Creating Cambridge Learner Profiles: A holistic framework for teacher insights from assessments and evaluations

Irenka Suto (Cambridge CEM)

Introduction

The pandemic has led to school closures and online learning in many countries, including in England. Enormous numbers of learners have experienced upheaval and missed learning opportunities. For example, the United Nations (2022) estimates that 147 million children missed over half of their in-person instruction in 2020–21. Some children have lost previously acquired knowledge, and wellbeing and social skills have been affected too.

When schools have re-opened, teachers in England have been eager to make the best use of their time with learners. Some secondary school teachers have favoured a highly focused approach, targeting their teaching around the content of high stakes examinations for General Certificates of Secondary Education[1] (GCSEs) to ensure their learners achieve the best possible grades. Similarly, many primary school teachers have renewed their emphasis on reading (TES, 2020) and on other fundamental academic knowledge, skills and understanding.

Alongside this potential narrowing of the curriculum, the need to take a broader, more holistic approach to understanding and supporting learners has also become more salient to teachers of all age groups. This includes understanding learners' wellbeing and resilience during these times of adversity and uncertainty. In addition to its inclusion in the National Curriculum for England and in other curricula around the world, psychological wellbeing is worthy of attention for its own intrinsic value. Given that children typically spend around 15 000 hours in education (Rutter et al., 1979), teachers and parents want them to feel well, and to feel that they are doing well, during this substantial phase of their lives. Moreover, nurturing all aspects of a learner's growth acknowledges the broader social,

1 GCSEs are qualifications in traditional school subjects and are obtained by most 16 year olds in England, Wales and Northern Ireland. They are a passport to higher-level study and are valued by many employers.

societal, and economic responsibilities of education.[2] Overall, it could be argued that Covid-19 has resulted in a reshaping of education, simultaneously narrowing and broadening different elements of it.

The need for a holistic framework for teacher insights into educational success

Periods of change provide an ideal opportunity to reflect upon the bigger questions of *what we want a high-quality education to achieve*, and *what that education could look like in practice*, especially in terms of the insights that teachers can gain along the way from associated assessments. Such questions are central to achieving the United Nations' fourth Sustainable Development Goal, on quality education: "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2022). Broad, holistic conceptualisations of high-quality education can accommodate the idea that each school around the world is unique, embedded within different local and national cultures and legal frameworks. Each school's senior leaders must ultimately determine the school's own educational approach, answering the big questions (above) for themselves. This is important when thinking about how best to support schools to optimise learning and wellbeing.

Given the potentially overwhelming complexity of what a rich and holistic education entails, a simple conceptual framework which is grounded in evidence about what is really important to learners' educational success could help school leaders and teachers to make informed decisions, whichever educational philosophy or goals they choose to adhere to. In this article we present and explain such a framework, which articulates the insights that teachers can gain from different types of educational assessment and evaluation.

It is important to acknowledge from the start that human performance is highly integrated; that is, it has many different interacting components. Educationalists and psychologists seek to understand it by disaggregating it and by distinguishing different influences upon it. However, performance and contributory factors can be divided up in many different ways and to different levels of granularity. There are alternative ways to slice the cake, to create a series of easy-to-articulate components or "constructs" that will, in reality, interact in a variety of ways. Relationships among components are often complex and opaque. John Hattie's renowned syntheses of over 1850 meta-analyses explore success in schools in great detail, identifying hundreds of influences upon educational outcomes (Hattie, 2012; Visible Learning, 2022). However, it can be challenging to hold all of these in mind simultaneously, to see the bigger picture, and moreover, to unpick the relationships among the influences. To complement previous research, we would assert that a higher-level understanding and structure that focuses upon the roles of assessments would be helpful.

2 Note that holistic conceptualisations of education are not new. As discussed by Suto et al. (2022), Jacques Delors' report to UNESCO, *Learning: The Treasure Within* (Delors et al., 1996), put forward a widely regarded holistic and integrated vision of education for the 21st century. This thinking draws in part from the deep-rooted educational philosophy of "Bildung" which has a long history in Germany and Scandinavia and denotes an educational ideal that can be traced back to Antiquity (Klafki, 1998, 2009).

In developing our framework, our main aim was to provide school leaders and teachers with a useful and memorable organising instrument. It has value in helping teachers to understand the main factors that influence learners' educational success, and hence the areas that a combination of different assessments would ideally cover during a learner's educational journey and why they are useful in a formative sense. We believe teachers could use the framework to combine numerical data from baseline and formative assessments with insights from observations, professional judgements, and learner discussions, to structure actionable learner profiles. They could also then identify complementary teaching and support strategies.

A new holistic framework

Our new holistic framework is presented in Figure 1. It comprises five interacting conceptual areas that contribute to learners' educational success, and into which we believe it is important for teachers to gain insights. These areas are: (i) cognitive skills and capabilities, (ii) cross-curricular knowledge, skills and understanding, (iii) subject domain knowledge (precursor curriculum coverage), (iv) teaching and learning environment, and (v) personal attributes. Learner data collected during the educational journey, both quantitative and qualitative, can be grouped in these five areas. Additionally, data can be collated on measures of educational outcomes and successes, such as qualification grades and progression to higher education institutions and employment.

