Essential skills and their impact on education outcomes

A quantitive analysis of the British Cohort Study

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Skills Builder PARTNERSHIP

Foreword

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Almost any employer will tell you that the essential skills - listening; speaking; aiming high; staying positive; teamwork; leadership; creativity and problem-solving - are high on the list of things they are looking for when they hire new staff. These skills are too important for it to be left to chance for young people to develop them: if we do that we risk leaving behind many who cannot rely on building such skills through a fortunate accident of birth. So essential skills matter, and helping people develop them is a job for schools and colleges from the earliest age.

The Skills Builder Universal Framework, launched in May 2020, sets out a framework of skills that is clear, measurable and recognisable to both employers and educators. For the first time, we have common language in which the skills are described, understood and measured, making them transparent to everyone, not only those whose families are in the know.

This British Cohort Study analysis is an important addition to the growing evidence of the importance of developing essential skills during schooling. The analysis shows a strong association between scores in essential skills and measures of literacy and numeracy at the ages of both 10 and 16, and a further association with career aspirations at age 16. Of course, we cannot tell in which direction any causal relation runs – whether strength in essential skills brings about strength in literacy and numeracy, or the other way round, or more likely, that it is a bit of both. What we can say, though, is that these two dimensions do not exist in isolation from one another. When schools engage in activities which improve essential skills, they are likely to improve literacy and numeracy, and vice versa.

Schools are rightly held to account for their success in national assessments, especially in literacy and numeracy, so it is not surprising that these subjects figure strongly in schools' motivation. People who are literate and numerate have greater chances of success in employment and in life, but what we are increasingly understanding is that essential skills are also critical to these life chances. The good news from this report is that these two critical factors go hand in hand.

I hope that this message will encourage schools to ensure that they have a curriculum that is not only strongly focussed on academic achievement, but also broad enough to develop the essential skills that will help young people lead rewarding future lives. This is an important part of raising the life chances of young people who have few prior advantages as well as those who have many.

Sir John Holman

Chair, Essential Skills Task Force

Executive summary

Essential skills, and the rationale for this research

Essential skills are those highly transferable skills that everyone needs to do almost any job, which support the application of specialist knowledge and technical skills. There have been calls over a long time, from the CBI in 1989 through to the Taylor Review in 2017 for greater emphasis on these skills, including their development through the education system.

In May 2020, the Skills Builder Universal Framework was launched *(See Appendix 1)*, the result of a partnership between the seven organisations of the Essential Skills Taskforce[1]. It provided a common language and shared expectations for essential skills which has subsequently been adopted by more than 800 organisations including educators, employers, and other impact organisations. It incorporates eight skills: listening; speaking; teamwork; leadership; creativity; problem-solving; aiming high; and staying positive.

This shared language offers an opportunity for increased focus in research around this area. A literature review published by the Centre for Education & Youth (CFEY) and Skills Builder Partnership in late 2020 highlighted some promising insights. There was some evidence that essential skills supported improved academic attainment, career progression, and wellbeing.

The review also highlighted gaps in the existing research base, particularly of longitudinal studies of the interplay of essential skills and other outcomes over time. This research aims to make a contribution here by using the rich longitudinal data provided by the British Cohort Study (1970), with a particular focus on children and young people.

The existing evidence and theoretical basis

Schools and colleges are increasingly thinking about the development of wider skills and competencies beyond singular academic achievement, including essential skills.

A growing number of studies have demonstrated a connection between building these broader skills and competencies and outcomes including reductions in absenteeism, engagement with learning, and decreasing behavioural problems.

There are also a number of studies that demonstrate a link between building some of the essential skills and academic outcomes at primary level. These include links between essential skills like problem solving, staying positive, and teamwork, and improvements in mathematics and reading scores. The evidence at secondary level is in shorter supply, but there is some evidence in higher education settings linking essential skills with improved academic engagement and outcomes.

It is possible to construct theoretical models of the link between building essential skills and how that would support such improvements. These include supporting students' capacity to learn effectively, their ability to build positive relationships with peers, and developing their self-efficacy. Together, these provide a promising basis for testing the link between essential skills development and academic outcomes.

[1] The Essential Skills Taskforce members were: Business in the Community, the Careers & Enterprise Company, the CBI, the CIPD, the EY Foundation, the Gatsby Foundation, and Skills Builder Partnership.

The approach to analysing the British Cohort Study

The British Cohort Study 1970 (BCS70) provides us with a robust and rich longitudinal data set which tracked participants at regular intervals over their lives. It included 14,350 participants at the age of 10, and 11,206 at the age of 16. At ages 10 and 16, participants were asked to respond to a series of statements which we can use as a proxy to give them a score for their essential skill development. This is because these are closely linked to the steps that underpin the Skills Builder Universal Framework.

The participants also completed other assessments that we can use to understand other educational outcomes for them. At the age of 10, participants completed the Edinburgh Reading Test which gives a good view of their literacy, as well as the Friendly Math Test to give a measure of their numeracy. At the age of 16, participants completed their CSE or O-Level in mathematics which gives a view of their numeracy. Their teachers also shared an assessment of their broader academic ability relative to their peers. Finally, participants were asked to reflect on their future career plans and aspirations.

In understanding the links between their essential skills, as measured by the proxies, and these other academic outcomes, it was important to control for socio-economic factors including: gender; father's social class; mother's involvement in the child's education; receipt of state benefits in the previous 12 months; and measurements of prior academic achievement where relevant.

The Results

The analysis sought to test five hypotheses, by linking together datasets around the British Cohort Study (1970). In doing so, we found that higher levels of self-reported essential skills levels are associated with:

- *Higher levels of literacy at primary school, as measured by the Edinburgh Reading Test:* We found that, for example, moving from essential skills score of 8 (median value) to 12 (maximum value) leads to an equivalent gain of the same child moving from 50th percentile to 80th percentile in the Edinburgh Reading Test.
- *Higher levels of numeracy at primary school, as measured by the Friendly Math Test:* We found that an additional point on the essential skill score is associated with, on average, the equivalent gain in numeracy score of a student moving from the 50th percentile of (reported) performance up to the 60th percentile, everything else being constant.
- *Higher levels of mathematics qualifications at secondary school, as measured by O-Level and CSE results:* We found that, for example, increasing skills score from median to maximum score (score 20 to 30) the probability of the same students attaining a higher mathematics grade increases by 50%.
- *Higher academic performance, as perceived by teachers:* We found that an increase in essential skills increases the likelihood that teachers will judge the cohort member to be a relatively higher academic performer. To give an example, if a young person reported an increase from the median skills score of 20 to 25, they are 55% more likely to be perceived a high performer by their teacher.
- *Higher levels of career aspiration:* We found that participants with higher essential skills were more likely to be clear on their career aspirations, and to have higher career aspirations. In general, the analysis indicated that individuals who have higher levels of skills are more likely to end up in professions in the top brackets.

Chapter 1: Introduction

Chapter Summary

- Essential skills are those highly transferable skills that everyone needs to do almost any job, which support the application of specialist knowledge and technical skills.
- There have been calls over a long time, from the CBI in 1989 through to the Taylor Review in 2017 for more emphasis to be put on these skills, including their development through the education system.
- In 2020, the Skills Builder Universal Framework was launched, the result of a partnership between seven members of the Essential Skills Taskforce. It provided a common language and shared expectations for essential skills which has subsequently been adopted by more than 800 organisations including educators, employers, and other impact organisations.
- The essential skills in the Universal Framework are: listening; speaking; teamwork; leadership; creativity; problem-solving; aiming high; and staying positive.
- This shared language offers an opportunity for increased focus in research around this area. A literature review published by CFEY and Skills Builder Partnership in late 2020 highlighted some promising insights. There was some evidence that building essential skills could support improvements in academic attainment, career progression, and wellbeing.
- The literature review also highlighted that there were gaps in the existing research base, particularly around longitudinal studies of the interplay of essential skills and other outcomes over time.
- This research aims to make a contribution here by using the rich longitudinal data provided by the British Cohort Study (1970), with a particular focus on children and young people.

Essential skills: What are they?

There have long been calls for individuals to hone a set of essential skills in order to thrive in education, employment, entrepreneurship and their wider lives. These calls have sometimes focused on the value of these skills to learning (CBI, 1989), to support modern working practices (Taylor, 2017), or to support social mobility (Cullinane & Montacute, 2017).

Essential skills are those which 'almost anyone needs to do almost any job. They are the skills that make knowledge and technical skills fully productive'. (UKCES, 2009)

These skills have frequently been given different names and conceptualized in different ways – including as transferable skills, 21st century skills, soft skills, or employability skills. Indeed, this is an area where the terminology can be confused and confusing. As such, we start with the taxonomy set out by Ravenscroft & Baker (2020) to differentiate between:

- *Knowledge:* content which can be recalled, understood and explained
- *Character attributes:* the choices individuals make, manifested as attitudes or behaviours
- *Skills:* the ability to successfully enact a repeatable process

Within this categorisation, our focus is on skills, which can be further broken down into:

- *Technical Skills:* those skills which are specific to a particular sector or role, sometimes drawing off a particular body of knowledge. These skills are not easily transferred beyond the sector or role to which they relate.
- *Essential Skills:* those highly transferable skills that everyone needs to do almost any job, which support the application of specialist knowledge and technical skills
- *Basic Skills:* these are literacy and numeracy, and basic digital skills.

