Education Perfect's Learning Cycle

The evidence base

Education Perfect

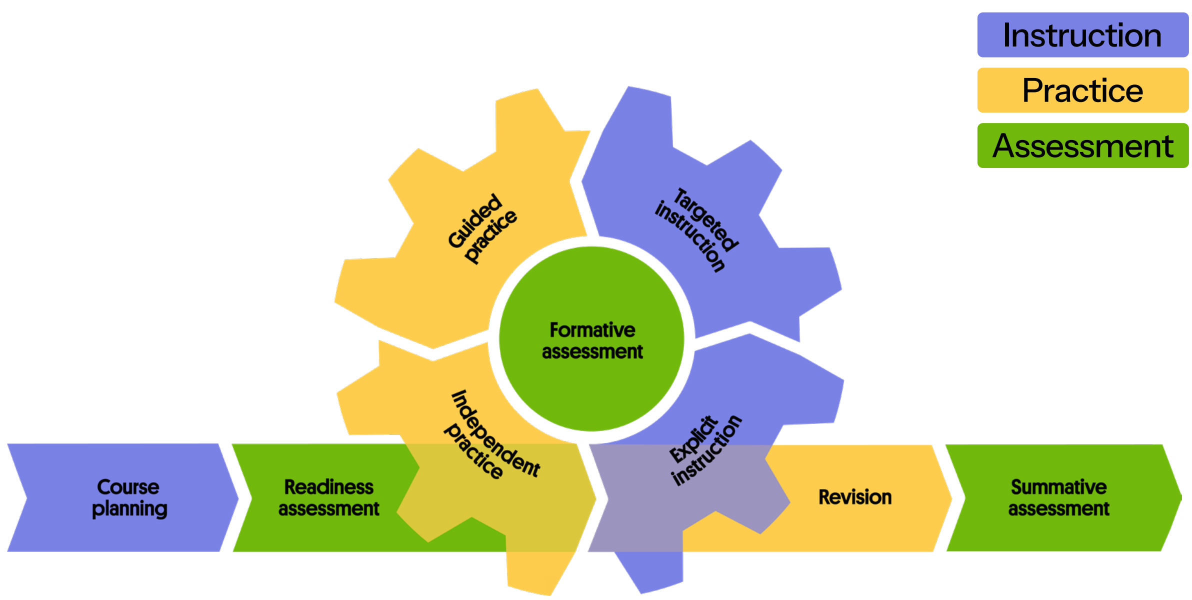
Contents

Introduction

Education Perfect (EP) is a leading digital learning platform which relies on an extensive evidence-base to design and develop learning experiences for students. This white paper provides a comprehensive explanation of the education research which supports the EP Learning Cycle framework and its component parts of instruction, practice and revision, and assessment. The Learning Cycle framework highlights that instruction, practice and assessment are not isolated activities, but are deeply intertwined processes that facilitate student understanding, skill development and critical thinking. Instruction, at all levels, is not just about transmitting information, but about fostering deep understanding to improve student outcomes. Practice and revision build on instruction and transform initial learning into lasting knowledge and transferable skills. Finally, assessment plays a critical role in the teaching and learning process, having moved beyond the traditional purpose to measure learning and instead also serving as an integral part of the learning process itself.

First and foremost, EP is focused on improving student outcomes and understands that teachers lie at the heart of all teaching and learning experiences. It is well-established that "the quality of teacher professional knowledge and practices ... are central to the enhancement of learning for all students" (Wyatt-Smith et al., 2019). Online learning using EP does not diminish the need for quality teaching but rather enhances teacher efficacy. In fact, a blend of online and face-to-face instruction has been found to result in stronger learning outcomes than face-to-face instruction alone (Means et al., 2013). EP also aims to expand teacher expertise by improving their capability to (1) use data to assess the effectiveness of teaching and learning methods and inform practice, (2) develop students' learning and self-assessment skills and their ability to transfer learning for innovation and problem-solving (Wyatt-Smith et al.), (3) deliver differentiated and personalised learning, and (4) provide timely and specific feedback to all students. EP is dedicated to providing teachers with the necessary support to achieve these goals.

Ultimately, the EP platform is not intended to replace the teacher but rather augment and support the teacher in their endeavours to improve student learning and outcomes.



Pedagogical Foundations

A variety of pedagogical strategies underpin the teaching and learning experience contained within EP lessons, assessments and quizzes. The principles of visible learning are the framework around which learning in EP is built, while Universal Design for Learning (UDL) and the principles of multimedia learning are integral to the development and design of EP's content and structure. Feedback loops are embedded throughout the EP experience and across every phase of the Learning Cycle. Bloom's Taxonomy is surfaced in learning activities, and Webb's Depth of Knowledge model forms the backbone of the EP Mastery Model, which drives how the EP product behaves for learners and how learning progress is tracked.

Visible Learning

Hattie's principles of visible learning are embedded throughout every aspect of the Learning Cycle, providing a robust framework for enhancing student achievement by making learning visible to both students and teachers. These principles have been implemented in schools globally for over a decade, resulting in improvements to collective school efficacy (Hattie, 2023). EP aims to follow the visible learning mantra that teachers need to see learning through the eyes of students and students need to learn how to become their own teachers (Hattie). Accordingly, a variety of proven teaching and learning strategies underpin learning in the EP platform, generally with effect sizes of greater than 0.40 to ensure a greater than average impact on student learning.

UDL

The EP digital learning platform has been intentionally designed to support learner agency, in line with the goals of the UDL framework (CAST, 2024). UDL is an instructional design framework that supports the design of inclusive, flexible and supportive learning environments, which take into consideration the variability of all learners (Rose & Meyer, 2006). EP considers this to be an iterative process which involves continuous monitoring of the learning environment to ensure that barriers are reduced where possible and students are able to engage fully in meaningful learning. A meta-analysis by King-Sears et al. (2023) of the academic achievement of learners in UDL environments, compared to those learning in "business-as-usual conditions", found UDL to have a moderate positive combined effect size of 0.43, or in other words, the potential to accelerate student achievement.

Multimedia Learning

Mayer's (2021) theory of multimedia learning is highly relevant to EP learning, which, at its very core, is learning by "words and pictures" to promote better student understanding. All phases of the Learning Cycle utilise both words, printed or spoken, as well as pictures in the form of graphs, photos, maps, animations and videos. EP's learning design follows a learner-centred approach, aiming to assist students in constructing knowledge, such that they both remember and understand presented material and can then transfer that knowledge to solve new problems (Mayer). When discussing online or multimedia learning, it is important to distinguish cognitive activity from behavioural activity, as the research shows that even if students are behaviourally inactive, it is the stimulation of cognitive activity which actually leads to meaningful learning (Mayer). The design of all EP lessons, quizzes and assessments is therefore focused on the stimulation of cognitive activity.