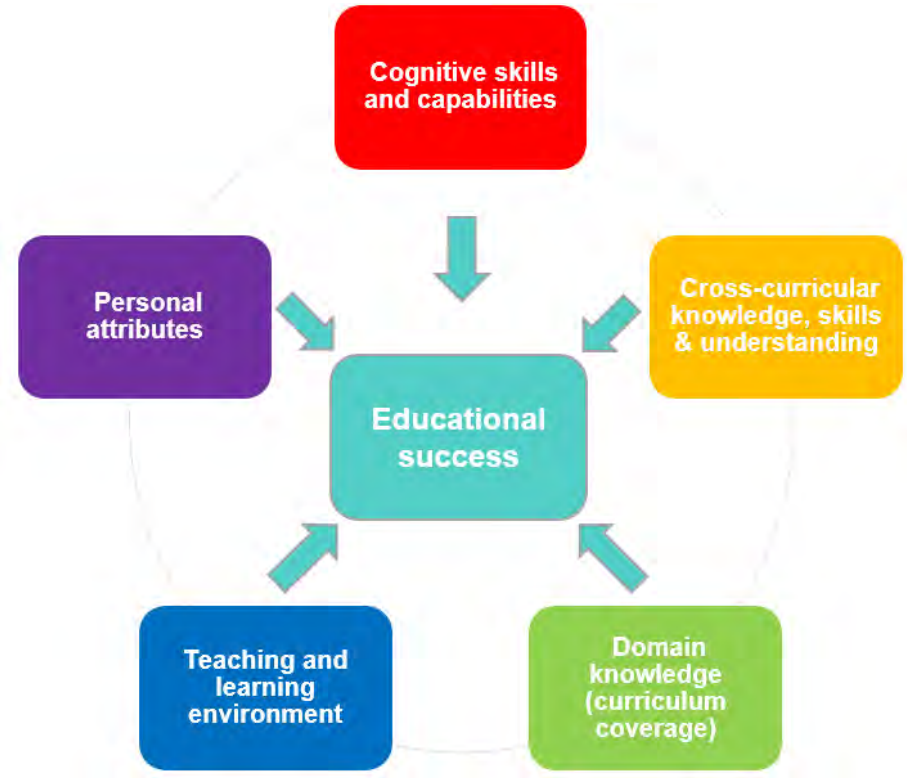

Figure 1: Our holistic framework for teacher insights from assessments and evaluations.

In the following sections of this article we explain each of the five areas of teacher insight in turn, to provide an evidence base for our framework.

Cognitive skills and capabilities

Our first area for teacher insight is that of cognitive skills and capabilities. Constructs in this area are assessed in many baseline and entrance tests, which are often taken at the start of the school year (for example Cambridge Centre for Evaluation and Monitoring (CEM)'s baseline tests and GL Assessment's CAT4). Cognitive skills are "curriculum free" in the sense that they do not typically feature in English or other school curricula. They include non-verbal reasoning and some types of verbal reasoning. CEM's assessments measure learners' ability in 3-D visualisation, spatial aptitude, pattern recognition and logical thinking.

In our recent analysis of assessments in this area (Suto et al., 2022) the assessment results of Year 6 learners (aged 10/11) in England were compared with their subsequent GCSE results (at age 16) in a range of school subjects. In line with earlier research (Deary et al., 2007), correlation coefficients were found to be high: for example, 0.77 for GCSE Mathematics, 0.72 for English, and 0.71 for Geography. These high levels of predictive validity are reassuring rather than surprising, given what is known about the constructs assessed.

Assessments of cognitive skills and capabilities have been described as measuring "eductive ability", which is "the capacity to forge new knowledge, discern meaning in confusion, perceive, and identify relationships" (Querioz-Garcia et al., 2021, p. 85), and to "make meaning" (Raven, 2008). Eductive ability is a close relative of analytical thinking. In their renowned taxonomy of educational objectives, Bloom and his colleagues explain that *analysis* "emphasizes the breakdown of material into its constituent parts and the detection of the relationships of the parts and of the way they are organized" (Bloom et al., 1956, p. 144). Both non-verbal and verbal reasoning tasks require candidates to undertake precisely these analytical tasks. In their revision of the cognitive domain of Bloom's taxonomy, Anderson and Krathwohl (2001) present *analysis* as a higher order thinking skill, which is more demanding than retrieving information from memory, understanding information, and applying it. Analytical skills are required in a wide range of secondary school subjects. They are also included in pedagogical taxonomies of critical thinking (Black, 2012) and 21st century skills (Suto, 2013), which would suggest that they are important for success across broader conceptualisations of education such as "Bildung" (Klafki, 2009) and that of Delors et al. (1996).

It is worth noting that although cognitive skills and capabilities are very difficult to teach, learner data in this area is of great value to teachers. Insights can be used to assign learners to teaching groups or streams, and to anticipate the levels of support that they will need. Baseline, entrance, and similar assessments can thereby support targeted teaching and encouragement for everyone.