It is important to note that although we use the language of 'job', the value of essential skills is not simply in employment. Rather, we encourage a wide understanding of 'job' as a task or piece of work which might equally be encountered in learning or wider life.

The Skills Builder Universal Framework of Essential Skills

Over nearly two years, culminating in May 2020, the Essential Skills Taskforce[2] sought to grapple with the challenge of this lack of shared definition around essential skills. The challenge was not a shortage of attempts to pin down this set of skills, but rather that none of the plethora of attempts had been able to reach a shared consensus on the matter. Indeed, the UKCES in 2009 reviewed dozens of such sets.

The Taskforce started with the Skills Builder Framework that had been developed from 2016 and which had been widely adopted in education. The work looked to build off that basis to create a framework which fulfilled three tests (Ravenscroft & Baker, 2020):

- *Clarity:* It must be simple enough to be useful in a range of different contexts and to be used by individuals who are not experts. It must not be easily misunderstood or misinterpreted.
- *Measurability:* It should be possible to use the Framework to reliably understand the existing skillset of individuals, and to measure growth.
- *Authority:* The Framework should be backed by evidence and by organisations who give it credibility.

The aspiration behind such a framework was to achieve several meaningful benefits:

- *Ensuring alignment between education and employers* in terms of the employability skills that employers actually need, and what schools and colleges understand and are equipped to build.
- *Supporting the process of recruitment* through increased transparency of skills. This would help employers to assess more accurately the competences of new recruits, who would have clarity on what they are being assessed.
- *Facilitating upskilling and reskilling within the workplace* by increasing the clarity of what progression looks like in these foundational skills.
- *Creating a common vocabulary* for schools, colleges, universities, employers and employees to use when discussing skills with one another.

To get to the point of a shared, universal framework the existing Skills Builder Framework was reviewed to ensure its relevance and completeness, against generic and specific employability frameworks, job advertisements, apprenticeship standards, and graduate attributes outlined by higher education institutions. It was subsequently reviewed and tested by more than thirty employers, alongside trialing in other settings with individuals, education institutions and impact organisations.

[2] The Essential Skills Taskforce members were: Business in the Community, the Careers & Enterprise Company, the CBI, the CIPD, the EY Foundation, the Gatsby Foundation, and Skills Builder Partnership.

The resulting Skills Builder Universal Framework incorporates the four broad themes that are consistent across almost all of this space: communication skills, interpersonal skills, self-management skills, and creative problem solving skills. It breaks each of these four themes into pairs, giving a total of eight skills:

- *Speaking* – the oral transmission of information or ideas.
- *Listening* – the receiving, retaining and processing of information or ideas.
- *Teamwork* – working cooperatively with others towards achieving a shared goal.
- *Leadership* – supporting, encouraging and developing others to achieve a shared goal.
- *Aiming High* – the ability to set clear, tangible goals and devise a robust route to achieving them.
- *Staying Positive* – the ability to use tactics and strategies to overcome setbacks and achieve goals.
- *Creativity* – the use of imagination and the generation of new ideas.
- *Problem solving* – the ability to find a solution to a situation or challenge.

The Universal Framework then goes further, into a much higher level of granularity by breaking the skills down into a series of steps which take an individual from absolute beginner though to a high level of mastery of that area. It is in these steps that the Framework is able to capture the nuance and progression of these essential skills. The full Universal Framework can be found in *Appendix 1*.

In the eight months since its launch in May 2020, the Universal Framework has been adopted by more than 800 organisations. These include schools and colleges, employers, and other impact organisations.

Essential skills: Why do they matter?

There have been regular calls for a greater focus on essential skills based on a consensus that they have the potential to make an impact across different points in an individual's life:

- To support learning in the classroom (Millard et al., 2017)
- To ease the transition from education into the world of employment (Cullinane & Montecute, 2017)
- To maintain and develop within employment (Haskel et al, 2005)
- To obtain new employment (UKCES, 2016)
- To thrive in wider pursuits and relationships beyond education or employment (Scott & Gratton, 2016)

There are plenty of reports which emphasise the importance of building essential skills in light of structural changes in the labour market, including technological disruptions and changing work norms. But what is less available is a wide range of experimental, quasi-experimental, and high-quality qualitative research to investigate the links between essential skills development and education, employment and social outcomes.

Recently, the definition of the Skills Builder Universal Framework has given an opportunity for a greater level of focus on these essential skills, with their shared definitions and language. An early piece of work here was developed by the Centre for Education & Youth (CFEY) and the Skills Builder Partnership in late 2020.

This rapid literature review (Angus et al., 2020) analysed the most robust studies where the highest levels of evidence were met, as outlined by Hughes et al. (2016). This research explored the relationship between young people's skills development, and life outcomes in terms of their educational attainment, employment prospects, and social and emotional wellbeing.

The evidence review focused on work looking at the outcomes for young people following interventions focussed on skill development. However, some studies did not make it clear whether they were interrogating the relationship between interventions and skills development, or skills development and outcomes. Additionally, studies sometimes focused on causal relationships and sometimes on associations, and there were gaps in the evidence base for examples of interventions delivered to younger children.

Overall though, the review found studies that demonstrated evidence of a link between development of the essential skills and:

- *Academic outcomes:* There was evidence that some of the essential skills, including listening, staying positive and teamwork, can support young people's academic outcomes, resulting in improved reading and writing skills, as well as attainment.
- *Employment outcomes:* The evidence found that the development of skills such as speaking, listening and staying positive can positively influence young people's employment prospects. There was also evidence of links between teamwork and leadership skills and performance in the workplace.
- *Social and emotional wellbeing:* The literature also indicated that interventions focused on pupils' social and emotional skills, such as teamwork, speaking and listening, can improve children and young people's emotional and social competencies. These competencies support self-regulation and relationship building, and can result in positive outcomes around wellbeing.

In terms of developing the skills, the review found that essential skills interventions tended to be more effective when they were regular, long-term, explicit, embedded, structured, supported, and targeted.

What do we still need to understand?

That last review highlighted that there was a need for greater research in this area. Particularly, the authors highlighted the need for research that:

- Evaluates outcomes across a range of areas, including education, employment and wellbeing, over time incorporating shorter- and longer-term metrics.
- Evaluates outcomes across a range of areas, including education, employment and wellbeing across different age groups and education settings.
- Evaluates the impact of interventions and skills on school-age children.
- Maps the mechanism for change (how skills were developed) against young people’s outcomes over time.
- Examines the comparative benefits of teaching individual skills versus clusters of skills simultaneously, and the opportunity costs associated with teaching skills explicitly versus not doing so.
- Evaluates the premiums associated with higher levels of essential skills compared to higher qualification levels in terms of employment outcomes and transitions to adulthood.

There was a particular emphasis on the shortage of longitudinal research that tracks outcomes over multiple years, and which focuses on younger children.

Why this report?

This report seeks to make a further contribution to building this evidence base. The British Cohort Study provides a rich dataset for longitudinal analysis. It also gives scope to focus on children and young people and to explore links between essential skills and other outcomes.

For the organisations who are part of the Skills Builder Partnership, and the much broader range of organisations who have adopted the Skills Builder Universal Framework, we hope that this report will also add to the collective understanding about the impact of building essential skills.

Chapter 2: A summary of the past literature

Chapter summary

- Schools and colleges are increasingly thinking about the development of wider skills and competencies beyond singular academic achievement. These include essential skills, as have been defined.
- A growing number of studies have demonstrated a connection between building these broader skills and competencies and outcomes including reductions in absenteeism, engagement with learning, and decreased behavioural problems.
- There are also a number of studies that demonstrate a link between building some of the essential skills and academic outcomes at primary level. These include links between essential skills like problem solving, staying positive, and teamwork, and improvements in mathematics and reading scores.
- The evidence at secondary level is in shorter supply, but there is some evidence in higher education settings that linked the development of essential skills with improved academic engagement and outcomes.
- It is possible to construct theoretical models of the link between building essential skills and how that would support such improvements. These include supporting students' capacity to learn effectively, their ability to build positive relationships with peers, and developing their self-efficacy.
- Together, these provide a promising basis for testing the link between essential skills development and academic outcomes.

Introduction

In this chapter a summary of the past academic literature is presented. In doing so, the chapter aims to flesh out a model of change by which improved education outcomes through development of essential skills is explored. Firstly, the section unpacks some key studies where the authors demonstrated positive association between essential skills as defined by the Skills Builder Universal Framework and improved academic performance or other education outcomes. Secondly, the chapter explores some theoretical underpinnings that could potentially explain how developing essential skills could support outcomes. Finally, the chapter draws on the insights gathered through this summary review to sketch the proposed analytical framework and the underlying logic model.

The place of essential skills

The focus of this study is to explore to what extent investing in developing skills such as self-management and communication could improve outcomes that are considered to significantly contribute to the future success of individuals. These include literacy, numeracy, and realistic and informed aspirations (for example Arendt et al. 2005; Parsons and Bynner 1997). With schools and colleges under pressure to prepare students academically, it is sometimes overlooked that children and young people require other skills to support them in life beyond classroom. It is well-evidenced that education is partly about human capital accumulation. Teachers do their best to make sure their students achieve good academic results. But schools are a place for more than just academic development and exam preparation (CFEY 2020).

What this paper intends to uncover is the association between essential skills and outcomes such as academic performance and aspiration for school-age children and young people.