Timely and Specific Feedback

Hattie's (2008; 2023) work affirms the power of feedback while recognising that not all feedback is equal: to be effective, feedback should include sufficient information and address what students should do next. Black and Wiliam (1998) believe the calibre of feedback to be paramount: it should be about the quality of a student's work, provide advice about how to improve, and avoid comparisons with other students or overall marks. Feedback does improve learning when it provides students with specific guidance about strengths and weaknesses (Black & Wiliam, 1998). Simply put, "good feedback causes thinking" (Black & Wiliam, 2003, p.631).

On that basis, EP aims to provide timely and specific feedback to students throughout all phases of the Learning Cycle, keeping the three questions developed by Hattie and Timperley (2007) front of mind to ensure students are indeed thinking:

1. "Where am I going?" (the goal)
2. "How am I going?" (the progress)
3. "Where to next?" (the actions for improvement)

The EP platform provides ongoing and actionable feedback to students in a variety of ways. As students progress through a lesson, many questions are automatically graded with model answers provided, allowing for continuous and instantaneous feedback as they move through the learning. This ensures students progress to mastery at a pace and level of guidance that suits each individual.

Lessons also contain extended response questions that require more open-ended student answers. Model answers, explanations and grading criteria are provided, and students can self-review their responses and improve on them. This type of self-assessment and reflection on learning is an essential component of formative assessment (Black & Wiliam, 1998). Teachers can view and provide feedback on these extended response questions via text or recorded verbal feedback. Additionally, these feedback features are available for use in peer review, an anonymous, teacher-mediated student-to-student feedback tool.

The platform now also includes AI-powered immediate feedback for extended response questions. Previously, providing feedback on such questions was a time-consuming task for teachers. Instantaneous feedback drives deeper student engagement with such tasks and enhances the quality of student work, as students are more likely to work on improving their responses after receiving quick, targeted feedback (Black & Wiliam,1998; Hattie & Timperley, 2007; Zhai & Ma, 2022). Given Hattie's (2023) finding that feedback from technology has an effect size of 0.55, these improvements have the potential to considerably accelerate student learning.

Bloom's Taxonomy and Depth of Knowledge (DOK)

The work of both Bloom and Webb are used by EP when designing learning experiences aimed at developing students' higher-order thinking skills. Bloom's taxonomy (Bloom et al., 1956), as revised by Anderson and Krathwohl (2001), guides the general sequencing of EP lessons. Students work through activities that ask them to remember and understand, move on to application and analysis activities, and conclude with tasks that challenge their evaluative thinking and creative skills. The distinction between the types of knowledge used in cognition allows teachers to plan and deliver appropriate instruction that is based on clear learning goals. As students progress through the cognitive processes, their ability can be assessed and tracked as they move on to the next stage. The important delineation between factual, conceptual, procedural and metacognitive knowledge is used both within lessons themselves and within overall lesson sequencing to ensure that students are logically progressing through the skills.

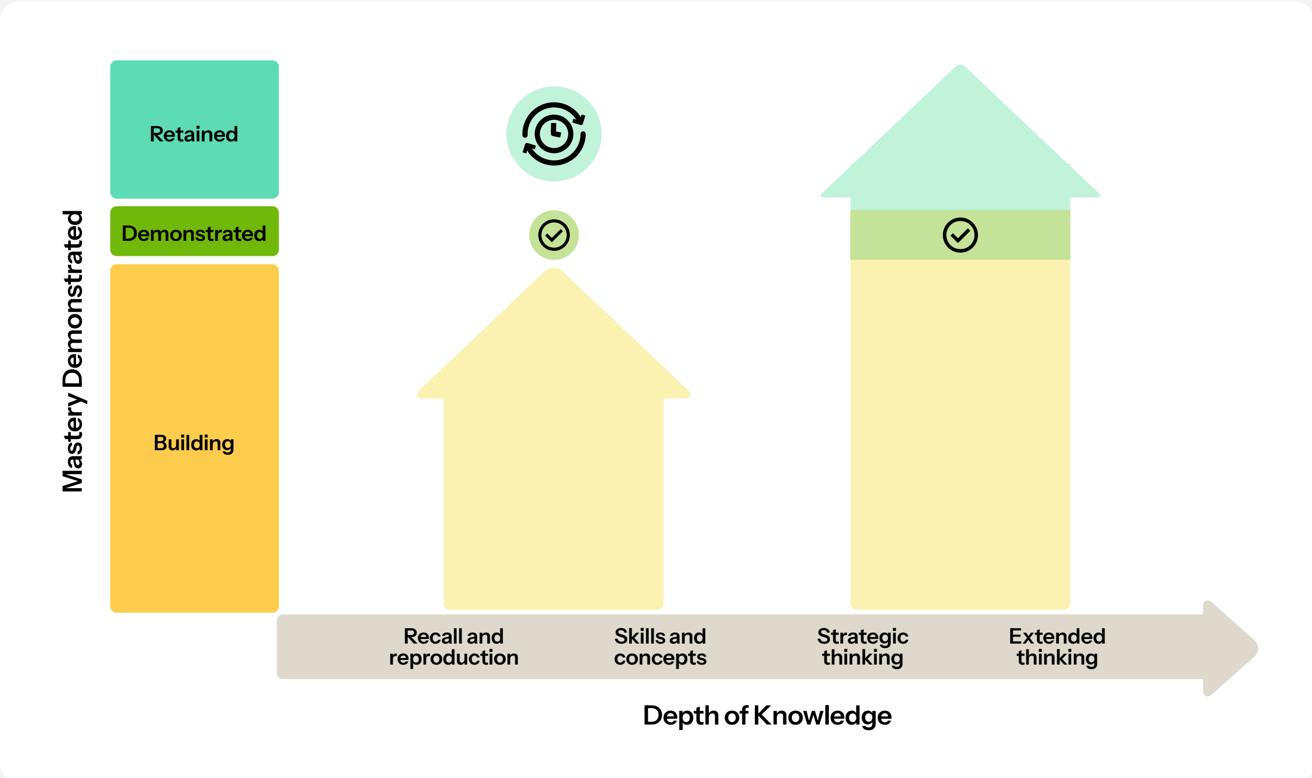
Unlike Bloom's taxonomy, Webb's (1997) DOK schema is not a hierarchy and is based on the premise that ascertaining the complexity of cognitive engagement for any given task necessitates looking beyond the verb describing the task to the full scope of that task (Webb et al., 2023). EP recognises that learning is not always linear and has developed a Mastery Model, which drives both product behaviour and the tracking of learning progress. Three levels of mastery (building, demonstrated and retained) are aligned with the four DOK levels of recall and reproduction; skills and concepts; strategic thinking; and extended thinking. The purpose is to create clarity about what happens (on the EP platform) when a student attains each level of mastery at each depth of knowledge phase.