Cross-curricular knowledge, skills and understanding

Like cognitive skills and capabilities, cross-curricular knowledge, skills and understanding (KSU) are relevant to many different school subjects; however, they are much easier to teach. They include core mathematical concepts, vocabulary and language comprehension, and they are also assessed in baseline and entrance tests (Cambridge Centre for Evaluation and Monitoring, 2023a; 2023b). In our recent predictive validity analysis we confirmed them to be good predictors of subsequent academic performance in a range of subjects (Suto et al., 2022).

Why might this be? Mathematical thinking arises in school subjects as diverse as the sciences, computer science, economics, geography, business, and design and technology. Learners of these subjects are often required to perform calculations, interpret graphs, and measure things. Language comprehension is needed in all school subjects, since learners must comprehend what teachers and fellow learners are saying, what they read in textbooks and other teaching resources, and of course, what examination questions are requiring of them. Similarly, it is needed in non-assessed elements of education, such as personal, social and health education, and in elements that contribute to and constitute education in its broadest sense, including extra-curricular activities.

Vocabulary is critical to language comprehension (Quigley, 2018). To ensure comprehension, the reader must know 95 per cent of words in a text, and this percentage is as high as 98 per cent in many texts for older learners (Blachowicz & Fisher, 2015). It could be argued that cross-curricular KSU is a subdomain of domain knowledge, however, we would argue it is a discrete area of teacher insight. While learners acquire some cross-curricular KSU through the taught curriculum, much vocabulary and therefore language comprehension is acquired outside of lessons. This includes during extra-curricular activities and during social and other aspects of school life, as well as at home. Not only are basic everyday words, which are often acquired outside the classroom, important for good communication with all teachers and fellow learners, but they are also needed to understand the background contexts used in questions in subjects such as geography, history, economics, English language, and drama. Even in mathematics, problem-solving questions contextualise mathematical content to check that learners can apply their mathematical understanding in the "real world" (Beck et al., 2013).

Domain knowledge

Arguably, this area of the framework needs little explanation or justification since it is well known and highly intuitive that prior KSU in a given subject domain is also a solid predictor of educational outcomes in that subject. In England, for example, correlations between GCSE grades (typically at age 16) and A level grades (typically at age 18) in the same subject tend to be between 0.5 and 0.65 (Ofqual, 2017; Sutch, 2013). Similarly, the relationships between performance at GCSE and prior attainment in national curriculum assessments at the end of primary school (Standardised Assessment Tests, known as SATs) have also been explored and reported to be strong (Benton & Sutch, 2013). Put simply, the greater a learner's

coverage of the curriculum and the deeper their understanding of the content, the better their performance in summative assessments is likely to be.

While the studies cited here relate to formal assessments, it is important to note that teachers can gain insight into their learners in this area through both internal and external assessments of varying formality and consequence. While some progress tests are offered by assessment organisations, others are constructed by teachers, and even less formally, day-to-day classroom interactions provide many opportunities to establish learners' domain knowledge.

Generalisation from a simple model of human performance

The final two areas of insight in our holistic framework were identified by revisiting some of our previous research on human performance in a different educational assessment context (Suto & Nádas, 2008). We propose that to increase educational success, on the one hand we can reduce "task demands" (see below) and on the other hand we can increase learners' personal expertise in learning.[3]

The idea of learning expertise is very similar to the multidimensional construct of "learning power", which stems from the idea that learning is learnable (Deakin et al., 2004) and to which we return subsequently. However, "expertise" or "power" imply agency and are not inclusive enough terms to capture all the personal attributes that come into play in acquiring new knowledge, skills and understanding. For example, psychological wellbeing affects learning and can be affected by factors that are beyond a learner's personal control (McLellan, 2021). Wellbeing can decrease through no agency or fault of the individual. Capacity or readiness to learn could therefore be added to learning expertise to comprise the "personal attributes" that influence educational outcomes (see purple box in Figure 1). Such capacity has been defined by Maddox, Forte and Boozer (2000) as the degree to which learners have prerequisite cognitive, emotive attitudinal, and behavioural attributes, skills and orientations that will prepare them for involvement in learning.

Elements within this model have already been explored extensively in past research, and in the remainder of this article we bring together the two bodies of literature on these two major routes to optimising educational performance: (i) the teaching and learning environment and (ii) personal attributes (learning expertise/power/readiness). They complete our framework of five areas of insight for teachers (Figure 1).

Teaching and learning environment: reducing demand in learning

The term 'reducing demand' could easily be misinterpreted. In the present context, it is *not* about reducing curriculum content demand by decreasing the volume, depth, or breadth of domain coverage or by lowering the sophistication of the mental processing required of learners.[4] In England during the pandemic, the

3 Our original research on marking expertise (Suto & Nádas 2008) showed that marking performance can be improved by decreasing the demand of the marking task and increasing the examiner's personal expertise.

4 See Suto, Greatorex, Vitello & Child (2020) for a detailed discussion of what increases and decreases curriculum content demand.

narrowing of secondary school teaching around the content of high stakes GCSE examinations (mentioned previously, and as instructed by the national regulator) is an example of "reducing demand" in this sense. There are clear risks associated with this approach. Arguably, the overall quality of education is impoverished and learners leave school with reduced KSU, which will serve them less well as preparation for employment or further study.