The impact of wider competencies on academic outcomes

The notion that academic performance and success in school are influenced by wider non-cognitive competencies has developed in the past two decades. A wide range of studies investigated the effects of developing non-academic skills through interventions and programmes. These studies demonstrated low to moderate effect sizes of developing such skills with improving classroom climate, enhancing academic achievement and bonding to school, and decreasing behaviour problems, school absenteeism and suspensions (e.g. Durlak & Wells, 1997; Hawkins et al., 1991; Malecki & Elliot, 2002). These programmes have typically focused on enhancing protective factors by teaching students an array of competencies, such as: problem-solving strategies, reasoning to support self-efficacy, self-management, and ways to be a collaborative member of the class.

Essential skills at primary level

Linares and colleagues (2005) are among more recent scholars to unpack the effects of developing a range of skills, such as problem solving, at the earlier stages of a child's development. In their 2-year study, Linares et al. assessed the impact of a designed intervention on aspects of key cognitive-social-emotional competencies known to impact academic learning in primary school and examined the dose-related characteristics of the intervention (i.e. after both Years 1 and 2). The intervention consists of a classroom package of concepts, activities, tools, and strategies designed to involve multiple agents (i.e., students, peers, teachers and other school staff, and parents) across different settings (i.e., classrooms, cafeterias, playgrounds, and at home). The researchers used a quasi-experimental design to examine the effects of the intervention on students and their classrooms as compared to their counterparts at a comparable school.

Final grades in Reading and Mathematics contained in official student report cards were collected at the end of Grade 3 (baseline), Grade 4 (Year 1), and Grade 5 (Year 2). Students were scored from 1 (unsatisfactory) to 4 (excellent). The findings of this study show that independent ratings of students' problem-solving skills, in combination with other non-academic skills, were increased as the result of the programme. This went on to have a positive impact on higher report card mathematics grades in the second year of the programme.

In another study, Ashdown and Bernard's (2012) small-scale study researched the impact of explicit skills instruction on 99 children in Reception and Grade 1 classes in Australia. They used a control group design to explore the impact of a skills programme on pupils' academic achievement and other outcomes. The researchers used surveys to assess skills such as resilience, speaking and listening, and recorded participants' teacher-assessed reading grade at baseline and endpoint. The programme was delivered to children in one Reception and one Year 1 class in Melbourne, over a period of 10 weeks. The classes were both randomly selected, with the other classes providing a control. The research reported some positive impact on less advanced readers in Year 1's reading achievement.

Essential skills beyond primary level

The evidence is less developed when it comes to evaluating the impact of developing essential skills in secondary education but Angus et al. (2020) have highlighted interesting studies regarding

older students at university and graduate level. For instance, Rodriguez (2008) has provided evidence exploring the links between critical thinking (defined as skills such as creativity, problem solving, reasoning and knowing how to learn) and academic achievement for university students. From his perspective, universities are concerned with educational processes that can motivate students and enhance their learning while developing their critical thinking, including their complicated understanding, which prepares them for uncertainty and complexity. Many prior studies have promoted the development of critical thinking in university students, but very few have looked at this to identify effective strategies to develop critical learning. His study identifies components of critical self-regulation which are conducive to academic gains.

Rodriguez (2009) examines how learning approaches influence skills development among undergraduate business students in one US college, and how this in turn affects academic outcomes. Using surveys to assess students' attitudes to learning and academic outcomes (n=131 undergraduates), the study found that higher academic self-concept and engaging in complex problem solving using creative thinking was associated with improved academic outcomes. Students equipped with deep learning approaches engage in deep processing which promotes high levels of reflection; they think creatively, critically and attach a personal meaning to the learning task. These students develop the ability to be a versatile learner which results in increased capacity for self-regulation and self-management.

The benefits of developing essential skills for postgraduate students has also been highlighted by Jaeger (2003). The results from his study shows that the potential for enhanced emotional capabilities could be improved in the traditional graduate classroom. Using Bar-On's theoretical framework[3], Jaeger defines emotional capabilities in 5 domains including the Interpersonal composite scale that addresses inter-personal skills and functioning. Individuals who score highly in this area understand, interact with, and relate well to others and their emotions. This study used a convenience sample of 158 students in five sections of a general management course taught in the fall 1999 semester at a graduate school of public administration in a large private university in the north-eastern United States. Jaeger (2003) reveals a strong relationship between development of these domains through the curriculum, and academic performance.

Theoretical considerations

There are a number of studies that show the importance of developing essential skills from early stages of life. For impact to be maximised, many have argued that teaching these skills should start at early stages of a child's life. The development of these competencies is an important foundation for young children's later success and well-being.

The Center on the Social Emotional Foundations for Early Learning goes beyond that and highlights the importance of developing capacity of the child from birth through to 5 years-old to form close and secure adult and peer relationships; experience, regulate, and express emotions in socially and culturally appropriate ways; and explore the environment and learn (Center on the Social Emotional Foundations for Early Learning 2008). Researchers and practitioners have described key skills that young children need as they enter school, including self-confidence, the capacity to develop positive relationships with peers and adults, concentration and persistence on challenging tasks, an ability to effectively communicate emotions, an ability to listen to instructions and be attentive, and skills in solving problems (Shonkoff and Philips 2000). The emergence of these skills helps young children

[3] The Bar-On model describes emotional intelligence as an array of interrelated emotional and social competencies, skills and behaviours that impact intelligent behaviour.

feel more confident and competent in developing relationships, building friendships, resolving conflicts, persisting when faced with challenges, coping with anger and frustrations, and managing emotions (Parlakian 2003). According to Ashdown & Bernard (2012) “The National Academy of Sciences reported that 60% of children enter school with the cognitive skills needed to be successful, but only 40% have the skills needed to succeed in kindergarten”.

On the other hand, Coie and Krehbiel (1984) discussed the longitudinal relations between academic and social outcomes. They believe that poor social skills cause later academic difficulties. The authors propose that one explanation is that children with social skill deficits become distracted from the learning situation as a result of these deficits. In this case, a child may not have the social skills that would allow him or her to pay attention for periods of time. Thus, his or her academic performance would likely suffer. Another explanation is that children may not have the skills to deal effectively with social situations, which may lead to problems with both teachers and peers. It is possible that these interpersonal problems may, in turn, hinder the learning process. Welsh, Parke, Widaman, and O’Neil (2001) found a significant direct-path coefficient from social to academic competence during the middle elementary school years.

Another established theoretical strand stems from Bandura’s (1997) social cognitive perspective. Although often an elusive construct (Tschannen-Moran & Hoy, 2001), past research has found that student self-efficacy[4] in learning plays a role in academic achievement and career aspirations (Bandura, Barbaranelli, Vittorio Caprara, & Pastorelli, 2001). From Bandura’s (1997) social cognitive perspective, student self-efficacy occupies a central role in the motivation to succeed, sustain effort, and persevere in the face of challenges. The capacity to sustain attention and concentration, while regulating emotion, underlie student competence in academic domains (DiPerna & Elliott, 2002; Wilson & Gottman, 1996). Generating, evaluating, and selecting alternatives to routine classroom challenges enable students to function effectively in the classroom (Elias, Rothbaum, & Gara, 1986; Spivak & Shure, 1974; Webster-Stratton, Reid, & Hammond, 2001). The ability of students to manage stress and solve interpersonal problems is related to improved learning (Sharma, Petosa, & Heaney, 1999) and positive self-concept (Branden-Muller, Elias, Gara, & Schneider, 1992).

In the social cognitive theory, individuals are self-organising, proactive, and self-regulating agents of their psychosocial development (Bandura, 1997, 1999). Among the mechanisms of human agency, none is more critical than perceived self-efficacy. Unless individuals believe they can produce desired outcomes by their actions, they have little incentive to act or to persevere in the face of difficulties. Perceived self-efficacy occupies a central role in the causal structure of social cognitive theory because efficacy beliefs affect adaptation and change not only in their own right, but through their impact on other determinants. Such beliefs influence aspirations and strength of commitments to them, the quality of analytic and strategic thinking, level of motivation and perseverance in the face of difficulties and setbacks, resilience to adversity, causal attributions for successes and failures, and vulnerability to stress and depression (Bandura, 1995;1997). This is believed to impact life outcomes of individuals including their academic performance, career choice and development.

There is evidence that interpersonal skills such as communication and problem solving enhance self-efficacy and therefore indirectly affect academic performance (Inês et. al. 2012; Haddad and Marx 2018).

[4] Self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997). Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behavior, and social environment.

Studies have investigated the effectiveness of interventions that are designed to address developing essential skills, including formal lessons and some that begin during the preschool years, and have demonstrated positive results (e.g., Payton et al. 2008). Joseph and Strain's (2003) review of the efficacy of these curricula found that the most successful approaches focus on skills development on a daily basis, use a systematic, intentional approach for teaching critical skills, and acknowledge the skills in context. In a meta-analysis of 34 universal and targeted preschool prevention programmes, Nelson et al. (2003) found that, overall, skills-based programmes had positive effects on both cognitive and academic outcomes in the short term (preschool), medium term (primary school), and long term (high school). The results also indicated that the programmes that contained a direct teaching component (including explicit lessons in curriculum format) and those that were of greater intensity and longer duration had a bigger positive effect on outcomes. A recent review of research on the effects of pre-school education yielded an integrated model of both approaches. Effective teaching in early childhood education is seen to require skilful combinations of explicit instruction, sensitive and warm interactions, responsive feedback, and verbal engagement or stimulation intentionally directed to ensure children's learning while embedding these interactions in a classroom environment that is not overly structured or regimented (Pianta et al. 2009).

