated by actions or sounds, can be used by the learner to operate a music player, a fan or toy; to make or to convey a choice; to take part in a classroom group activity; or to gain social contact. These approaches can be embedded in play and other motivating activities.

Interaction-based approaches

The challenges experienced by learners with PMLD mean that they benefit greatly from consistent and skilled communication partners. Parents/carers and other family members will have a great deal of experience in how best to communicate. Practitioners, therapists and other school staff will also all have the opportunity to be communication partners, sharing and developing their expertise. There is some evidence that typically developing peers and siblings can also fulfil this role (Nijs, Vlaskamp and Maes, 2016).

'Intensive Interaction' aims to promote social communication, enjoyment of interaction and enhance the learner's sense of agency. The emphasis in training and in practice is on what are described as the 'fundamentals of communication', e.g. taking turns; sharing personal space; understanding and using eye contact, facial expression, physical contact, non-verbal communication and vocalisation. There have been some good evaluations of intensive interaction, though more research is needed (Hutchinson and Bodicoat, 2015).

The Hanging Out Programme, like 'Intensive Interaction', focuses on the quality of interactions and a positive way of thinking about the person. Interaction partners are expected to adapt their language and interaction style to match the communication of the person with a disability and what is meaningful to them. The core principle of the programme is that everyone deserves at least ten minutes a day of uninterrupted positive attention.

Cueing as a communication strategy

The term 'cues' is usually used to mean a way of indicating to the learner what is about to happen. Ideally, cues are an established part of a routine and are natural, that is, they occur within it. These cues can be across the range of sensory inputs and through other means as shown in the Table 3 below.

Table 3: Examples of cues used to indicate what is about to happen

Sensory	Visual	Showing a coat for going out. Showing a preferred cup for snack time.
	Auditory	Rattling keys for car ride. 'Ping' of a microwave for lunch.
	Tactile	Holding a spoon for dinner. Feel of a towel for getting out of the bath.
	Smell	Smelling jam for toast. The increasing smell of chlorine as you move towards the hydrotherapy pool.
	Proprioceptive (position)	Using standing frame for messy play. Special seating for group time.
Other	Routine	Following a set timetable.
	Verbal	Words/intonation signifying next action.
	Person–place related	Physiotherapist for exercise.
	Gesture/movement	Swinging in a hammock before physical education.

Many cues can be usefully paired with key words (e.g. 'lunchtime') to give specific signals to help attention, recognition and understanding.

It is important that means of communication match both the learner's cognitive development and sensory abilities. For example, using pictures and symbols is ineffective for a learner not at a symbolic level of understanding. Similarly, attention needs to be paid to the learner's comprehension skills. For example, introducing a cue for a very abstract concept (e.g. emotions) will be ineffective for a learner who isn't able to understand abstract concepts. Graphic media (pictures of any kind) need to be suitably presented for learners with visual impairment, as do visual signs (e.g. no visual clutter and strong background/foreground contrast). For signing with learners who cannot see, hand under hand (where the learner places their hands over the signer's) is the recommended approach (Deuce and Rose, 2019).

Objects of reference

Objects of reference are frequently used with learners with PMLD. However, despite their widespread use, there is little evidence base for their use or success (Hodges et al., 2019). Objects of reference can relate directly to the learner's experience (sometimes because this association has been taught or the learner made the association themselves) but come to represent it outside the immediate context, such as presenting an object to indicate where a learner needs to go next (Hodges and Pease, 2002; McLinden, McCall and Hodges, 2019). Objects need to be within the learner's perceptual understanding and therefore will often be (at least in early stages of introduction) individual to the learner. One may use a plate to indicate lunchtime because he sees lunch being put on that plate, while another, who cannot see, may be given a spoon to be shown that lunch is coming.