Instead, "reducing demand" in order to improve learners' performance is broadly equivalent to applying cognitive load theory in education (Sweller, 1988). This is the longstanding idea that when curriculum content is held constant, cognitive load typically increases when unnecessary demands are imposed on a learner, making the task of processing information overly complex. In the context of education such demands include, for example, the unnecessary distractions that can occur in a classroom and inadequate teaching methods. When cognitive load is managed well, learners can learn new things more easily than when high cognitive load interferes with the creation of new memories (Anon., 2022). Sweller (*ibid.*) originally argued that instructional design can be used to reduce cognitive load in learners, and over 30 years later, Hattie's (2022) reported effect sizes would certainly support that position.

We would argue that in order to understand cognitive load in education, teachers and school leaders need deep insight into what we label the learner's "environment"; this is a fourth area of insight in our holistic framework. School leaders and teachers will want to adjust what is within their control to make the learner's environment as conducive to learning as possible.

There are different ways of dissecting and articulating the learner's environment. For example, McLellan (2021) writes:

> "Bronfenbrenner (2005), in talking about human development, puts the individual at the heart of his ecological systems theory, that describes the interacting systems within which we exist in society. So, for example, a student is learning within the microsystem of a classroom interacting with staff and students. In turn this microsystem is nesting within and interacting with other systems outside the classroom – such as the family and local community, government policy and societal beliefs. All these systems evolve and change with time and what happens in one part of the ecosystem affects the rest of it, ultimately impacting the learner" (McLellan, 2021).

Kyriakides et al. (2020) offer a similarly dynamic model, focusing specifically on the educational environment. It includes: (i) system level, (ii) school level and (iii) classroom level factors affecting learners' academic outcomes, and is underpinned by recent analyses and meta-analyses of studies in the burgeoning field of educational effectiveness and improvement.[5] At the level of the system, control factors include national and regional policy for education, plus curriculum, pedagogy, and accountability. School-level factors include school leadership

5 Kyriakides et al. also include learner-level factors in their dynamic model. We consider these factors later in the paper.

practices, school policy, and the quality of implementation of such policy. Classroom-level factors relate to the quality of teaching and include: orientation, structuring, modelling, application, questioning, assessment, management of time, and the classroom as a learning environment (Creemers & Kyriakides, 2008).

Many of the numerous factors evaluated by Hattie (2022) can be placed within these three levels, and within the school and classroom levels in particular. For example, factors with relatively large effect sizes such as classroom discussion (0.82), scaffolding (0.82), and summarisation (0.79), which can all be elements of instructional design, come into play at the level of the classroom. Overall, Hattie asserts that the key to making a difference is to make teaching and learning visible. He argues that learning becomes visible when teachers are also learners (i.e., evaluators of their own teaching), and help learners to become their own teachers through metacognitive strategies, feedback and reciprocal teaching (Hattie, 2012).

To Kyriakides et al.'s three levels of influential factors, we can also add pastoral-level factors, which can be highly distinct in boarding schools, for example. In addition to the school or educational environment, a learner's home environment is also very important for education (Hattie, 2022). A great many aspects of home environment potentially influence educational outcomes, both physical and social. For example, for some learners, a challenging home environment can be one in which they receive little parental support, interest, and encouragement. In stark contrast, but also potentially just as challenging, other learners may have extremely demanding parents with unrealistic expectations for their academic achievement. This pressure may be coupled with little free time to unwind and relax.

Personal attributes

As discussed previously, in addition to reducing the demands of learning by focusing on educational environments, teachers can also improve educational outcomes by attending to their learners' personal expertise in learning and their learning readiness. We believe every learner possesses a unique combination of personal attributes beyond their cognitive ability that help (or hinder) their learning. "Personal attributes" are essentially emotive, attitudinal and behavioural descriptors of individual learners and we use the term broadly and simply. They are the fifth and final area of teacher insight in our framework.

Wellbeing

Personal attributes range from being relatively stable "traits" to more transient "states", although all can change to some extent. This is true even for personality traits which are at the more stable end of the spectrum (Rantanen et al., 2007). For example, Soto's (2015) analysis of a nationally representative sample of over 16 000 Australians reveals that personality traits and aspects of wellbeing reciprocally influence each other over time. Wellbeing is defined most comprehensively as a transient psychological state which combines both feeling well (hedonic wellbeing) and functioning well (eudaimonic wellbeing). It can change from month to month or even week to week, since it is influenced by life events (McLellan & Steward, 2015).

There is increasing evidence that wellbeing is linked to academic performance. For example, researchers in the UK (Gutman & Vorhaus, 2012) and the USA (Suldo et al., 2011) identified correlations between wellbeing and educational performance (including at GCSE) when they were assessed at the same point of time, for multiple age groups (from age 10 to 16 years); moreover, they identified similar associations when academic performance was assessed two years after wellbeing was assessed. More recently, an international literature review (Lindorff, 2020) concluded there is evidence of links between wellbeing and attainment and between whole-school approaches to wellbeing and attainment, but that the latter is heavily dependent upon implementation. The author also concluded that these relationships hold true across different contexts and countries, albeit with some variation.