Chapter Conclusion

In summary, this section highlighted the existing evidence on the relationship between development of essential skills as defined by the Skills Builder Universal Framework and changes in education outcomes for individuals across different life stages. It also shared some theoretical explanation on why and through what mechanisms change in educational outcomes, including academic achievement, occurs. Overall, there is some good evidence that shows the potential of building essential skills on other outcomes, and this paper intends to support building this evidence base further.

Chapter 3: Research methods

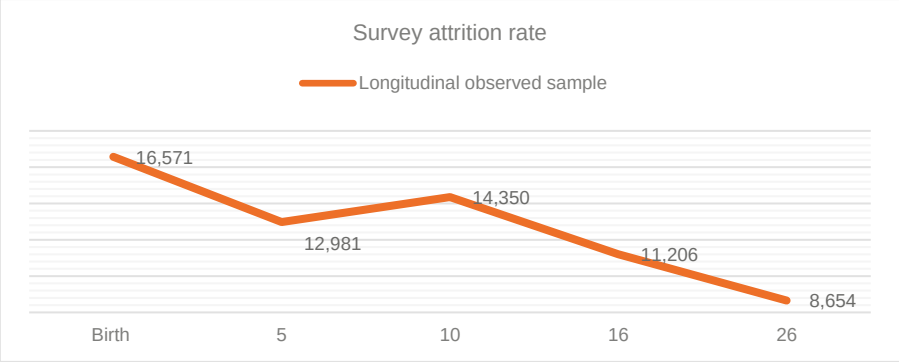
Chapter summary

- The British Cohort Study 1970 (BCS70) provides us with a robust and rich longitudinal data set which tracked participants at regular intervals over their lives. It included 14,350 participants at the age of 10, and 11,206 at the age of 16.
- At ages 10 and 16, participants were asked to respond to a series of statements which we can use as a proxy to give them a score for their essential skill development. This is because these are closely linked to the steps that underpin the Skills Builder Universal Framework.
- The participants also completed other assessments that we can use to understand other educational outcomes for them. At the age of 10, participants completed the Edinburgh Reading Test which gives a good view of their literacy, as well as the Friendly Math Test to give a measure of their numeracy.
- At the age of 16, participants completed their CSE or O-Level in mathematics which gives a view of their numeracy. Their teachers also shared an assessment of their broader academic ability relative to their peers. Finally, participants were asked to reflect on their future career plans and aspirations.
- In understanding the links between their essential skills, as measured by the proxies, and these other academic outcomes, it was important to control for socio-economic factors including: gender; father's social class; mother's involvement in the child's education; receipt of state benefits in the previous 12 months; and measurements of prior academic achievement where relevant.
- This gave us the basis to use regressions to explore our hypothesis that each incremental increase in the essential skills score (based on children and young people's self-reported reflection data) will be associated with an incremental improvement in outcomes measures including literacy, numeracy, academic performance and career aspiration.
- While the approach has limitations, particularly around causality and the age of the dataset, the analysis should still make a useful contribution in the space.

The British Cohort Study 1970

This paper draws upon one of the richest and most robust longitudinal data-sets in the UK, the British Cohort Study 1970 (BCS70).

BCS70 is a study of the outcomes and families of babies born in the UK in one particular week in April 1970. Since BCS70 began, there have been seven full data collection exercises undertaken in order to monitor the cohort members' health, education, social and economic circumstances (ESDS 2012). These took place when respondents were aged 5, 10, 16, 26, 30, 34, 38, 42, 46, and, most recently, aged 50. The 1970 British cohort was designed to survey approximately 17,000 babies born in Great Britain. In common with other cohort studies, BCS sample size has declined as the cohort has aged (Centre for Longitudinal Studies 2004). Figure 1 presents the response rate for the waves until early adulthood. BCS70 response rates do not follow what has come to be seen as the expected pattern for longitudinal wave-on-wave responses rates.



The data used for this study are collected from birth to age 16 with response rates varying by wave, questionnaire and individual question. While acknowledging the unavoidable risk of bias caused by non-response rates, we invoke a wide range of control variables, from demography to socio-economic status and academic background. To the extent that non-response bias or any compensatory weighting schemes might relate to included variables, our analysis will be robust.

BCS70 allows the investigation of correlation between essential skills and education outcomes for both primary and secondary education. This is possible as the cohort members were asked a wide range of questions regarding their competencies at age 10 and 16 in addition to their performance in selected literacy and numeracy skills assessments administered by the BCS researchers.

As with any study exploring variation in education outcomes of children and young people, it is important to include background variables in the analysis, as particular effects might otherwise render the analysis misleading. For instance, it is possible that individuals from more advantaged socio-economic backgrounds are more likely to attend schools with better access to opportunities to develop essential skills, but also go on to earn more due to social advantages, or access to better familial networks regardless. Hence, it is important to include a control for individuals' family background. In general, BCS allows a rich range of background variables (from birth to age 16). The analysis in the paper uses a range of key background variables to include in the prediction models: socio-economic status, home learning environment and demographics (see, for example, Schoon and Polek 2011; Yates et al. 2011). Ideally, a range of school-level control variables would add value to this exploratory analysis. However, a teachers' strike during 1986, when school-level data were collected, reduced sample coverage for such questions to around a third. The decision to strike is not independent of the types of school or features of the local area. Family level data from 1986 are still used but not teacher-level responses.

Proxy skills measurements; Mapping statement agreement and essential skills using the Skills Builder Universal Framework for essential skills

Throughout the survey, the participants when aged 10 and when aged 16 were asked to reflect on a number of statements which we used as proxy measurement for the eight essential skills in the Framework. We mapped the statements in the BCS questionnaire against 16 steps of skills in the Skills Builder Universal Framework to the closest proximity using professional judgements. We used definitions of eight essential skills and their components to select representative statements. Responses to these statements were then used to build a skill score for each individual using a weighting system. Table 3 shows the coding system, statements used and the proxy skills.

Table 3- Construction framework for Skills Score at age 10 and 16

Age 16 (secondary education)			Age 10 (primary education)		
Statement	Proxy for	Coding	Statement	Proxy for	Coding
I am always willing to admit mistakes	Staying Positive	True=1	**Do you like team games**	Teamwork	Yes= 1
I am punctual	Teamwork	Very much=2 somewhat=1	**There are things you like to change about yourself**	Leadership or Staying Positive	Yes=1
I am a responsible person	Teamwork	Very much=2 somewhat=1	**Prefer to be on own**	Teamwork	Not at all= 2, sometimes=1
I am independent	Problem Solving	Very much=2 somewhat=1	**Ability in creative writing**	Creativity	Well=1
I am reliable	Teamwork	Very much=2 somewhat=1	**Not worth trying hard**	Aiming High	No=1
I am able to concentrate on what I am doing	Aiming High	Much more than usual=2 Same as usual=1	**Like taking part in plays**	Creativity or Teamwork	Yes=1
I am capable of making decisions about things	Problem solving	Much more than usual=2 Same as usual=1	**Useless to try in school**	Aiming High	No=1
I am able to face up to my problems	Staying Positive	Much more than usual=2 Same as usual=1	**Believe in planning ahead**	Aiming High	Yes=1
I feel I am playing useful part in things	Teamwork	Much more than usual=2 Same as usual=1	**Bad things are someone else's fault**	Leadership	No=1
I feel I couldn't overcome my difficulties	Staying Positive	Much more than usual=2 Same as usual=1	**Arguments are someone else's fault**	Leadership	No=1
I agree it's not worth trying-never turn out anyway	Staying Positive	No=1	**Studying for tests is a waste of time**	Aiming High	No=1
I agree bad things happen-usually others' fault	Staying Positive	No=1			
I agree studying for tests is a waste of time	Aiming High	No=1			
I like writing stories-creative writing	Creativity	Yes=1			
I find it difficult to do things	Aiming High	No=1			
I understand communications	Listening	Yes=1			
I feel school is largely a waste of time	Aiming High	Not at all=1			
I find it difficult to keep mind on work	Aiming High	Not at all=1			
I never take work seriously	Aiming High	Not at all=1			
Plans are pointless, I take things as they come	Aiming High	Not at all=1			
I am always willing to help the teacher	Teamwork	True=2, partly true=1			

At age 10, 3,069 children were included in the analysis as they have responded to all the statements included in the table above. The maximum skills score achieved by the respondents in the sample is 12 and the minimum 2, with the mean of 8 score. Table 4 demonstrates the frequency of skills score at age 10.

Table 4- frequency of skills score at age 10

Skills score at age 10	Frequency	Percent
Below average	900	29%
Average (=8)	673	22%
Above average	1,496	49%
Total	3,069	

At age 16, 1,989 young people responded to all the statements included in the table above. The maximum skills score achieved by the individuals in the sample is 30 and the minimum 7, with the mean of 20. Frequency of skills score at age 16 can be found in table 5.