Multisensory and creative approaches

A diversity of creative approaches has been used to support and enhance communication, including music therapy, aromatherapy, animal therapy, multisensory stories and storytelling among others. At the time of writing, these vary in the extent of the good quality evidence supporting their use, with music therapy and narrative approaches being the better supported. Some are also reported by practitioners to have good outcomes.

In multisensory stories, language and multisensory props are used to construct a narrative. Multisensory stories aim to provide the learning opportunities and pleasure of engaging with a story, without the need to understand the language used. There is evidence that learners show increased attention in multisensory stories. Story sacks and other resources are familiar to practitioners and there are several books (e.g. Grove, 2009) which support this approach.

Summary

Learners with PMLD will experience complex communication challenges. Success in communication involves skilled communication partners who create opportunities for communication and interaction, using their knowledge of the individual and a variety of approaches. Communication partners support the learner to maximise their skills and help the learner to enjoy and make sense of their experiences. Knowledge about communication and interaction is shared with others so that the learner experiences consistently good support.

Conclusion

The purpose of assessment within Curriculum for Wales is to support each individual learner to make progress at an appropriate pace. It is an integral part of the learning process, helping to develop a holistic understanding of the learner in order to identify their strengths, areas for development and next steps in learning. The Routes for Learning materials aim to support practitioners to achieve this purpose with learners with PMLD, ensuring that the diverse needs of all learners can be met within Curriculum for Wales assessment arrangements, and to identify, acknowledge and celebrate (with family carers and other professionals) the progress of each individual learner.

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Appendix 1: Who are learners with profound and multiple learning difficulties (PMLD)?

There is no universally agreed definition of profound and multiple learning difficulties (PMLD) (Bellamy et al., 2010); indeed other countries in Europe use a different term – profound intellectual and multiple impairment (PIMD).

The working definition of learners with PMLD published in 2006 in the original *Routes for Learning: Additional Guidance Booklet* (Welsh Government) was compiled by a General Teaching Council for Wales network group. The dangers of labelling learners are recognised and flexibility is required to avoid limiting expectations. However, a working definition is considered essential for ensuring sufficient high-quality provision (including planning and monitoring). An updated version of the original working definition is therefore included here. This definition takes into account the changes in legislation and terminology currently underway in Wales[17].

Learners with PMLD will have a profound cognitive impairment/learning difficulty, leading to significant delay in reaching developmental milestones. Such learners will be operating overall at a very early developmental level and will display one or more of the following:

• significant motor impairments

• significant sensory or perceptual impairments

• complex health care needs/dependence on technology for health management.

The inter-relationship of these disabilities increases the complexity of need, in turn affecting all areas of learning.

Although learners who do not appear to have any of the additional impairments listed above are not included within the definition of PMLD, these learners may nonetheless have additional impairments which haven't yet been recognised and present a significant challenge for teaching. The Routes for Learning materials are applicable to all learners with a profound level of cognitive impairment.

Learners with PMLD are likely to be working on the behaviours shown on the Routemap for most or all of their school life. Practitioners will almost certainly find it difficult to establish reliable and consistent methods of communicating with them. Moreover, owing to high levels of dependency for basic self-care (such as dressing, toileting and feeding), they are also likely to require extra resources such as:

• specialist staffing and substantial support

• adapted curriculum and individual learner plans

• mobility aids and therapy programmes

• frequent assistance and medical support.

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17 This definition does not include those whose difficulties are believed to result from autistic spectrum disorders (ASD) unless this is also combined with a profound level of general learning difficulties.

Under the new additional learning needs (ALN) system, to be introduced by the Additional Learning Needs and Education Tribunal (Wales) Act 2018 on a phased basis from September 2021, these learners will have an individual development plan (IDP). This is a single statutory plan that replaces the existing variety of statutory and non-statutory special educational needs (SEN) plans.

Appendix 2: A short summary of vision and hearing impairments

Vision impairment can be caused by a wide range of issues, many of which are related to conditions causing other disabilities. It is much more frequent in learners with learning disabilities (Emerson and Robertson, 2011). An extremely short and simple summary follows.