Recent research on mechanisms to explain the link between wellbeing and readiness to learn, and therefore educational outcomes, has shown that better wellbeing is associated with more adaptive forms of motivation, such as wanting to learn and progress, rather than focusing on performance relative to others or avoiding learning situations (McLellan (2021) citing Wormington & Linnenbrink-Garcia (2017)). Additionally, wellbeing is associated with engagement. An influential and substantial annual survey of young people's wellbeing in the UK revealed that those with lower levels of wellbeing were more likely to truant (The Children's Society, 2018).

So-called 21st century skills and emotional intelligence

Looking beyond wellbeing, a large and important group of personal attributes are those that are often known as "21st century skills". This term stems from the view that the skills needed to compete in today's global economy are quite different from those upon which 19th and 20th century education systems have traditionally focused. According to Silva (2009), there are hundreds of descriptors of the skills set, including life skills, workforce skills, interpersonal skills, applied skills, and non-cognitive skills. We have argued previously that many skills of this kind, such as creativity, innovation, critical thinking, problem-solving, decision-making, learning to learn, metacognition, life and career skills, citizenship, and information literacy skills, are in fact not very new (Suto, 2013). They fall within Anderson and Krathwohl's (2001) revision of the cognitive domain of Bloom et al.'s (1956) taxonomy of educational objectives (Suto, *ibid*; Suto & Eccles, 2014). According to Silva (2009), creative, critical and analytical thinking skills have been articulated and valued by many philosophers and educators from Socrates 2400 years ago, to John Dewey in the 20th century.

Others have argued that many 21st century skills, including creativity, problem-solving, decision-making, communication, collaboration, citizenship, and personal and social responsibility, are linked inextricably to personality characteristics and so-called "emotional intelligence". Petrides (2001) and Petrides and Furnham (2003) have defined emotional intelligence as a constellation of behavioural dispositions and self-perceptions concerning one's ability to recognise, process, and utilise emotion-laden information. Emotional intelligence is further

conceptualised by the authors as an aspect of personality, which is malleable and still developing well into a person's twenties.

It is hard to deny that 21st century skills and emotional intelligence are a good thing to have and contribute to an individual's personal learning expertise and readiness. They are frequently mentioned in job advertisements, and some would argue that curricula and pedagogy should be structured around such attributes (e.g., RSA, 2022). Taking each attribute separately, a literature review will quickly engender a convincing argument for each one's worthiness of teacher attention. However, when it comes to determining the most worthwhile insights for teachers to obtain, we identify two distinct challenges.

Firstly, there are hundreds of attributes that could be considered 21st century skills and emotional intelligence, but there is little in the way of strong rationale as to why any particular combination of attributes is more relevant to education than any other. In addition to the skills and attributes mentioned so far, countless others are all valued by teachers, employers, and in society at large. These include being mentally fluent (Partington 2011), self-reflective (Shaw et al., 2018), articulate, resilient, responsible, confident, flexible, honest, motivated, hard-working, tolerant, and pragmatic, as well as having linguistic aptitude, common sense, integrity, and perseverance, and this list is far from exhaustive.

Secondly, valid and reliable measurements of many personal attributes of this kind are hard to come by. Self-assessment is difficult due to the Dunning-Kruger effect. That is, people tend to hold overly favourable views of their abilities in many social and intellectual domains. Not only do they reach erroneous conclusions and make unfortunate choices, but they also lack the metacognitive ability to realise it and they cannot evaluate themselves accurately (Dunning & Kruger, 2000). Although teacher assessment can be a better option, this relies upon teachers themselves having sufficient personal attributes to recognise and evaluate them in their learners.

Personal attributes with predictive validity

A constructive way up and out in this potential quagmire is for teachers to focus upon those attributes that researchers have found, so far, to predict educational outcomes. Not only are they of most (known) formative value, but evidence of predictive validity assumes a degree of robustness to assessment. Note that predictive validity here could be measured not only in terms of examination results, but also outcomes associated with the broader conceptualisations of education discussed previously, including employment.

The empirical and theoretical work of Deakin Crick and her colleagues centres around the well-validated, multidimensional construct of "learning power". It is derived from the idea that learning is learnable (Deakin Crick, 2007), and as mentioned previously, it is conceptually similar to the idea of personal expertise in learning. Learning power comprises seven basic dimensions, or *learning dispositions*, which Buckingham Shum and Deakin Crick (2012) describe "as a key requirement for life in the 21st century" (p. 2). The dispositions are: (i) resilience, (ii)

strategic awareness, (iii) learning relationships, (iv) creativity, (v) critical curiosity, (vi) making meaning, and (vii) changing and learning. The research group developed ELLI, the Effective Lifelong Learning Inventory, to assess learning power via the learning dispositions (ELLI Global, 2022). This self-report measure has been validated among 100 000 people globally, and the learning dispositions have been found to be correlated positively with standardised assessment outcomes (Buckingham Shum & Deakin Crick, 2012).