Table 5- frequency of skills score at age 16

Skills score at age 10	Frequency	Percent
Below average	828	42%
Average(=20)	217	11%
Above average	944	47%
Total	1,989	

Outcome measurements for age 10

Edinburgh Reading Test at age 10

At the age of 10, British Cohort Study members were asked to take the Edinburgh Reading Test (ERT) which assesses a range of different literacy skills and provides a diagnostic profile that highlights each pupil's strengths and weakness. ERT is suitable for group or individual administration, for ages 10 to 12. The ERT is popular with class teachers as well as special needs and support teachers wanting more than just a simplistic, global measure of reading attainment. The test yields richer, diagnostic information and a profile that informs teaching and allows more effective monitoring of progress in reading across the full ability range. It provides norms as both standardised score and reading age. This test provides a variety of tasks that assess aspects of children's reading. Since children are able to make use of textual or pictorial clues that are provided in the test materials, the test may be considered representative of 'real world' reading (Gibb 2004). The test consists of four sections assessing, in turn, the child's vocabulary, knowledge of syntax, sequencing and comprehension of text.

A shortened version of the ERT was used in British Cohort Study 1980 follow up which was made up of items extracted from the full Edinburgh Reading Test after consultation with its authors (Godfrey Thomson Unit 1978). Items were carefully selected to cover a wide age range of ability from seven to thirteen years in a form suitable to straddle the ten-year cohort. Particular attention was paid to the lower limit to allow a score to be allocated for very poor readers. The shortened test contained 67 items which examined vocabulary, syntax, sequencing, comprehension and retention.

The British Cohort Study has reported the standardised score which is used for the analysis in this paper. Table 6 below shows the descriptive statistics of the ERT for the entire sample at age 10 and for the analysis sample where we have data for their skills score at age 10.

Table 6. Descriptive statistics: shortened ERT at age 10

	N	Min	Max	Mean	Standard deviation
Full sample	11,641	0	65	40	12.6
Analytical[5] sample	2,760	4	65	40	12.4

Friendly Math Test at age 10

The lack of a fully acceptable mathematics test appropriate for ten-year olds led to the development of a special test for the BCS70 follow-up in 1980. This was done in collaboration with Colin Appleton and John Kerley, specialists in primary mathematics. The Friendly Math Test (FMT) was piloted in two halves in Bristol schools each on 400 children. FMT consisted of a total of 72 multiple choice questions and covered in essence the rules of arithmetic, number skills, fractions, measures in a variety of forms, algebra, geometry and statistics.

FMT provided a score over the full range of mathematical competence, from the earliest awareness of number operations in the first year of school up to the levels expected at around 13 years of age. The descriptive statistics for FMT can be found in table 7.

Table 7. Descriptive statistics: shortened FMT at age 10

	N	Min	Max	Mean	Standard deviation
Full sample	11,633	1	72	44	12.3
Analytical sample	2,759	3	71	44	12.2

Outcome measurements for age 16

Mathematics performance at age 16

The questionnaire for age 16 was distributed in 1986 where the qualification system was different to the current one. This analysis uses the Mathematics level achieved through both vocational and academic qualifications from Certificate of Secondary Education (CSE) and 'O' level which applies the traditional UK academic levels to allow comparison of individuals across different types of qualification.

Table 8. Frequency table for Maths performance in secondary education 1986

O level Maths Grade (%)	**Grade A**	**20.4**	**CSE Maths Grade (%)**	**Grade 1**	**15.5**	**Overall Maths score in secondary education (%)**	**O level A**	**11.0**
	Grade B	27.6		Grade 2	21.3		O level B	14.7
	Grade C	31.4		Grade 3	26.7		O level C/ CSE 1	22.1
	Grade D	11.3		Grade 4	24.8		O level D/ CSE 2	15.6
	Grade E	8.8		Grade 5	11.2		O level E/ CSE 3	17.8
	Fail	.5		Fail	.5		CSE 4	12.9
	N=3,072			N=2,817			CSE 5	5.9
							N=5,400	

[5] Analytical sample refers to the sample for which we have the skills score data and included in the final analysis

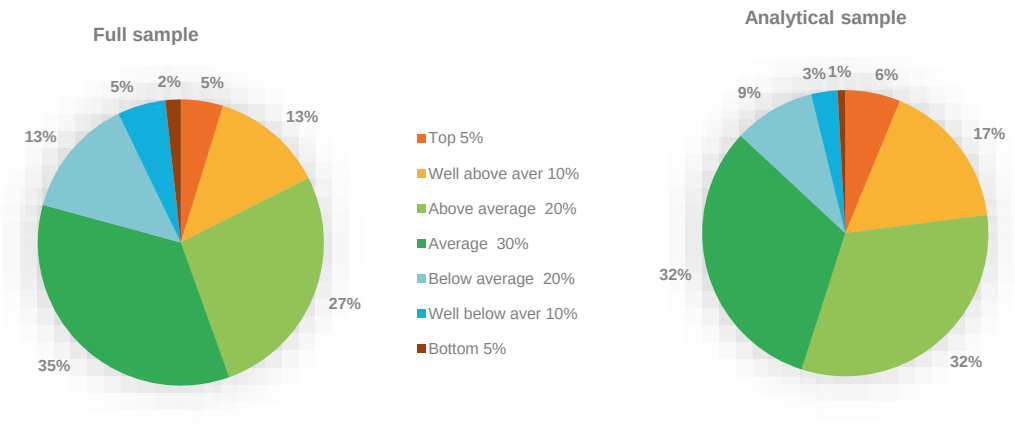
The analysis looks to understand whether a higher skills score is correlated with the higher likelihood of performing better in maths qualifications in secondary education.

Teacher assessment of academic performance

In 1986, BCS has asked teachers to assess the cohort members' academic performance against a 7-point scale ranking. This variable reports the assessment of academic performance by teachers' ranking of cohort members' classroom standing along a 7-point scale ranging from 'top 5 percent' to 'bottom 5 percent' (Yates et. al 2011). Figure 2 shows the distribution of academic performance at age 16 for students we have data for and for the sample where we have their skills score data (the analytical sample).

Looking at the full sample for which we have data, the majority of the students are in the middle tiers of academic performance (the green slices). Only 7% of the respondents are in the very poor performance ratings (well below 10% and in the bottom 5%). A similar pattern exists for the sub-sample with available skills score at age 16.

Figure 2. Academic performance at age 16



The analysis in this paper will use this assessment as an outcome measurement to find out whether the essential skills score is correlated with teacher-led performance assessment and to what extent.

Career aspiration and certainty

According to Schoon and Parson (2002) teenage aspirations are a good predictor of adult occupational attainment: young people with high aspirations are more likely than their less ambitious peers to enter a professional or managerial career. In another comprehensive review of longitudinal studies by Mann et al. (2017), indicators of successful transitions to adulthood are presented. Among these indicators is the extent to which teenagers have given thoughts about the future and have plans measured by whether they have an actual job in mind that they want to do after they leave education (see Sabates et al. 2011).

The evidence also shows that uncertain career aspirations at age 16 are associated with poorer transitions to early adulthood and more likelihood of experiences of NEET (Yates et al. 2011).

The approach taken in this part is based on the work of Yates and colleagues in 2011. At age 16, BCS70 cohort members were asked 'Nearly everybody of your age has some sort of idea of what they will want to do in life. This analysis uses this question to determine teenagers' level of aspiration based on the occupation they choose to do when they leave education and training. Here is a list of types of jobs/careers/professions for which various amounts of training are necessary. How about your choice? Please tick a box to indicate your first choice for the type of career and as many other choices for careers that you may do.'

Among the options given were professional, managerial, clerical, administrative, worker in agriculture, fishery or farm, craftsman, maintenance worker, processing worker, restaurant worker, salesman, health worker, transport worker, manufacturing, service work, armed forces, other jobs or 'cannot decide'. Yates and colleagues defined the first three categories of jobs as high aspiration and the others where lower qualification level was required matched as low aspiration.

Occupational aspiration	Required educational level
Matched high	
Professional	University degree
Managerial/teaching/nursing	Post-18 education
Trained clerical	A-level
Matched low	
Administrative	O-level
Agriculture or fishing industry	O-level or vocational training
Craftsman/designer	O-level or vocational training
Processing worker (ICT)	O-level or vocational training
Health worker	O-level or vocational training
Transport worker	O-level or vocational training
HM Forces	O-level or vocational training
Maintenance worker	Stay on post-16 education
Restaurant worker	Stay on post-16 education
Salesman rep./shop worker	Stay on post-16 education
Manufacturing work	Leave schooling at 16
Service work (cleaning, etc.)	Leave schooling at 16
Other not included above	O-level

About 29% of the sample at age 16 aspired towards 'high aspiration' occupations, based on the calculations done for this paper. We have counted first choice and joint first choice to construct our variable of interest.

BCS also asks young people whether there is an actual job they have in mind that they'd like to do when they grow up. Those who answered yes or no are deemed likely to have considered their future career plans, while those who responded 'don't know' are categorised as being uncertain about what career they would like to follow when they grow up. According to Mann et al. teenagers who had considered their future are more likely to have a smoother transition to the future.

Table 9. Frequency table: Career uncertainty at age 16

Is there an actual job you wish to do?	Frequency	%
Yes	3928	64.0
No	1025	16.7
Don't know	1183	19.3
Total	6136	

In this paper we are interested in whether higher levels of essential skills lead to higher career aspiration and career certainty and what the effect size is.

Within the second phase of analysis, this paper also looks to understand the perceptions of young people towards the difficulty finding a job and its relationship with skills score.

Socio-economic control variables included in the analysis

Based on the academic literature there are many external factors that could have an impact on education outcomes for children and young people including demographics, parental social class and home earning environment and parental engagement in education (Brown 1991; Dolean 2019; Dexter 2013).

To control for socio-economic factors in the analysis we used the following measures:

- gender,
- father's social class based on the SOC code,
- mother's involvement in child's education,
- whether the respondent's family received state benefit in the past 12 months and
- measurements of prior academic achievements where relevant.