Some vision impairments are caused by problems in the eye and can relate to the clarity of vision (acuity), the field of vision (how far round can be seen) and eye movements. Some vision impairments are caused by problems in the processing of visual stimuli and can make it hard to discriminate features from the background and recognise unfamiliar items, as well as having acuity and field difficulties. Factors which need to be considered to compensate include lighting, contrast, size, movement, background, where items are presented and colour. Most vision impaired learners will have remaining vision and will be able to use their vision for learning in carefully structured activities, possibly helped by the use of glasses.

Hearing impairment is also much more common in people with learning disabilities (Kerr et al., 2003). An extremely short and simple summary follows.

Hearing impairment is related to the intensity (volume, loudness) of stimuli and their frequency (pitch). The measurement of hearing impairment relates to the volume needed to perceive different pitches. Most sound signals have multiple factors, meaning that learners may appear to hear speech but not be able to discriminate the different pitches, leading others to assume that they can 'hear when they want to' (Murdoch, 1994). Most hearing impaired learners will have remaining hearing and be able to use their hearing for learning, likely supported by hearing aids or implants, and by careful structure of the listening environment.

Deafblindness (dual sensory impairment) occurs when a learner has combined vision and hearing impairment. It has a profound effect on the ability of the learner to respond to communication, to learn to move and travel, and to interact with the environment. Some learners may need high levels of sensory stimulation in order to learn to respond (e.g. bright lights in a darkened room) but others will find such high levels too demanding and may withdraw or become passive. Some learners may benefit from using sound in conjunction with visual stimuli or touch but many others will manage only one stimulus at once, and may shut their eyes if listening.

Responding to sensory stimuli is hard work for all learners with PMLD but especially those with sensory impairments. To do this effectively they need to have appropriate positioning support and to be comfortable and secure. They may respond best to sensory stimuli when not engaged in any other effortful activity – and sitting, standing, or walking may well need to be considered as effortful activities for learners with PMLD. When asked to look or listen the learner needs to be alert, and able to attend to the stimulus presented.

Appendix 3: An extended case study demonstrating the impact of including mainstream peers in a special school PMLD class to facilitate social play opportunities

A music specialist working in both a mainstream primary school and a local authority special school developed the idea of inclusive music sessions as a means of introducing learners from a mainstream setting to learners with PMLD in a local special school. All learners in Years 5 and 6 are offered the opportunity to participate in the project. The deputy headteacher from the special school hosts a presentation at the mainstream primary school at the start of the academic year providing the learners with some information about the special school, the project and possible benefits for mainstream learners. Learners voluntarily visit the special school on a weekly basis with the music specialist to participate in a music and movement-based play session with seven learners from the PMLD class. All learners in the special school class have PMLD (see Appendix 1) and are dependent on health professionals to meet their daily medical and health needs. The class teacher and other members of the class team assess the well-being levels of the learners in the morning to inform and make adjustments to the activity, e.g. using a different area of classroom in the event that a learner is unwell, in pain or distress. The sessions are planned collaboratively by the music specialist and the PMLD class teacher, incorporating Pupil Voice, and identifying communication opportunities and potential barriers. Sessions are led by the music specialist supported by four teaching assistants from the special school class.

The special school adopts the national MOVE initiative (Mobility Opportunities Via Education) led by the Paediatric Physiotherapy Team. Learners have individualised physical targets that are incorporated into their daily learning plans to promote their physical, social and emotional well-being. By hosting the music session in the special school classroom, physical barriers to engagement and learning are mitigated by affording the learner an enabling position through accessing specialised equipment, e.g by being supported in a suspended standing sling using an overhead hoist system or positioned on a physiotherapy wedge. This allows the learner to participate in play based activities from an alternative position from that of their wheelchair.