In line with these findings, Hattie (2022) has reported effect sizes of 0.35 for creativity, and of 0.48 for motivation as well as concentration, persistence and engagement, which are closely linked to Deakin Crick's construct of resilience. Similarly, Kyriakides et al. (2020) include perseverance and motivation as learner-level factors in their evidence-based model of influences on educational outcomes.

There is considerable overlap between learning dispositions and the constructs assessed in the Cambridge Personal Styles Questionnaire (CPSQ)[6] and the "Big Five" personality model that underpins it. This five-factor model is well researched (e.g., Norman, 1963; Goldberg, 1992) and comprises (i) openness to experience, (ii) conscientiousness, (iii) emotional resources, (iv) extraversion, and (v) agreeableness. Its traits predict real-world behaviours that are important to participation in school and the workplace, such as productive study habits (Credé & Kuncel, 2008). A major meta-analysis by Poropat (2009), in which cumulative sample sizes extended to over 70 000, concluded that academic performance correlates significantly with openness, conscientiousness, and agreeableness, in primary, secondary and tertiary education. Research to explore the predictive validity of CPSQ directly has recently been conducted at Imperial College London. Among undergraduates, CPSQ's conscientiousness measure was found to be highly and significantly correlated with better exam results (Dale, personal communication).

Development of 21st century skills

Personality traits and dispositions tend to be quite stable over time (Rantanen et al., 2007). However, many teachers are interested in how the more malleable personal attributes develop and the extent to which they can be taught. We have argued previously that such development commonly occurs through lessons in traditional school subjects. Puntis (2011) explained how academic subjects such as mathematics and the sciences can also be reconceptualised in terms of the 21st century skills they engender, which include critical thinking, problem-solving, and creativity – a position shared by the Advisory Committee on Mathematics Education (2011). Many vocational courses can also nurture 21st century skills. Rose (2011), for example, has articulated some of the highly sophisticated analytical, problem-solving and creative skills developed on electricians' courses. Another longstanding and complementary perspective is that personal attributes of this

6 This online self-report assessment measures: (i) intellectual curiosity and open thinking, (ii) motivation to achieve and self-management, (iii) resilience and adaptability to demands, (iv) communication, and (v) collaboration.

kind can be nurtured successfully outside of lessons in extra-curricular activities (Haensly et al., 1985).

We share these views and would add that learners may *initially* develop each attribute in a small number of specific contexts. These could be either within the taught curriculum or external to it, including in social interactions during breaktimes and at home. This position stems from our review of Marzano and Kendall's (2007, 2008) respected taxonomy of educational objectives (Suto et al., 2020). The authors describe various metacognitive skills as levels of mental processing that are initially taught within specific domains of knowledge, building cumulatively upon less sophisticated mental processing. These metacognitive skills include monitoring: (i) goals, (ii) progress towards them, (iii) clarity (the degree to which you are free from ambiguity about the knowledge you are attempting to acquire), and (iv) accuracy (the degree to which you understand the given knowledge). Essentially, this means making learning an object of learning and reflection. At an even higher level of mental processing (which the authors term "self-system") these skills cover examining one's overall motivation, emotional response to learning, efficacy, and whether knowledge is important or meets a need or personal goal (Marzano & Kendall, *ibid*.).

Marzano and Kendall's taxonomy coheres with the findings of a review by Watkins (2001) which suggested that teachers can promote learning about learning or "meta-learning" by using classroom activities which make learning an object of attention, conversation, reflection, and learning. Watkins went on to argue that if meta-learning is to develop in classrooms, then two principles must apply: (i) the monitoring must engage the agency of the learners, and (ii) the language used must be owned by the learners themselves. These principles can be advanced through classroom practices such as noticing, narrating and navigating.

As learners' education progresses, we hold the view that their personal skills gradually generalise across contexts as learners make connections across subjects and test out and apply what they have learnt in new settings, consciously or otherwise. Generalisation of this kind is well known to occur in the development of vocabulary (Beck et al., 2018) and other aspects of language development (Tamminen et al., 2015). This would provide an important explanatory mechanism for generalisation for several metacognitive and other personal skills, given their reliance upon language, though there could well be many others.

We would cautiously suggest that by the time we reach adulthood, 21st century skills are often well generalised but continue to develop further. For example, many courses offered in the workplace support the further development of these skills. Also, many teachers, as working professionals, appreciate on a personal level the value of 21st century skills in the workplace and in life in general. They perceive them as valuable "goods" of education, and their own experiences and needs for professional development in adulthood could explain enthusiasm in some teaching communities to structure curricula and pedagogy around such attributes (e.g., RSA, 2022).

Tentatively relating these ideas to our framework of five areas of teacher insight in Figure 1, we suggest that during the course of childhood education and well into adulthood, metacognitive skills and other malleable personal attributes move from the green "domain knowledge" area, through the yellow "cross-curricular knowledge, skills and understanding" area, to the purple "personal attributes" area of insight. Different attributes are likely to transition at different paces.