For the education outcomes at primary level we also included the amount of time the child read books, for its potential impact on reading skills. Table 10 summarises the descriptive statistics for the full sample at both age 10 and 16 as well as for the analytical sample.

Table 10: Descriptive statistics for control variables included in the analysis (1970 British Cohort Study)

	(%)	Full sample 10	Analytical sample10	Full sample 16	Analytical sample16
Gender	Male	51.8	55.8	50.1	41.6
	Female	48.2	44.2	49.9	58.4
	N	**14,870**	**3,069**	**11,615**	**1,989**
Father's Social class	I	5.8	5.5	8.0	9.6
	II	23.4	23.7	29.7	33.9
	III non-manual	10.7	10.2	10.3	11.1
	III manual	41.7	42.1	40.3	36.3
	IV	13.9	14.1	9.3	7.0
	V	4.5	4.3	2.4	2.1
	N	**13,230**	**2,704**	**6,338**	**1,420**
Mother's interest in child education	Very Interested	55.0	55.1	…	55.0
	Moderate Interest	34.3	35.2	…	34.3
	Very Little Interest	7.8	6.6	…	7.8
	Uninterested	3.0	3.1	…	3.0
	N	**10,733**	**2,594**		**1,430**
In receipt of Benefit	No	78.5	77.8	69.0	74.9
	Yes	21.5	22.2	31.0	25.1
	N	**10,743**	**2,193**	**9,358**	**1,639**
Child reads book	Never or hardly ever	7.0	7.0	…	6.0
	Sometimes	37.5	36.3	…	38.9
	Often	55.6	56.6	…	55.1
	N	**13,593**	**2,777**		**1,805**

The sample size reduces dramatically from full sample to the analytical sample due to the unavailability of data for all the children in the cohort for the skills score variable. Given this sample size reduction, it is important to compare the smaller of our main analytical sample to the full

population as captured in individual survey questions. However, when comparing the characteristics of the full sample and the analytical sample characteristics at age 10, no significant gap is observed. The analytical sample therefore remains representative of the 1980 sweep.

For age 16 the picture is slightly different. Looking at the difference in the characteristics of the sample, the analytical sample appears to be slightly wealthier (looking at benefit recipients and father's social class) and more likely to be female (58%). The findings should be interpreted in the context of this small sample bias.

Estimation methods

At age 10, we study the impact of a higher essential skills score on two outcome variables: the ERT and FMT, which are both continuous variables. Since our dependent variables are continuous linear, Least Squares Regression model is applied using SPSS v26. The broad suitability of a linear model is investigated using additional diagnostic tests. The assumptions for multiple linear regression models including multicollinearity, homoscedasticity and the influence of outliers are also tested using standard techniques.

At age 16, we use a different prediction model as the three outcome areas we are interested in are categorical variables with three categories, where membership in categories is mutually exclusive. For the correlational analysis of skills score and mathematics performance an Ordinal Logistic Regression is used, as the dependent variable is an ordered categorical variable. For the analysis of career aspiration and certainty, we use a Binary Logistic Regression model as the outcome variables are dichotomous. For both logistic regression models tests of fitness are undertaken.

We hypothesis that each incremental increase in the essential skills score (based on children and young people's self-reported reflection data) will be associated with an incremental improvement in outcomes measures including literacy and numeracy, academic performance and career aspiration. Based on the evidence presented in this paper, interpersonal skills such as communication and problem solving enhance self-efficacy and therefore indirectly affect academic performance.

Limitations

This paper uses quantitative research methods to surface the relationships between higher proficiencies in essential skills and specific outcome areas. This is not a causal relationship and the limitations of regression models as applied in this study are apparent. Controlling for a range of socio-economic factors allows analysts to ensure that any relationships found, for example, between skills and an education outcome, cannot be dismissed as a mask for social privilege or a comparable indicator of advantage or gender. However, the prediction models do not offer the whole picture as there are extraneous factors that this dataset does not measure and therefore that this analysis does not control for. Future research should look to replicate the results with more or different sets of control variables to further prove the relationships.

There are limitations to the variables in this dataset. Many questions in this longitudinal survey rely on self-reported data. Furthermore, many questions lack answers, resulting in a smaller sample size, particularly once a large number of control variables are included. The lack of a school-level identifier and the small sample size at school level makes it impossible to explore certain fixed effects models, as well as preventing statistically testing the range of variation in skills score at the school level.

To some extent, and by necessity in a longitudinal study of this nature, the data does not directly reflect the current education system. Using a more recent data-set could provide useful evidence in future research.

This paper is a stepping stone to quantify the relationship between essential skills and the education outcomes for children and young people and the results of the analysis tend toward the indicative. This is the first instance of research that applies a widely used essential skills framework with demonstrated measurability, clarity and authority to a traditional outcomes dataset. It is hoped that this paper encourages further research in evaluating the impact of essential skills on a wide range of outcomes for individuals across different life stages and by focusing on other outcomes such as employment, education and well-being.

Chapter 4: Essential skills development and education outcomes: the findings

Chapter summary

- The analysis sought to test five hypotheses, by linking together datasets around the British Cohort Study (1970). In doing so, we found that higher levels of self-reported essential skills levels led to:
- *Higher levels of literacy at primary school, as measured by the Edinburgh Reading Test:* We found that, for example, moving from essential skills score of 8 (median value) to 12 (maximum value) leads to an equivalent gain of the same child moving from 50th percentile to 80th percentile in the Edinburgh Reading Test.
- *Higher levels of numeracy at primary school, as measured by the Friendly Math Test:* We found that an additional point on the essential skill score is associated with, on average, the equivalent gain in numeracy score of a student moving from the 50th percentile of (reported) performance up to the 60th percentile, everything else being constant.
- *Higher levels of mathematics qualifications at secondary school, as measured by O-Level and CSE results:* We found that, for example, increasing skills score from median to maximum score (score 20 to 30) the probability of the same students attains a higher mathematics qualification increases by 50%.
- *Higher academic performance, as perceived by teachers:* We found that an increase in essential skills increases the likelihood that teachers will judge the cohort member to relatively higher academic performers. To give an example if a young person acquires more essential skills during teenage years and reports an increase from the median skills score of 20 to 25, they are 55% more likely to be perceived a high performer by their teacher.
- *Higher levels of career aspiration:* We found that participants with higher essential skills were more likely to be clear on their career aspirations, and to have higher career aspirations. In general, the analysis indicated that individuals who have higher levels of skills are more likely to end up in professions in the top brackets.

The hypotheses

This chapter presents the findings of a series of analysis in order to explore the relationship between self-reported essential skills level for children and young people and selected education outcomes including literacy, numeracy and career aspiration. The analysis is presented in two chapters, children aged 10 and in primary school and teenagers aged 16 in secondary schools.

The paper sets to test a number of hypothesis using quantitative research methods including:

1. Higher levels of self-reported essential skills using proxy measurements has positive correlation with higher levels of literacy at primary education.
2. Higher levels of self-reported essential skills using proxy measurements has positive correlation higher levels of numeracy at primary education.
3. Higher levels of self-reported essential skills using proxy measurements has positive correlation higher levels of mathematics score in secondary education.

4. Higher levels of self-reported essential skills using proxy measurements has positive correlation with higher academic performance assessed by secondary school teachers.
5. Higher levels of self-reported essential skills using proxy measures in the British Cohort study 1970 has positive correlation with higher levels of career aspiration in secondary education.

(1) The relationship between higher essential skills score and literacy at age 10

The first part of this section studies the link between essential skills and children's performance in key areas of literacy and numeracy and uses available metrics for these two outcomes areas to do so. To evaluate respondents' literacy level, BCS administered the Edinburgh Reading Test (ERT). A shortened version of the ERT was used in British Cohort Study 1980 follow up which was made up of items extracted from the full Edinburgh Reading Test. Items were carefully selected to cover a wide age range of ability from seven to thirteen years in a form suitable to straddle the ten-year cohort. Particular attention was paid to the lower limit to allow a score to be allocated for very poor readers. The shortened test contained 67 items which examined vocabulary, syntax, sequencing, comprehension and retention. This analysis uses a standardised outcome variable to show the effect size.

Linear regression model is used to test the hypothesis that higher essential skills score is associated with higher literacy score using ERT after controlling for socio-economic control factors. The result of the analysis is shown in Table 11.

The findings show a positive and significant (at 5%) relationship between essential skills score and literacy skills measured by the ERT at age 10. For each additional point on participants' essential skills scores there is 7% increase in the ERT achievement i.e. enhanced levels of literacy. Acquiring an extra point on the essential skills score is associated with, on average, the equivalent gain in reading score of a student moving from the 50th percentile of (reported) performance up to the 55th percentile in the reading skills performance. To give an example, moving from essential skills score of 8 (median value) to 12 leads to 28% increase in the student's reading performance via ERT which is an equivalent gain of the same child moving from 50th percentile to 80th percentile.