Education Perfect Mastery Model

The EP Mastery Model supports each individual student to progress from building their understanding to independently demonstrating mastery, and ensuring that this is retained over time. Essential components to achieve this include:

- Clear learning intentions and success criteria
- Scaffolded progression in cognitive complexity that guides a student from simple recall through to extended thinking
- Regular checks for understanding along with timely, specific and actionable formative feedback
- Dynamic adjustments to instruction and questioning to ensure that each student is working in their zone of proximal development
- A clear measure that the student has demonstrated mastery
- Spaced retrieval to ensure that mastery is retained and further strengthened over time

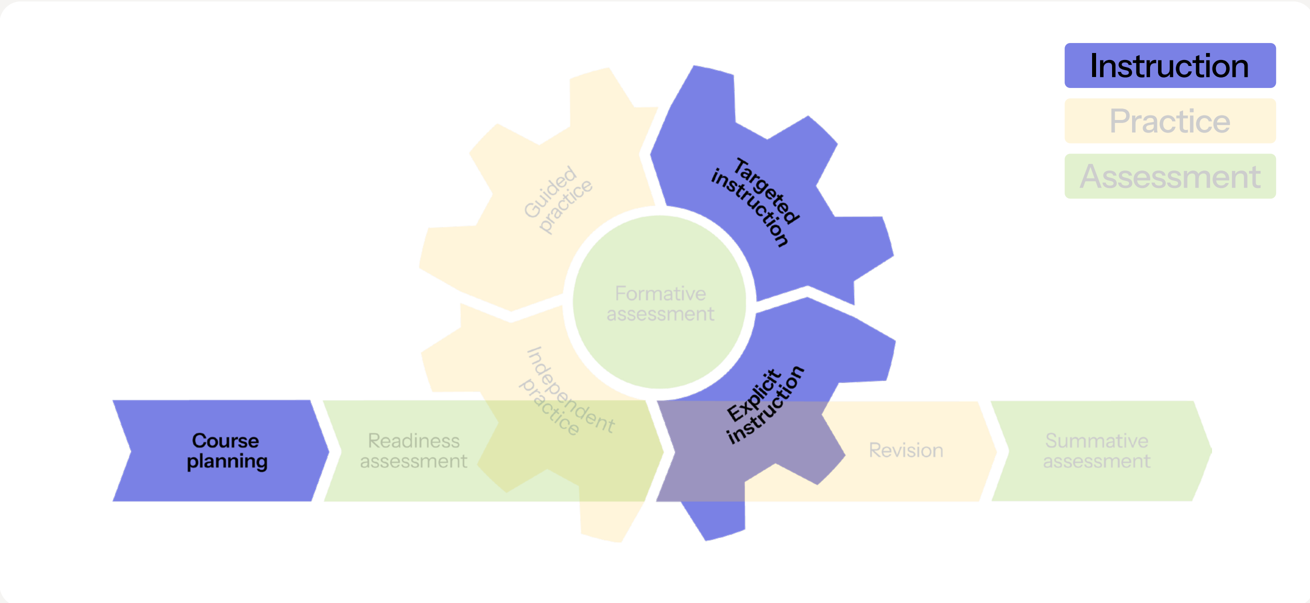
Through this process of supporting students to develop, demonstrate and retain mastery across a range of cognitive complexities, EP is ensuring that every student builds a strong, lasting foundation of knowledge and skills, fostering a sense of competence and confidence that will serve as a springboard for further learning.



Mastery Demonstrated			Depth of Knowldge			
Building	**Demonstrated**	**Retained**	**Recall and reproduction**	**Skills and concepts**	**Strategic thinking**	**Extended thinking**
Student begins to build mastery from the moment they start interacting with a skill.	Student reaches a defined evidence benchmark of performance against the skill.	Student retains the ability to perform against the skill, over a period of time.	Recall or reproduction of facts, details, definitions, or procedures.	Application of knowledge and skills, with basic decision making, reasoning or inference.	Use of reasoning, planning and evidence to solve problems and justify answers or conclusions.	Thinking extends across and makes connections between different information, ideas and contexts.

Instruction

Planning and the ability to cater to individual student needs are key to effective instruction. EP facilitates dynamic instruction built on careful planning, clear delivery, adaptive strategies and timely feedback, all geared towards fostering deep understanding of content and driving improvement of student learning outcomes. EP assists teachers in overcoming the complexities of designing and delivering instruction that meets the diverse learner needs evident in today's classrooms.



Course Planning

Course planning is an important component of the instruction phase of teaching and learning and sets the stage for students to be successful. EP courses are designed with the end in mind. This entails first figuring out what students need to know and be able to do, based on the curriculum, so that we can then create lessons, quizzes and assessments that help them get there. The extensive work that schools put into course planning is acknowledged, and accordingly, all EP courses can be customised to align with existing scope and sequences. We also surface clear learning intentions and success criteria so teachers and students always know what's expected and how progress will be measured.

Explicit Instruction

All EP lessons utilise the clear, direct, systematic learning style known as explicit instruction (Archer & Hughes, 2011). EP guides students by providing a clear purpose and rationale for learning new content or skills, and clear explanations and demonstrations. This involves the use of learning intentions and success criteria; chunking, sequencing, scaffolding and worked examples; and feedback via automatically graded questions, model answers and clear explanations, and artificial intelligence (AI) assistance. This type of guided learning, along with practice, directly aligns with Vygotsky's (1978) Zone of Proximal Development theory (ZPD), as the necessary support and scaffolding is provided to help students master skills they cannot yet perform independently. The progression from EP-led learning to independent application with feedback mirrors the "I do, we do, you do" structure of the gradual release of responsibility model, ensuring that learners are supported as they move toward independent mastery.

Targeted Instruction

Targeted instruction involves tailoring instruction based on student readiness or understanding. In order to target learning in this way, it is essential to first take into account teacher judgements and the insights gathered from lessons, quizzes and formative assessment to pinpoint misunderstandings, misconceptions and areas where students are struggling, or conversely, areas where students are excelling. For EP, this means using assessment data to target interventions to small groups or individual students who have not yet mastered a skill or concept, or provide extension work for those who need it, thereby providing teachers with the capacity to both differentiate and personalise learning as needed.

The evidence-based pedagogical strategies utilised by EP in the instruction phase are explained below.