Creating learner profiles

In Figure 2 we show how some assessments developed within our organisation offer teachers insight into their learners in the five areas in our holistic framework. A teacher could collate data from these assessments to create a "Cambridge Learner Profile" for each individual in their class as they progress along their educational journey. Using simple statistics, teachers and senior leaders within schools could also profile whole classes and year groups. Profiles of individuals and groups could also include data on educational outcomes (shown in turquoise in Figure 2) such as results in general and vocational qualifications and, more holistically, evaluations of the Cambridge Learner Attributes.

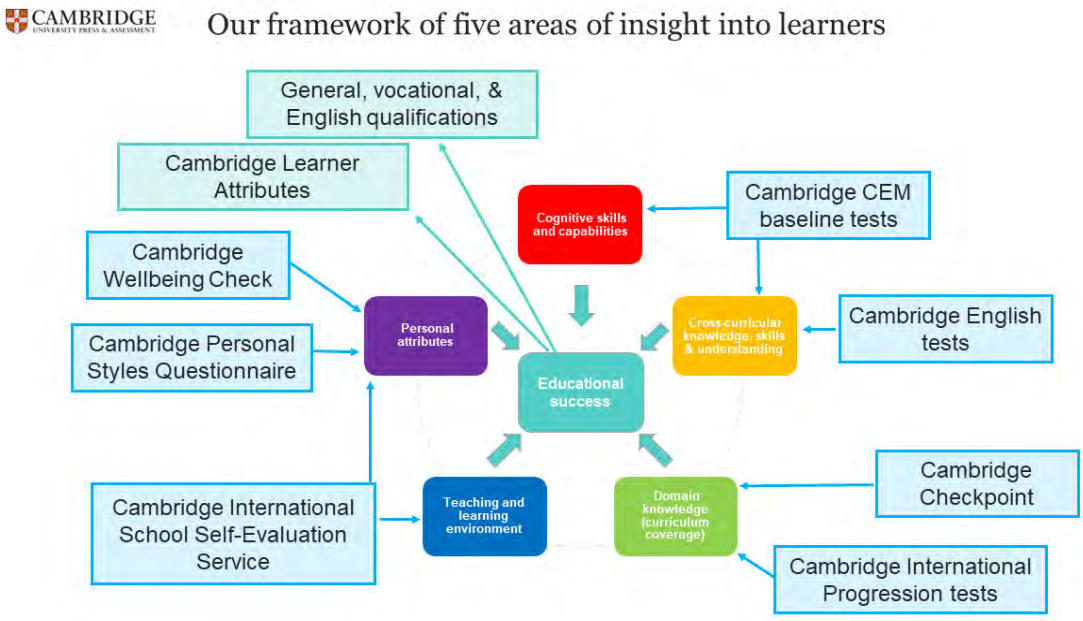

Figure 2: Mapping of Cambridge's assessments to our framework for teacher insights.

In a sense, the five areas in the framework are "multi-purpose": not only can they be used to articulate the main influences upon educational success, but they can also be used to categorise areas of education and the outcomes or goods of that education. That is, summative assessments, as well as baseline and formative assessments and associated curricula and teaching resources,[7] can be positioned in each area. Through its inclusion of personal attributes in particular, the framework accommodates broad, holistic conceptualisations of education such as "Bildung" (Klafki, 2009) and that of Jacques Delors et al. (1996).

7 This is with the possible exception of teaching resources for cognitive skills and capabilities since they are very difficult to teach.

Teachers' own assessments and evaluations of their learners and schools can also be added to all areas in the framework, as could local and national assessments, plus any others that are used in a particular school. Indicators of educational success other than qualifications and the Cambridge Learner Attributes can also be mapped. A simple illustrative example is given in Figure 3.