Table 11: Literacy skills at age 10, regression outputs

Dependent variable= Measurement of literacy skills via ERT n=1,314				
Variable	**Estimate**	**Std. Error**	**T statistics**	**P-value**
Essential skills score	.074	.013	5.679	.000
Gender	-.078	.046	-1.686	.092
Mother's interest in child education	-.372	.034	-10.890	.000
Child reading book	.531	.038	13.945	.000
Age child sat the assessment	.347	.106	3.268	.001
Fathers social class	.096	.019	5.033	.000
Benefit	-.083	.057	-1.453	.147

The model also reveals that socio-economic factors have a significant relationship with literacy score as measured by ERT. For instance, female students appear to have scored slightly less than male peers and the effect of gender is statistically significant. Children with mothers who show higher interest in their children education go on to score more highly in literacy. The prediction power of this model after including the control variables is 30% (Rsquare=0.30).

Given the complexity of literacy drivers, the regression reported above performs well on standard diagnostic tests. It is common in social sciences for predictor variables to be correlated, introducing the risk of multicollinearity to regression analysis. In this case, the risk is minimal, supported by the approach taken to identify parsimonious control variables, as the variance inflation factors (VIF)[6] are generally below 1.1. The errors term of all of the independent variables are the same across all the variables included in the regression model above (same variance) which does follow the assumptions of homoscedasticity. The model residuals also follow a normal distribution and have a mean equal to zero which is a standard diagnostic test for normality of the error term.

Another diagnostic test implemented to identify any auto-correlations in the regression model was a Durbin Watson test[7]. The value achieved in this regression model was 1.98 which is very close to the cut off value of 2. A value less than 2 shows that this is not the case for the analysis. And finally, the results of this analysis don't seem to be hugely affected by the outliers as the descriptive stats of the DFBETA[8] show. The minimum and maximum value of DFBETA does not fall outside of the normal value of ±2 in this regression model.

(2) The relationship between higher essential skills score and numeracy at age 10

The Friendly Math Test (FMT) is used to measure children numeracy skills at primary age. FMT consisted of a total of 72 multiple choice questions and covered in essence the rules of arithmetic, number skills, fractions, measures in a variety of forms, algebra, geometry and statistics.

FMT provides a score over the full range of mathematical competence, from the earliest awareness of number operations in the first year of school up to the levels expected at around 13 years-old. This analysis uses a standardised outcome variable to show the effect size.

The hypothesis is that, after controlling for socio-economic factors, children who had the opportunity to acquire higher levels of essential skills (using self-perception data in the BCS) will be in general more confident in numeracy skills and therefore perform better in the FMT. Since our dependent variable is continuous, similar to literacy skill score via ERT, a Least Square Regression model is applied to show the relationship between essential skills and numeracy at age 10. The result of the analysis is shown in Table 12.

Table 12: Numeracy skills at age 10, regression outputs

Dependent variable= Measurement of numeracy skills via ERT n=1,346				
Variable	**Estimate**	**Std. Error**	**T statistics**	**P-value**
Essential skills score	.076	.014	5.344	.000
Gender	-.142	.049	-2.881	.004
Mother's interest in child education	-.424	.037	-11.495	.000
Age of child sat the assessment	.321	.116	2.760	.006
Fathers social class	.123	.021	5.929	.000
Benefit	-.001	.062	-.012	.990

[6] These VIF scores indicate that standard errors are less than 1.3 as large as they would be without any correlation and have minimal effect on the analysis of interest.

[7] The Durbin Watson Test is a measure of autocorrelation (also called serial correlation) in residuals from regression analysis. Autocorrelation is the similarity of a time series over successive time intervals. It can lead to underestimates of the standard error and can lead to identifying predictors as significant when they are not. The Durbin Watson test reports a test statistic, with a value from 0 to 4, where 2 is no autocorrelation.

[8] DFBETA is a measure found for each observation in a dataset. The DFBETA for a particular observation is the difference between the regression coefficient for an included variable, calculated for all of the data and the regression coefficient calculated with the observation deleted, scaled by the standard error calculated with the observation deleted. The cut-off value for DFBETAs is 2/sqrt(n)

The result of the regression model indicates a positive and significant relationship between the changes in essential skills score and standardised FMT. The findings show children with higher essential skills score perform better in numeracy. For each additional point on the essential skills score there is an additional 7.6% increase in FMT performance. Acquiring an additional point on the essential skills score is associated with, on average, the equivalent gain in numeracy score of a student moving from the 50th percentile of (reported) performance up to the 60th percentile, everything else being constant.

To give an example, moving from essential skills score of 8 (the mean skills score at age 10) to 12 (maximum skills score) leads to 30% increase in the student's numeracy score via FMT which is an equivalent gain of the same child moving from 50th percentile to 85th percentile in the reading performance rankings.

All the control variables, apart from child's access to benefits, are correlated with performance in the Friendly Math Test and the relationship is statistically significant at 5%. Female respondents are more likely to score higher on the FMT and those with more engaged mothers are significantly likely to outperform their peers with least maternal engagement in education.

The model also passed the standard diagnostic tests. There is no trace of multicollinearity between the independent variables. The variance inflation factors for all the variables are generally below the cut off threshold of 1.1. The Durbin Watson test for the model is 1.99 which is very close to the cut-off point of 2. The model residuals also follow a normal distribution and have a mean equal to zero which is a standard diagnostic test for normality of the error term.

The results of this analysis don't seem to be hugely affected by the outliers as the descriptive stats of the Standardised DFBETA shows so. The minimum and maximum value of DFBETA does not fall outside of the normal value of ±2 in this regression model.

Table 13: Descriptive stats: Standardised DFBETTA for predictive variables

	Skills core	Age	Father's SES	Mother's involvement	Sex	Benefit
Minimum	-.17	-.27	-.16	-.15	-.10	-.24
Maximum	.17	.173	.12	.27	.11	.11

(3) The relationship between higher essential skills score and mathematics qualification at age 16

The second phase of this chapter focuses on experiences of teenagers at age 16. As explained previously, the mathematics score is achieved through both vocational and academic qualifications from Certificate of Secondary Education (CSE) and 'O' level and allow comparison of individuals across different types of qualification.

Similar to the analysis of the numeracy at primary, the hypothesis is that young people aged 16 will achieve higher mathematics levels if they score higher in the overall measurement of essential skills. To test this hypothesis for the secondary school students in the 1986 cohort, a Logistic Regression model is used. The standardized mathematics qualification is coded into this 7-category ordinal variable *(see Table 8)* and to fit an appropriate model to this categorical dependent variable an Ordinal Logistic was selected. To control for prior mathematics ability the model includes the results of the FMT in addition to the rest of socio-economic factors.

The result of the regression model shows that there is a significant relationship between essential skills score at age 16 and performance in mathematics score. The findings reveal that for any additional unit change in skill score the probability of the student falling into higher levels of mathematics increases by 5%. If a student's skills score goes up by one unit, they are 5% more likely to attain higher grades in mathematics. For instance, increasing skills score from median to maximum score (score 20 to 30) the probability of the same students attaining a higher mathematics grade increases by 50%.

Table 14: Maths score at age 16, regression outputs

N=737	Odds Ratio	Std. Error	P-value
Essential skills score	0.05	.019	.010
Gender	1.791	.142	.000
Benefit	1.465	.182	.029
Father's social class	1.483	.057	.000
MotherInvolvement10	1.045	.098	.516
FMT score	.997	.006	.886

Except for the prior Friendly Math Test performance, the socio-economic control variables included in the model are statistically significantly associated with mathematics qualification grades. Male students are highly likely to have attained higher mathematics qualifications grades. Those from more advantaged family background also outperform their peers who come from more disadvantaged families. Mother's involvement in education also increases the probability of attaining higher mathematics grades.

The regression model has relatively fitted well with the data. When comparing the intercept only model with the full ordinal regression model the chi square statistics show that the latter fits the data much better (P-value: 0.00). The analysis also looked at the test of the parallel lines as another fitness of model test to check for the proportional odds assumption. In this test the null hypothesis states that the slope coefficients in the model are the same across response categories (and lines of the same slope are parallel). Since the ordered logit model estimates one equation over all levels of the response variable, the test for proportional odds tests whether our one-equation model is valid. This hypothesis is rejected in this and the ordered logit coefficients are not equal across the levels of the outcome, and we would fit a less restrictive (P-value: 0.84).

Multicollinearity between exploratory variables in the model could still cause an unreliable model here. However, it is not the case in the regression model above; VIF for all the predictive variables remains below 1.1 threshold. The results of this analysis don't seem to be hugely affected by the outliers as the descriptive stats of the standardised DFBETA shows so. The minimum and maximum value of DFBETA does not fall outside of the normal value of ±2 in this regression model.

In addition to the above analysis, it was interesting to find out whether, in general, students who responded to the survey in 1986 at age 16 found the subjects they studied, including mathematics, helpful for their future and whether those who have reported higher essential skills have a similar perception to their peers with lower skills score. Table 15 shows the result of the cross-tabulation between these two factors.

Table 15: Cross-tabulation: essential skills score and perceptions of subject usefulness

N=1,960 P-value=0.00	Any of your subjects useful in future?		
	All are useful	Some are useful	Many are not useful
Essential skills score< average	20%	68%	11%
Essential skills score>= average	33%	60%	6%

Overall, teenagers who reported higher levels of essential skills appear to have found the subjects they studied mostly helpful for their future. Young people with a lower than average essential skills score found mostly found many of their subjects not useful for their future. Based on the chi square statistics this relationship is significant at the 5% level.

This finding is helpful in the interpretation of the regression model above. When young people have a better attitude towards their subject of studies and perceive them as useful for what they want to do in the future, they might in fact become motivated to study harder and being equipped with essential skills could act as a catalyst and influence their self-belief.