Backward Design: *planning with the end in mind*

Content creation at EP is premised on the logic of "backward planning", developed by Grant Wiggins and Jay McTighe (2005). Their creation of a comprehensive curriculum planning framework known as "understanding by design" (UbD) emphasised a three-stage process:

- **Identify desired results:** What should students know, understand, and be able to do at the end of the learning experience?
- **Determine acceptable evidence:** How will a teacher know if students have achieved the desired results? This involves planning assessments before planning instruction.
- **Plan learning experiences and instruction:** What learning activities and teaching strategies will best equip students to achieve the desired results and demonstrate their understanding?

There is much literature which speaks to the benefits of UbD and some empirical studies (for example, Dari et al., 2024; Ozyurt et al., 2021; Tshering, 2022; Yurtseven & Altun, 2017). A small quasi-experimental study has attributed improved student outcomes to the use of teaching based on UbD principles (Ostinelli, 2024). This included evidence of better understanding of the topics learned and better global understanding of ideas, effects which lasted for at least one school year (Ostinelli).

Using the UbD framework, EP recognises that learning design is an iterative rather than linear process, and invests the time during course planning to go back and forth as needed to ensure that all assessments, tasks and lessons do in fact equip students to demonstrate deep understanding and achieve the desired results (Wiggins & McTighe, 2005). Teachers can confidently incorporate EP resources into their course planning, knowing they've been thoughtfully crafted with student understanding as the primary goal.

Learning Intentions and Success Criteria: *learning roadmaps*

Learning intentions and success criteria provide a clear roadmap for both educators and students, ensuring a shared understanding of what needs to be learned and how mastery will be demonstrated. The taxonomy of educational objectives, originally created by Bloom et al. (1956), underscores the importance of developing clear and measurable learning objectives to inform course planning and ultimately ensure instruction and assessment are aligned to the curriculum.

Using Anderson and Krathwohl's (2001) two-dimensional revision of Bloom's taxonomy to classify learning objectives and success criteria, course plans are evaluated to ascertain necessary improvements and thereby ensure that each lesson provides students with ample opportunity to learn (Krathwohl, 2002). EP lessons begin with learning intentions and success criteria, providing students with clarity about the intention of the lesson and what they are expected to have learned by the end of it. To further support learner autonomy, prompts at the end of lessons ask students to reflect on what they've learned. Providing this awareness leads to more goal-directed behaviours and enhances student enjoyment of learning success (Hattie & Donoghue, 2016).

Cognitive Load Theory: *optimising learning*

In order to optimise learning for students without overwhelming them, course planning and the content and design of all EP lessons, quizzes and assessments are informed by John Sweller's (1988; Chandler & Sweller, 1991; Sweller et al., 2011) work on cognitive load. While the long-term memory of humans has an enormous capacity to organise and store information, working memory has only limited, temporary capacity: cognitive load is the amount of working memory being used at any one time to process new information. Sweller's cognitive load theory posits that for instruction to be effective, it must be designed to reduce the load on cognitive memory, as this will allow for more efficient passage of information from working to long-term memory. Hattie (2023) agrees that the complexity of cognitive demands must always be considered when planning learning, and working memory demands should be reduced wherever possible.

EP manages intrinsic cognitive load (the inherent difficulty of the subject matter) by following Rosenshine's (2012) principles of instruction relating to sequencing, chunking, modelling and scaffolding (Ayres, 2006; van Merriënboer et al.,2006). Recent research has also shown that smaller chunk-style learning in an online environment may also improve student attention, assist with time management to complete learning materials and increase unit engagement (Humphries & Clark, 2021). To minimise extraneous cognitive load (unnecessary mental effort which doesn't contribute to learning), EP learning designers ensure that course navigation is clean and simple, the layout of all materials is clear and devoid of irrelevant information, and the need to mentally integrate separate sources of information is reduced. According to Sweller (1998), by minimising extraneous load, working memory capacity is freed up, and the capacity to focus on the essential task of learning and schema construction is increased.

Principles of Instruction: *guiding teaching and learning*

The following principles provide a blueprint for the core teaching and learning experiences within the Instruction phase of the EP Learning Cycle:

- Sequencing and chunking
  Sequencing, the presentation of a new concept in parts, and chunking, breaking down complex information into smaller, more manageable parts, reduces cognitive overload and supports mastery learning.
- Modelling and worked examples
  Modelling and worked examples provide the cognitive support necessary to help students learn how to solve problems. Worked examples in particular help students to focus on the specific steps to solve problems and reduce cognitive load.
- Questioning and checks for understanding
  Questions provide feedback regarding how well new material has been learned by students and whether there is a need for additional instruction. Frequent checks to see if students are learning new material assists with moving that information into long-term memory and ensures any misconceptions are caught early.
- Scaffolding
  Providing temporary supports and scaffolds to assist with difficult tasks is a form of guided practice which can include modelling, prompts or checklists, and aids the development of competency.
  (Rosenshine, 2012; Sherrington, 2019b)

EP lessons are broken into small chunks, with text-based instructional material supported by images, interactives, videos and worked examples. Frequent questioning and checks for understanding are interspersed with instructional material and scaffolding, ensuring students grasp the material before introducing additional information or difficulty. If a student answers incorrectly, then the question and feedback cycle continues until mastery is established. Completing an EP lesson requires a student to eventually answer every question correctly.

In this way, EP learning focuses on mastery-based progression, which Bloom (1971) determined to be so important for educators. The goal is to use the methods and materials necessary to ensure that the most number of students can attain mastery of what is taught in EP lessons. Alongside the student completion measures, our learning analytics monitor time spent and student responses, including specific errors or areas of difficulty. This enables the teacher to provide targeted support to students that need it, further enabling student mastery of the learning material. AI feedback on extended response questions provides additional scaffolding and modelling to assist students in their journey to develop mastery.

Differentiation: *meeting students' learning needs*

Differentiation is no longer an optional extra but rather a core requirement for teaching and learning for all teachers around the globe. The ability to differentiate teaching to meet the specific learning needs of students across the full range of abilities is an expected skill for all teachers in Australia, New Zealand and Canada (AITSL, 2011, Standard 1.5; Education Council New Zealand, 2017, Teaching Standard; Ontario Ministry of Education, 2010). However, variation in student attainment levels can be large (Hunter et al., 2022), making differentiation a time-consuming and complicated burden for teachers. A 2021 survey by the Grattan Institute found that 92% of teachers 'always' or 'frequently' do not have enough time to prepare for effective teaching (Hunter et al). It is, therefore, simultaneously an area of critical importance to schools and one in which support is desperately needed.

Personalised learning: ***making learning worthwhile***

All teachers aim to personalise learning for their students, but their capacity to adapt learning opportunities and instruction is so often undermined by competing priorities and a lack of time. Educational theory, going back to John Dewey (1916) and Vygotsky (1978), has supported the need for personalisation. In fact, Vygotsky advocated that the most effective way for a student to learn is for them to work in their ZPD, where the challenge is just beyond their current skill level. Recently, personalisation has been found to enhance motivation and attitude, metacognitive skill development, self-reflection, academic achievement and student engagement (Zheng et al., 2022). Digital technology-supported personalised learning, like that provided by EP, has been specifically shown to have a positive effect on student learning outcomes (Zheng et al.).