Mainstream learners are partnered with learners from the PMLD class. The session begins with the music specialist playing the familiar welcome song on the ukulele and introducing all members. Mainstream learners join in by exploring each PMLD learner's tactile personal signifier and developing a rapport either through resonance, the learner experiencing proximity of their peer, or coactively, partners playing together to handle personal signifiers. All learners are supervised and monitored carefully by teaching assistants throughout the session who offer advice and intervene where necessary.

The session is planned and designed to promote familiarity and to develop awareness and build anticipation and communication skills at pre-intentional, reactive and proactive level. Learners work in the same pairs for several weeks in order to build interactions before changing partners, except in the instance of illness or absence.

The session consists of musical songs represented by adapted tactile symbols that enable every learner to encounter or hold materials and tactile items to play with and explore such as fabric, water, lightweight balls with bells, shaving foam and shredded paper. Learners are offered the opportunity in turn to choose a song and are encouraged to explore and scan, visually or through touch, tactile symbols that represent the song. Pausing or behaviour interpreted as 'like' are considered as their choice and backed up by emphasising the tactile symbol, augmenting language with aided input and to acknowledge and encourage the development of intentional signalling.

One learner in the group has displayed an interest in reaching out and touching the tactile symbols and materials. Her arms are normally in a bent fixed position tucked close to her body. Her partner will show and name the two symbol choices and present them in front of her in her line of sight and within reach. Over the period of the sessions she has become more confident scanning and locating the symbols, and now given time she will look between both objects and then independently reach towards the tactile symbols, touching both symbols and then fixing her gaze on her preference from the choice of two. Her partner will check her choice and understanding by calling her by her name, she will respond by turning to look at her partner, a skill she does not consistently apply in other activities, her partner will wait and then ask her 'You want [name of the song]?' to which she will smile to confirm her understanding or maintain a blank expression to reject the selection, and her peer will repeat and check preference.

Learners play with objects and sensory materials related to each song; mainstream learners repeat their peer's actions or build on displays of interest (e.g. increased visual engagement, smiling, stilling) by modifying their interactions with the resources.

Partners are actively encouraged to join their peers in enjoyable movements, holding materials, rolling, dropping, gentle swinging. Once learners with PMLD are actively participating and engaged in the activity, relative to their ability, mainstream learners are encouraged to introduce a pause and offer opportunity for their partner to signal intent, to reinitiate the interaction and carry on with cooperative play.

Since the onset of these sessions some learners with PMLD have begun displaying changes in behaviour. One child who is usually quite withdrawn and tired during afternoon sessions shows greater levels of awareness and interest. He opens his eyes wide when the welcome music is sung and actively looks towards his partner and the tactile symbols placed in his line of sight. This learner's behaviour can be interpreted as anticipation of what is about to happen, shown in an increased frequency of 'happy' vocalisation and leg movements when his partner sits beside him and says hello. This behaviour is also displayed during burst-pause activity of his favourite song when he is interpreted as actively attempting to gain his partner's attention by turning his head and increasing

the duration and volume of vocalisation to communicate 'more' and to continue the interaction and the song when the singing is paused. This learner has also displayed a reduction in self-stimulating and self-injurious finger mouthing behaviour during these sessions. After the initial song his fingers do not automatically rest in his mouth, his gaze and head position is angled in the direction of his partner and he is happy to coactively explore resources such as the water and shaving foam with support from his partner, displaying greater frequency of subtle finger movements while showing signs of listening to his partner talking to him about the interaction.

All learners engage in these sessions. Health issues such as illness or seizures that occur during the session are managed with upmost regard for the learner's health and dignity. Class teaching assistants follow individual health care plans in accordance with school policy to ensure the safety and well-being of the learner, remaining practitioners provide reassurance to learners and offer support by answering questions. In the event of a serious health issue practitioners would follow contingency planning and learners would be supported away to a separate room adjoining the classroom to continue with an alternative music activity.