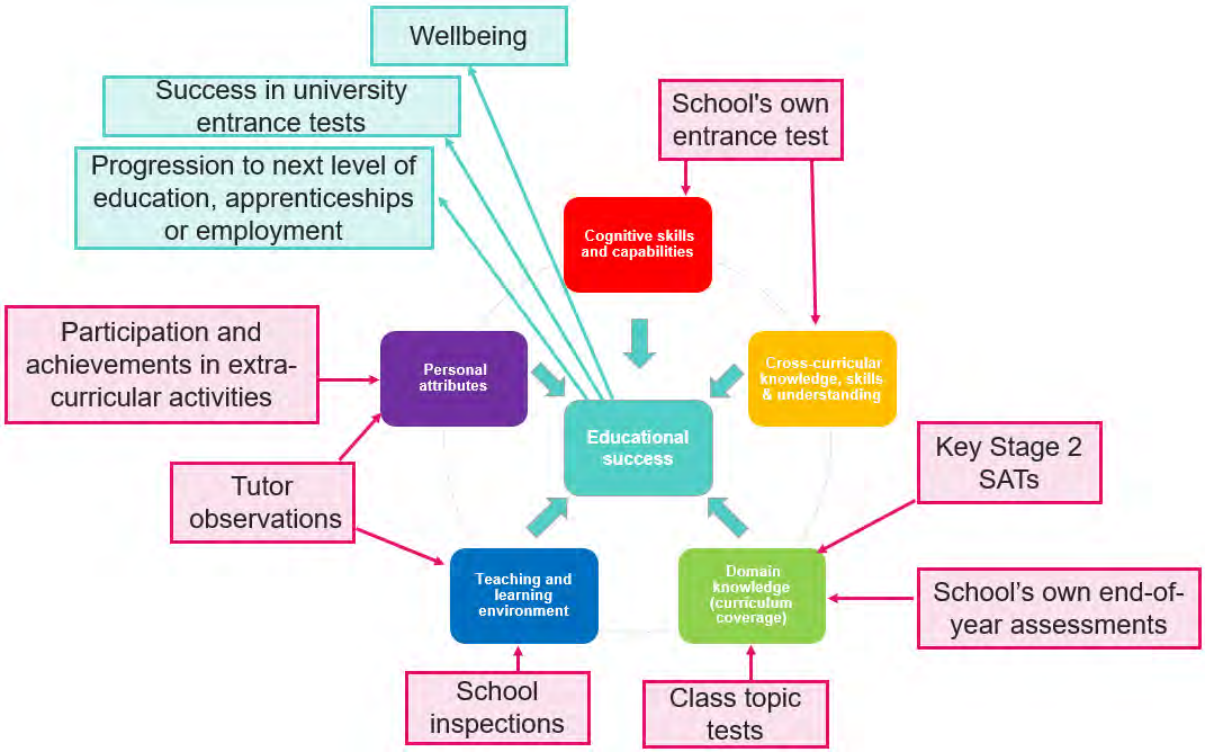

Figure 3: A simple mapping of some non-Cambridge assessments and evaluative approaches to our framework.

It is important to emphasise that the framework's main benefit lies in steering teachers' and school leaders' attention towards considering information in all five areas, rather than advising them on what to focus upon or which assessments to use. As mentioned previously, since every school is unique, its own senior leaders must ultimately determine its own approach to educational assessment. Returning to the bigger questions mentioned near the start of this paper, of what we want a high-quality education to achieve, and what that education could look like in practice, we stress that they are for each school leadership team to answer for itself.

To be successful, staff teams need members with the quantitative and data-handling skills to understand numerical assessment results (Schildkamp, 2019). As Figures 2 and 3 illustrate, and as mentioned previously, data from across the five areas of teacher insight could be brought together to create a profile for every learner, which could then be used formatively, to guide next steps in teaching, learning and pastoral support. Data from groups of learners could be used to shape class teaching plans and even whole school policies, around numeracy, literacy and wellbeing, for example. This is, in essence, the idea of data-based decision-making for school improvement, and teachers may also wish to integrate

their data with insights drawn directly from research findings, parents, learners' previous schools, and other evidence sources (Schildkamp, *ibid.*).

For many years, some schools have used spreadsheets to collate, link and analyse their data. More recently, others have begun to develop or purchase user-friendly dashboard software to draw together data from multiple sources, including learners' demographic data. In the future, we anticipate many further developments in this area. However, we acknowledge the importance of robust legislation to ensure data protection and privacy within an ethically defensible framework, and also the risk of drawing the wrong conclusions because of over-reliance on indicators that are easily quantified. Although it has been beyond the scope of this article to explore the numerous interactions that exist across constructs in our five areas of insight, software of this kind will undoubtedly facilitate such data analysis in schools and educational research in the future.

Just as educationalists such as Watkins (2001) and Marzano and Kendall (2007, 2008) advocate making learning an object of learning and reflection for learners, we believe this principle is also critical at the level of the teacher community. Arguably, it should be a whole-school mentality. However, approaches that depend heavily upon various forms of assessment and evaluation can, if done badly, distract from learner agency and responsibility. Rather than thinking of learners as objects and in terms of the numbers associated with them, there is more to be gained all round from viewing them as independent agents who need more skilled and reflective self-agency (Watkins, 2001), and by actively including them on the journey to improvement.

The professional judgements that contribute to teachers' wider insights and decision-making include those on academic achievement but also those around progress and outcomes in other aspects of school life. These include speaking up in class, performance in school debates, sportsmanship on the playing field, personal organisation, handling disappointment, and so on. These judgements can be made through careful observation but importantly, also through deep engagement with the learners themselves via discussions and other interactions. To be successful, school staff teams need self-confidence in their personal expertise and ultimately, in their ability to draw upon both quantitative and qualitative data, both of which are critical to the approach we have advocated.

Conclusion

To summarise, in this article we have presented an evidence-based, holistic framework of five interacting areas of insight into educational success. These areas are: (i) cognitive skills and capabilities, (ii) cross-curricular knowledge, skills and understanding, (iii) domain knowledge, (iv) teaching and learning environment, and (v) personal attributes. We believe the framework will be useful for teachers and school leaders in making sense of the vast number of assessments and evaluation tools that are available to them from our organisation and many others. There is a risk that data and information on learners is so plentiful that, at times, it can be difficult to see the wood for

the trees. We hope that our framework helps teachers to perceive the wood by organising data, combining it into learner profiles, and using insights appropriately to inform teaching. It also has the potential to highlight gaps in insight, where further assessment and evaluation could be beneficial.

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