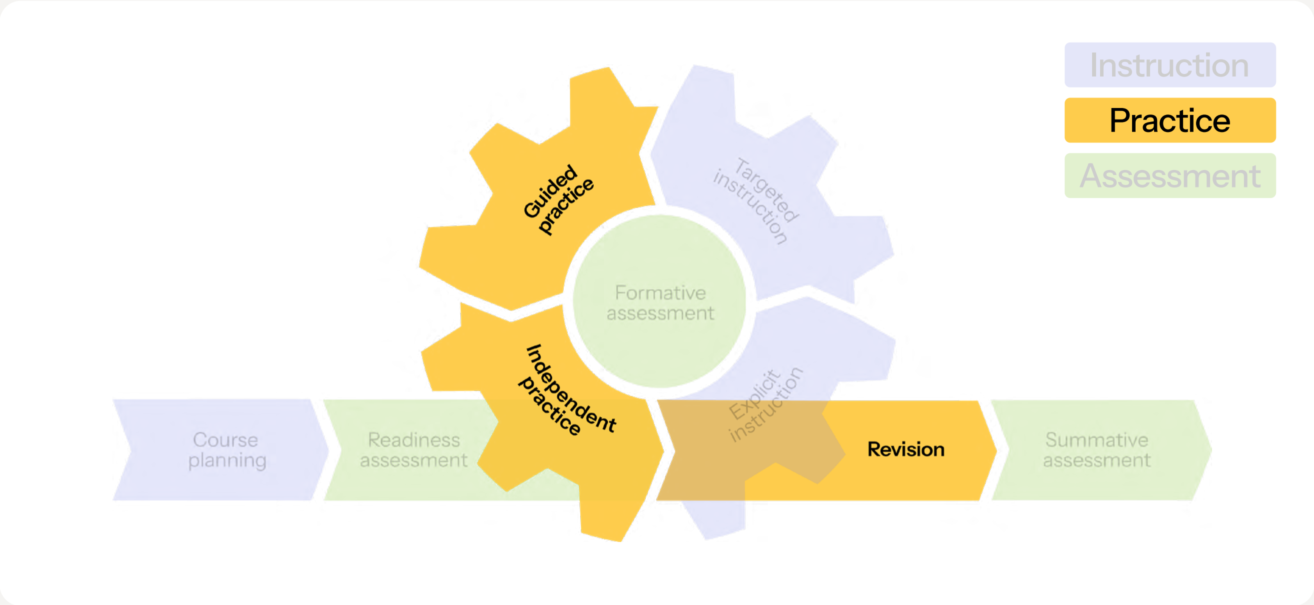
EP's responsive learning system assists teachers in differentiating and personalising teaching and learning by providing targeted instruction that caters to each student. Teachers can assign lessons to different groups or individuals within a class and can easily assign specific sections of lessons to target specific skills or difficulty levels better. Teachers can also customise resources or create their own using EP's integrated content editing features, providing further tailoring to meet the unique needs of their students. An additional benefit for students is that by all using the same platform, those achieving at lower levels do not feel self-conscious and are able to learn at a more rapid rate.

EP Create is a teacher-led, AI-optimised feature that enables teachers to quickly create curriculum-aligned activities. For any given topic, activities such as check-ins, reviews and wrap-ups can be generated in alignment with lessons and curriculum. This feature further supports teachers to create targeted learning experiences as needed for their students.

In addition to tailoring and targeting learning material, teachers can use EP's assessment functionality to identify student strengths and weaknesses, and automatically generate recommended next steps to create a unique learning pathway for each student. This is explored further in the formative assessment section later in this paper.

Practice and Revision

Practice is essential for deeper understanding, skill mastery and long-term retention. In a 2024 report about the state of Maths education in Australia, the Grattan Institute recognised the importance of guided practice after explanation of new concepts, followed by independent practice as part of the knowledge acquisition phase of learning (Hunter et al., 2024). The report also noted that technology can support the development of student fluency by personalising and gamifying practice. EP provides students with opportunities to engage with the guided and independent practice that mirrors the same gradual release of responsibility approach to instruction. This transforms initial learning into lasting knowledge and transferable skills.



Guided Practice

Guided practice is the process whereby students are supported to move from "I Do" to "You Do". On the EP platform, it involves teachers working through problems with students at the same time, step-by-step, while checking for understanding. This type of practice, also referred to as deliberate practice by Hattie (2023), allows focus on new content or weaknesses and is a critical first step in consolidating learning. Scaffolding and modelling provided at this stage assists students to gain mastery, as do checks for understanding and the provision of immediate feedback which corrects misconceptions and reinforces correct understanding (Rosenshine, 2012). The importance of guided practice can be seen in Rosenshine's finding that a high success rate during guided practice leads to a higher success rate during independent practice.

Independent Practice

In addition to guided practice, students also require extensive, successful, independent practice, both in and outside the classroom, to develop fluency (Rosenshine, 2012). Independent practice of the same material provided during guided practice allows students to apply learned skills and knowledge autonomously. The more independent practice that a student does, the greater their ability to automatically recall material from long-term memory, freeing up space in their working memory. EP provides ample opportunities for students to practice skills or concepts from a lesson independently. Teachers are also able to personalise practice to match individual student needs and ensure that no student is left behind.

Revision

The final component of the practice and revision phase is revision, namely the opportunity to look at a skill or concept learned previously to consolidate knowledge and understanding. Revision plays an important role in strengthening memory and consolidating learning over time. The more a student rehearses and reviews information, the stronger the development of schemas in their long-term memory and the easier it becomes to access prior knowledge and solve new problems (Rosenshine, 2012).

The three components of the Practice and Revision phase combined have the capacity to improve student outcomes because “the more practice, the better the performance” (Rosenshine, 2012, p.19). The pedagogical strategies which form the backbone of this phase of the Learning Cycle are explained below.

Deliberate practice: *becoming an expert*

Ericsson’s (2008) review found that expert performance is related to active engagement in deliberate practice focused on improving particular tasks. He concluded that when the following conditions are met during practice, significant improvements in performance result:

1. the task has a well-defined goal
2. the learner is motivated to improve
3. feedback is provided and
4. ample opportunities for repetition and gradual refinement of performance are provided.

As has already been highlighted, EP lessons start with learning intentions and include many questions, starting with simple recall and comprehension of newly presented material, building to guided, scaffolded practice, followed by extensive independent practice. All lessons are responsive to student responses and include automatic grading and AI feedback where possible, clear model answers and repetition with dynamic question variants to assist development of fluency. Further revision is enabled through EP’s quiz tool, delivering targeted practice questions that are responsive to student answers without the surrounding instructional material. This functionality can be used to allow sufficient practice for students to build confidence in and mastery of the target topic.