Reflection on this intervention and discussion regarding the quality and quantity of interactions between learners in this session has highlighted the engagement shown during interactions by all learners, evaluated against individual engagement profile descriptors. The music specialist reviews the session with the group, celebrating success and providing ongoing assessment to inform next steps. Conversation with the learners also gives an opportunity for them to:

- reflect on how they are supporting the needs of others

- reflect on the use of language in interactions with other people

- think to problem solve in order to address communication breakdowns

- suggest ways of adapting activities and interactions

- pose any questions.

This information is fed back into the 'plan-do-review' process.

Social communication, exposure to language and spontaneous interactions that the mainstream learners offer is organic in its occurrence and development, highlighting Vygotsky's theory on zone of proximal development (ZPD), whereby a more knowledgeable other facilitates learning of another through social transaction. The learners engage with play at a comfortable level that an adult finds less natural. Bottrill (2018) in his text 'Can I go and play now?' discusses the importance of early years play provision and its significance in child development and refers to the importance of 'child chat', the natural conversation between children, as being far richer and more interesting than a conversation with an adult, that children explaining games and activities to another get greater attention from their partner. During the activity, the mainstream learners are encouraged to take over all interaction and support of the learners from the PMLD class they are partnered with (including 'hand over hand' help with instruments and touch to represent song actions) in order to allow for more natural relationships to develop without adult intervention.

This idea of promoting learner interactions and dialogue also actively promotes the reduction in the frequency of adult intervention and the dependence on adults to support interactions, a common feature in the daily routine of a child with PMLD.

This model of inclusion where learners from mainstream classes are included within the special school class seeks to entice the learner with PMLD to broaden their relationship with the wider world in an arena that they feel settled and confident exploring, and provides the bedrock for play with their peers in routine contexts. This enabling environment allows opportunity for effective learning by creating social communication interactions, verbal and non-verbal, that would otherwise be very challenging to engineer in an inclusive mainstream setting because of the acute needs of some learners. By creating the opportunity for all learners to participate in the same activity we are exposing both groups to the diverse needs and abilities of children, developing greater understanding of the needs of the learners with PMLD among their typically developing peers. It was the main intention of the project leader to encourage confidence and friendships in the learners, in the hope that they might nurture and develop empathy through a planned activity that would probably otherwise not happen in typical chance encounters. By creating activities that enable all learners to be active contributors and participate through strategies that promote healthy, confident individuals we aim to raise awareness and understanding of the impact of the children's actions as ethical citizens of Wales in supporting the needs of the wider and more marginalised groups of people in their community and that exist around the world.

Acknowledgements

Co-construction is at the heart of educational reform in Wales and has been central to the process of updating the Routes for Learning materials, bringing together practitioners, academic experts and policy leads.

As part of this, we would like to thank all educational and health practitioners who contributed to the updating process by providing feedback via online forms and engagement events in summer 2019 and spring 2020.

Routes for Learning: Guidance

We are grateful to the Routes for Learning Advisory Group for leading the work updating the guidance. It met between June 2019 and June 2020 and membership of the group included:

- Dr Jean Ware, Bangor University (Chair)
- Tahayra Ayub-Buhllar, Welsh Government
- Aron Bradley, Ysgol Hen Felin
- Dr Jill Bradshaw, University of Kent
- Alys Burford, Ysgol Hafod Lon
- Lesley Bush, Crownbridge School (until September 2019)
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- Dr Manon Maragakis, Welsh Government
- Ceri Moorcraft, Crownbridge School (from February 2020)
- Phil Martin, former headteacher of Ysgol Crug Glas
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- Bethan Morris Jones, Ysgol Pendalar (until September 2019)
- Eleanor Phillips, Ysgol Crug Glas (from September 2019)
- Suzi Smith, Ysgol Crug Glas (until September 2019)
- Clive Underwood, Bangor University (until January 2020).

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