Gamification: *motivating and engaging students*

EP utilises gamification to increase student engagement and motivation to learn, based on research that shows it has a positive impact. Sailer & Homer’s (2020) meta-analysis considered the impact of gamification on:

- **Cognitive learning:** conceptual (knowledge of facts, principles and concepts) and application-oriented (procedural knowledge, strategic knowledge and situational knowledge),
- **Motivation:** intrinsic motivation, dispositions, preferences, attitudes, engagement, confidence and self-efficacy, and
- **Behavioural learning:** technical skills, motor skills, and competencies.

While noting the need for more research, they found that gamification is effective for learning with significant small effects in all three areas. Smiderle et al. (2020) agreed that gamification in education can enhance engagement and optimise learning, and specifically considered how the effect of gamification might change based on personality traits. They found a “significant improvement in the accuracy of students with personality traits of low agreeableness, low openness, and introverts” (Smiderle et al., p.10). This suggests that students who are least likely to engage with group work or direct instruction in a classroom may benefit significantly if gamification elements are incorporated in their education.

EP has a variety of gamification elements that are designed to enhance student engagement and persistence. Every question answered correctly earns students a point, contributing to their annual score and placing them on a scoreboard alongside their classmates and school. These points are directly tied to effort rather than performance, giving students of all ability levels a chance to engage actively. The points system is further utilised in annual competitions for each subject, where students compete with other students worldwide to earn certificates, badges and other prizes.

The Dash game is unlocked once a lesson is completed and provides a fast-paced, competitive review of the material in the lesson. This harnesses a number of gamified elements, including peer competition, time trials, high scores and leaderboards. A balance of speed and accuracy is rewarded, leading to both an engaging and highly effective tool for consolidating learning. Students can earn a range of stickers of varying rarity by completing EP lessons. These stickers can be collected in their sticker collection and sent to other students as encouragement. Teachers can award additional stickers to students to reward or motivate reasonable effort. In addition to the points, Dash and stickers features, EP utilises engaging avatars and backgrounds to enable students to personalise their learning experience.

Learner Autonomy: *promoting perseverance*

The significance of learner autonomy has long been recognised. Dewey (1916) laid the foundations by emphasising the importance of creating a supportive classroom environment that helps students persevere in their learning. Henri Holec (1981), in defining learner autonomy as the ability to take charge of one's own learning, found that learning is more effective when learners can tailor learning to individual needs and goals. Robinson (2011) called for educators to create environments where students feel safe to take risks and learn from failure, and to foster individual potential and agency. Extensive research into the value of empowering students to take ownership of their learning journey has shown that from a psychological perspective, when students have choices, their curiosity and motivation to learn is stimulated (McCombs, 2015).

The importance of student motivation in relation to practice has already been highlighted, as have the gamification aspects of the EP product, which help to promote motivation. Having access to immediate feedback and the ability to improve responses and build on knowledge with a variety of assessment types and additional instructional material places students in charge of their own learning. Supporting learner autonomy is yet another way in which EP aims to enhance motivation to learn and nurture lifelong learning.

Desirable Difficulty: *learning through productive struggle*

The principle of "desirable difficulty" acknowledges that a sense of struggle or difficulty during learning is not necessarily a sign of failure but often an indicator that genuinely effective cognitive processing is occurring (Bjork, 1994a; 1994b). The level of difficulty is, however, important; difficulty becomes undesirable if students do not have the requisite background knowledge or skills (Bjork & Bjork, 2020). In the case of desirable difficulties, learning conditions which create challenges support lasting learning and the ability to transfer learning (Bjork & Bjork, 2011). This implies a deeper level of understanding and metacognition, and the ability to apply knowledge, in contrast to rote memorisation, a more superficial form of learning that prioritises recall over understanding. EP facilitates this productive struggle by breaking content into interactive chunks, where progression is strictly gated by checks for understanding. This structure ensures that the challenge is calibrated to the learner's current mastery; students engage in a continuous cycle of questioning and feedback until the concept is solidified, preventing the struggle from becoming overwhelming.

Spaced Retrieval Practice: *consolidating learning*

Retrieval practice is fundamentally an active study technique that involves the deliberate attempt to remember information that has been taught via testing, as opposed to passive study methods, such as rereading notes. Repeated retrieval practice has been found to enhance long-term retention and consolidate learning (Karpicke & Roediger, 2007b; 2008). Desirable difficulties can be created for students by utilising retrieval practice (Bjork,1994a; 1994b), spacing (rather than massing) practice and using tests (Bjork & Bjork, 2011).

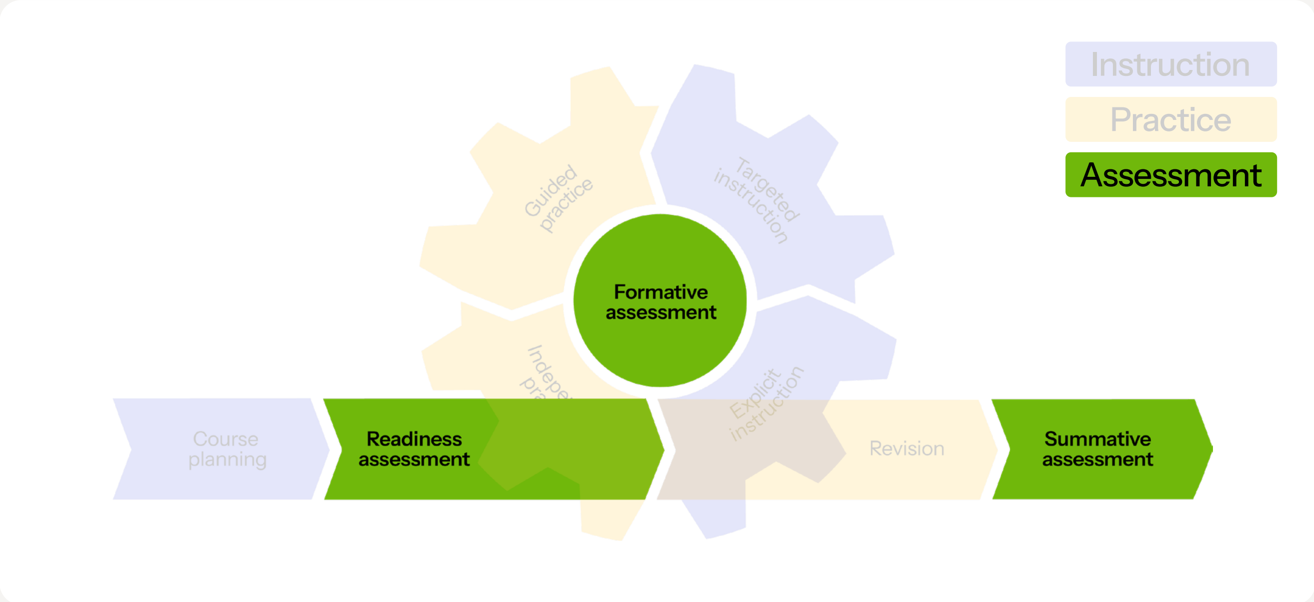
Karpicke & Roediger (2007a) found that by delaying initial retrieval to make it more difficult, as occurs during equally spaced retrieval practice (consistent, fixed-interval questioning/testing), long-term retention is promoted. This aligns with Rosenshine's principles relating to daily, weekly and monthly review, which Sherrington (2019) combines into the strand of "reviewing material". Daily review allows reactivation of new knowledge and helps to combat the forgetfulness that is a natural part of learning, but by placing prior learning in working memory, it also frees up cognitive capacity to focus on new content (Sherrington). Weekly and monthly review further support fluency of recall by forming more extensive schema in long-term memory and reducing the use of the limited space available in short-term memory (Sherrington).

EP has a range of features that encourage retrieval practice, specifically the spaced review of learning material. Points are awarded for each correct answer to lessons, with an additional point per question available at the following intervals: one day, one week, one month, three months, and six months.

In addition to the points system for all learning material, the Dash revision game and vocabulary and spelling lists have a star-based spaced-rewards system, further encouraging students to revisit and revise the material.

Assessment

Assessment is not merely about measuring learning at the end of a unit; it's a continuous process that is an integral part of the learning process itself. EP assessment tools provide educators with insights into student learning, which facilitate improvement of teaching practice and allow differentiation and personalisation of student learning. Students have access to engaging and authentic assessment tasks, along with timely and specific feedback, co-opting them into the learning journey and providing them with the autonomy to self-correct, practice and improve.



Readiness Assessment

The purpose of readiness assessment is to identify students' prior knowledge, skills and learning gaps before instruction begins. This type of assessment is essentially a diagnostic tool which ensures teachers are not teaching what students already know and allows identification of any areas needing targeted support. As highlighted by Wiggins and McTighe (2005), flipping the teaching and learning process to have assessment as the starting point for instruction, rather than the end point, ensures purposeful lesson planning and resource allocation, from the perspective of both materials, but also time dedicated to instruction and student assistance. In this way, assessment to inform instruction facilitates differentiation and the creation of personalised learning experiences (Wiggins & McTighe). EP supports readiness assessment at a pre-topic level, with teachers able to use pre-made assessments or make their own with the Quiz tool or EP Create, including quick 'entry tickets'. The actionable insights into prior knowledge and skills provided to teachers from these quizzes allows them to then make informed choices to tailor instruction to meet individual student needs. Similarly, students are made aware of the gaps in their knowledge and are empowered to overcome them.

Formative Assessment

Formative assessment can have multiple purposes in a classroom. For EP, the focus is on formative assessment for learning and as learning. The former empowers teachers to adjust instruction to suit individual student needs, while the latter provides student ownership of learning through ongoing feedback loops. McCallum's and Milner's (2021) report on the effectiveness of the formative e-assessments considered student voice and staff reflection. They found that students believe formative e-assessments help them monitor progress, encourage further study and improve overall learning and understanding. From the teacher's perspective, formative assessment provides valuable feedback, allowing teachers to gauge student comprehension and adjust their teaching strategies accordingly. Ongoing formative assessment also has an important role to play in preparing students for summative assessment.

Summative Assessment

Summative assessment is commonly undertaken to evaluate learning outcomes and ascertain what students have learned at the end of a unit, term or year, often for the purpose of reporting student progress to parents. It does, however, also serve a broader purpose in informing future curriculum design and evaluating a teaching and learning program. Using data from summative assessments can inform teaching strategies and subsequently improve student outcomes (Griffin, 2014). As with formative assessment, EP summative assessment tasks are created using backward design techniques, ensuring authenticity and relevance (Wiggins & McTighe, 2005). EP has a broad range of pre-built summative assessments available, and teachers are also able to create their own bespoke assessments using EP's content curation and creation tools. These assessments generate reports against the curriculum that aggregate continually, building a rich picture of student learning and allowing for the tracking of learning growth over time.

EP assessment aligns with the five key strategies for effective formative assessment, which Dylan Wiliam (2011) has written about extensively, many of which apply equally to readiness and summative assessment on the EP platform and are also linked to the instruction and practice phases:

- Clarifying, sharing and understanding learning intentions
  EP learning intentions and success criteria make sure students know what they are supposed to be learning and what a successful outcome looks like. They work in tandem with the sequencing, modelling and scaffolding provided in lessons and give students the agency to monitor their own progress.
- Engineering effective classroom discussions, activities and tasks that elicit evidence of learning
  Questions in lessons, quizzes and assessments all check for understanding and seek out evidence of what students know and don't know in real-time, allowing the personalisation of instruction.
- Providing feedback that moves learners forward
  EP quizzes and assessments provide immediate and specific feedback to guide students on what to do next and ultimately improve their learning. This is the concept of moving from guided to independent practice (Rosenshine, 2012).
- Activating students as learning resources for one another
  The peer review function encourages peer-to-peer feedback and collaboration, helping students learn from each other and take ownership of their learning.
- Activating students as owners of their own learning
  Automated and individualised next steps for each learner, based on their assessment results, puts students in charge of their own learning. Exit slips, peer review activities, student self-reflection, checks for understanding, and quick quizzes all promote learner autonomy.

EP has an extensive range of assessments which teachers can use, but it is also really easy for them to create their own quizzes and assessments using the EP quiz feature and the new EP Create feature. The quiz feature allows teachers to feed in any combination of lessons, with a formative assessment automatically generated based on the lessons selected. EP Create is an AI-powered tool that generates unique questions based on the targeted curriculum descriptors and a prompt. Teachers can clearly see where students are making progress, where gaps in knowledge are being filled, and determine future pathways based on clear and actionable data. This is a huge asset when having learning conversations and offering personal feedback to individual students. For students, the ability to monitor their own progress, set goals, and reflect on their learning means they can take control of their own education. This can increase confidence, help develop a growth mindset and improve self-regulation (Sherrington, 2019a).

A Cohesive Learning Ecosystem

The EP platform is built upon a strong foundation of educational theory and research. Our focus is to enhance teacher practice and improve student self-efficacy. We believe that instruction, practice and revision, and assessment are not isolated phases of teaching and learning but deeply intertwined processes that create a cohesive learning ecosystem.

Our approach to instruction is both systematic and adaptable. Every EP course and lesson is developed using a backward design framework, ensuring that all content and assessments align with clear learning intentions and success criteria. Explicit instruction provides a clear roadmap for learners while reducing cognitive overload by sequencing, chunking, modelling and scaffolding. Mastery-based progression ensures that students grasp new material before moving on. Insights from student responses are leveraged to enable targeted instruction, allowing teachers to differentiate and personalise learning experiences to meet individual student needs.

Practice is essential for consolidating learning and building mastery. EP provides extensive opportunities for both guided and independent practice, which are critical for transforming initial learning into lasting knowledge. The platform's deliberate practice features help students build proficiency and confidence. Student motivation is enhanced through gamification, using points, leaderboards and rewards to increase engagement and persistence. Retrieval practice and spaced repetition encourage students to revisit material at strategic intervals to strengthen memory and consolidate knowledge. By promoting learner autonomy, we empower students to take ownership of their educational journey.

EP views assessment as an integral part of the learning process, not just a tool for measurement. Our platform provides a variety of assessment tools that serve multiple purposes: helping teachers identify students' prior knowledge and learning gaps, enabling purposeful lesson planning and targeted instruction (readiness); providing real-time evidence of learning, allowing teachers to adjust their instruction and providing students with immediate, actionable feedback (formative); and evaluating learning outcomes and informing future curriculum planning (summative).

Ultimately, Education Perfect is dedicated to providing teachers and students with the tools to support teaching and learning, leveraging educational research to ensure that everything we do is evidence-based. Pedagogical strategies with high effect, as highlighted in Table 1, are utilised across the Learning Cycle with the data insights generated throughout providing a constant companion for teachers and school leaders to inform instruction in their classrooms and schools. EP supports educators to apply the four-step process established by Paul Bambrick-Santoyo (2019) to implement data-informed practice:

Assess

EP understands the importance of setting a clear roadmap and continually assessing learning. This is supported by allowing teachers to create and assign a wide range of curriculum-aligned activities, all of which provide the raw data needed to measure student learning.

Analyse

It is critical to analyse data to gauge student understanding and track progress. EP provides rich, usable data insights through its dashboards that allow teachers to easily track student performance, identify trends and pinpoint specific strengths and weaknesses. Teachers are also supported in making estimates of achievement in specific subjects, allowing them to more accurately tailor learning (Hattie, 2023). EP's streamlined data analysis also helps educators save time and make informed decisions.

Act

To be useful, data must actually be used to inform effective teaching. Based on the data insights generated from EP activities, teachers can assign specific gap-filling or extension work to individual students, ensuring that instruction is targeted to their unique needs. The platform's extensive, adaptable resources help teachers quickly implement new instruction informed by their analysis.

Build the Culture

EP facilitates a data-informed culture in schools by making the entire process more efficient and accessible. Automated marking, instant feedback and easy-to-interpret data dashboards help build a culture where using student data to inform decision-making becomes a routine part of daily teaching practice, rather than a time-consuming and cumbersome task.

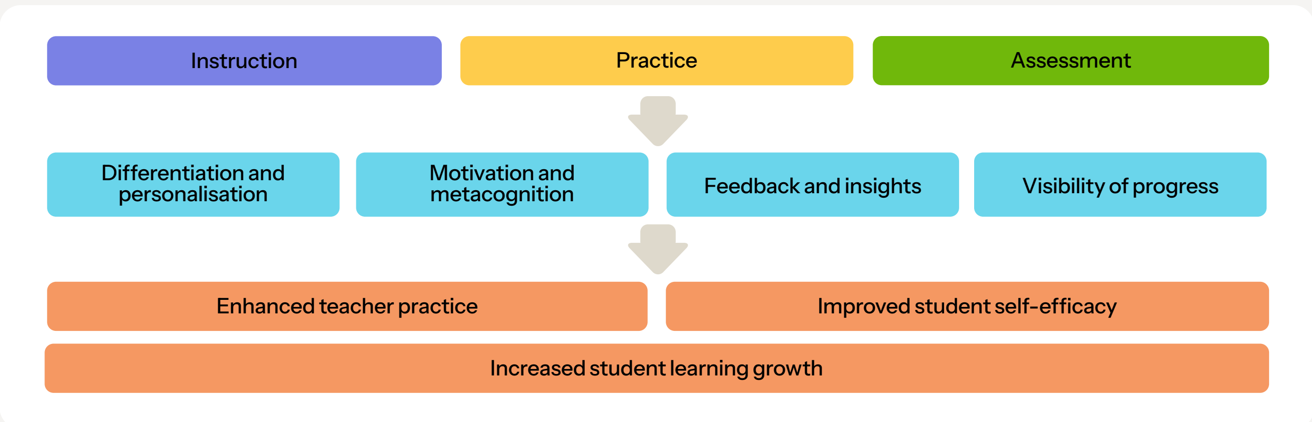
Table 1: Effect sizes of EP teaching and learning strategies[1]

Teaching and learning strategy	Effect size
Deliberate practice	0.49
Differentiation	0.58
Direct instruction	0.56
Explicit teaching strategies	0.63
Feedback from technology	0.55
Gamification	0.42
Mastery learning	0.67
Metacognition	0.58
Motivation	0.40
Personalised learning	0.43
Practice testing	0.49
Scaffolding and situated learning	0.52
Spaced vs mass practice	0.59
Success criteria	0.64
Rehearsal and memorisation	0.71
Retrieval practice	0.51
Teacher estimates of achievement	1.30
Worked examples	0.47

[1] An effect size is a quantitative measure that shows the extent of impact a teaching approach has on learning. *Corwin Visible Learning Plus, 2024; Hattie, 2023.*

Education Perfect is much more than a content platform; it's a cohesive learning ecosystem which empowers teachers to create dynamic learning experiences for their students. The powerful link between each phase of the Learning Cycle is what makes the platform so effective. Instruction becomes more targeted because it's informed by readiness and formative assessments. Practice becomes more deliberate because it's guided by instructional feedback. Assessment becomes a tool for growth, providing the actionable insights needed to continuously refine teaching and learning. We believe that leveraging all aspects of the EP Learning Cycle combined with a data-informed approach, has the potential to enhance teacher impact and improve outcomes for every student.

Emerging trends in educational technology, such as advancements in AI and learning analytics, will continue to enhance personalised and responsive instruction and practice, transforming the education landscape. We encourage teachers and schools to prioritise and strategically implement a diverse range of instruction, practice and revision, and assessment strategies, embracing a holistic, data-informed approach to teaching and learning, leveraging the capabilities of EP's robust tools and innovative, evidence-based technology to transform learning in an environment where ongoing professional learning and support are provided.



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