(4) Teacher-rated academic performance and its link with essential skills at age 16

Teenagers' academic performance is also measured through the views of their teachers in 1986. The following analysis uses the teacher's view of each participant's academic performance as an outcome area to test the hypothesis that a higher level of essential skills is correlated with better academic performance. Similar to the previous section, Ordinal Logistic Regression is used to fit the data as the teacher-rated performance variable is an ordinal variable with multi categories. The same socio-economic control variables are included in the model. Unfortunately, there is a large sample size reduction when including those socio-economic factors. The final sample size for which we have complete data is 345.

Table 16: Academic performance at age 16, regression outputs

N=345	Odds Ratio	Std. Error	P-value
Essential skills score	.11	.027	.000
Gender	.949	.202	.797
Benefit	1.962	.248	.007
Father's social class	1.615	.086	.000
Childs reading books	1.202	.172	.285
MotherInvolvement10	1.299	.144	.064
FMT score	.994	.009	.452

Acknowledging the limitations of the reduced sample, Table 16 shows the change in probability of performing academically better as the result of higher essential skills level. The analysis shows that for each additional point in the skills score reported by the respondents at age 16, the probability of them performing better academically increases by 11%. This relationship is statistically significant at 5%.

To give an example if a young person acquires more essential skills during teenage years and reports an increase from the median skills score of 20 to 25, they are 55% more likely to fall into the top performance categories.

The regression model has fitted relatively well with the data. When comparing the intercept-only model with the full ordinal regression model, the chi square statistics show that the latter fits the data much better (P-value: 0.00). The analysis also looked at the test of the parallel lines as another fitness of model test to check for the proportional odds assumption. The statistics show that the model with the variables above passes this diagnostics test (P-value: 0.10).

Similar test of multicollinearity between exploratory variables using VIF is undertaken; the variance inflation for all the predictive variables remains below 1.1 threshold. The results of this analysis don't seem to be hugely affected by the outliers as the descriptive stats of the standardised DFBETA shows so. The minimum and maximum value of DFBETA does not fall outside of the normal value of ±2 in this regression model.

(5) Does higher level of essential skills at age 16 correlated with higher career aspiration and certainty?

Career aspiration

The analysis below explores whether a higher level of self-reported essential skills is linked to higher career aspirations. Using theory-led measurements of career aspiration in BCS, a dichotomous outcome variable is created to test this hypothesis. If a young person aspired to a career that required a degree or higher levels of qualifications they are considered to be in the category of high aspiration. This categorisation is borrowed from the past academic literature (as explained in *Chapter 2*). As the dependent variable is a binary variable, a Logistic Regression Model is considered. Table 17 presents the findings of the analysis. There is a sample size reduction when including the socio-economic control factors. The final sample size for which we have complete data is 484.

Table 17: Career aspiration at age 16, regression outputs

N=484	Odds Ratio	Std. Error	P-value
Essential skills score	1.058	.031	.067
Gender	2.082	.232	.002
Benefit	.783	.323	.449
Father's social class	.765	.093	.004
MotherInvolvement10	.784	.152	.111
Math score 16	.458	.084	.000

After controlling for the effects of socio-economic factors which might affect a young person's career aspiration, the analysis shows that there is a statistically significant relationship between higher self-reported essential skills and the young person's aspiration (at 10%). When teenagers reported higher levels of essential skills as measured by the proxy statements in the BCS they are more likely to aspire to 'high aspiration' professions, which are linked to enhanced employment outcomes in the long term. For instance, if the reported skills score increased by 5 additional points, the probability of them holding higher career aspirations increases by almost 30%. In general, the

analysis indicated that individuals who have higher levels of essential skills are more likely to end up in professions in the top brackets.

Gender, prior mathematics performance and family's social class are also significantly correlated with young people's career aspiration, as shown in Table 17. In this sample, female respondents are more likely to aspire for higher levels professions, as do those who are from more advantaged backgrounds and those who achieved higher mathematics grades.

Overall, the model has predicted the values correctly in almost 77% of the times, as observed by the regression model descriptions in SPSS. The chi square test for the Hosmer and Lemeshow Test, a goodness of fit test for logistic regression models, also validates that the fitness of the model is not poor (P-value:0.48).

In the regression above no trace of multicollinearity between control variables was detected. In a separate analysis the VIF was screened and for all predictive variables the value is less than 1.1.

Career certainty

Young people who are uncertain about their future and have not given sufficient thinking and consideration to what they want to do after they leave education and training are more likely to experience episodes of unemployment and potentially more fractured transitions into early adulthood (see chapter 2).

The analysis in this section intends to understand if essential skills development can play a role in supporting young people to feel more certain about their future career. Young people were asked at age 16 whether there is an actual job they have in mind that they'd like to do when they grow up. Those who answered yes or no are assumed to have given some thoughts to their future career plans and those who don't know are categorised as being uncertain about what career they would like to follow when they grow up.

A Binary Logistic Regression Model is used to test the hypothesis that higher levels of self-reported essential skills at age 16 is associated with teenagers' career certainty, after controlling for socio-economic variables. The result of the analysis is presented in Table 18.

When teenagers reported higher levels of essential skills as measured by the proxy statements in the BCS they are more likely to be certain about the job they want to do in the future. For each additional point on their skills score, the respondent's probability of career certainty increases by 5.5%. This relationship is statistically significant at borderline 5%. If the reported skills score increases from median score of 20 to its maximum value at age 16, they are almost 55% more likely to have a career in mind i.e. have given thoughts to their plan after education, everything else held constant.

Table 18. Career certainty at age 16, regression outputs

N=781	Odds Ratio	Std. Error	P-value
Essential skills score	1.056	.028	.051
Gender	.806	.214	.313
Benefit	2.037	.350	.042
Father's social class	1.110	.086	.224
MotherInvolvement10	1.114	.142	.450
Math score 16	1.091	.066	.188

Overall, the model has predicted the values correctly in almost 85% of the times, as observed by the regression model descriptions in SPSS. The chi square test for the Hosmer and Lemeshow Test, a goodness of fit test for logistic regression models, also validates that the fitness of the model is not poor (P-value:0.88).

In the regression above no trace of multicollinearity between control variables was detected. In a separate analysis the VIF was screened and for all predictive variables the value is less than 1.1.

Teenagers were also asked at age 16 how difficult they will find finding a job when they leave education. 5.5% of the respondents said they already have a job secured when they leave their education and approximately 19% said they think they will find it easy or fairly easy while 67% of the teenagers said they will find it difficult or fairly difficult. The majority of those teenagers who already secured a job or think it will be easier to find a job are from higher socio-economic classes and more likely to be male.

To explore this further, the analysis looks at the role higher levels of essential skills play in young people's perception of finding a job after education. Table 19 shows the result of a cross-tabulation between skills score and whether teenagers expect to find it easy or difficult to find a job.

Based on the analysis, respondents with higher reported essential skills score are more likely to find getting a job easier or have secured a job already. Young people with skills scores less than average are more likely to think finding a job is very difficult (24%) comparing to their peers with a skill score above average (16%). The relationship between these two variables is also statistically significant.

Table 19: Cross-tabulation: essential skills score at age 16 and difficulty finding a job

N=1,863 P-value=0.00		
	Essential skills score< average	**Essential skills score> average**
Very easy/Have a job secured	7%	8%
Fairly easy	19%	22%
Fairly difficult	49%	54.0%
Very difficult	24%	15%

Chapter 5: Conclusion

Schools and colleges are increasingly thinking about the development of wider skills and competencies beyond singular academic achievement. These include essential skills, as have been defined in the Skills Builder Universal Framework. In 2020, the Skills Builder Universal Framework was launched, the result of a partnership between seven members of the Essential Skills Taskforce[9]. It provided a common language and shared expectations for essential skills which has subsequently been adopted by more than 800 organisations including educators, employers, and other impact organisations.

This shared language offers an opportunity for increased focus in research around this area. A literature review published by CFEY and Skills Builder Partnership in late 2020 highlighted some promising insights. There was some evidence that building essential skills could support improvements in academic attainment, career progression, and wellbeing. The rapid evidence review showed a growing number of studies that have demonstrated a connection between building these broader skills and competencies and outcomes including reductions in absenteeism, engagement with learning, and decreasing behavioural problems.

It also highlighted a number of studies that demonstrate a link between building some of the essential skills and academic outcomes across different education phases, from primary to university and postgraduate level. These include links between essential skills like problem solving, staying positive, and teamwork, and improvements in mathematics and reading scores. Based on its key findings, it is also possible to construct theoretical models of the link between building essential skills and how that would support such improvements. These include supporting students' capacity to learn effectively, their ability to build positive relationships with peers, managing emotions effectively and developing their self-efficacy.

The review also highlighted that there were gaps in the existing research base, particularly around longitudinal studies of the interplay of essential skills and other outcomes over time. This research, therefore was undertaken with the aim to make a contribution here by using the rich longitudinal data provided by the British Cohort Study (1970), with a particular focus on children and young people.

The analysis sought to test five hypotheses, using quantitative research methods, by linking together datasets around the British Cohort Study (1970). In doing so, we found that higher levels of self-reported essential skills levels led to:

- *Higher levels of literacy at primary school, as measured by the Edinburgh Reading Test:* We found that, for example, moving from essential skills score of 8 (median value) to 12 (maximum value) leads to an equivalent gain of the same child moving from 50th percentile to 80th percentile in the Edinburgh Reading Test.
- *Higher levels of numeracy at primary school, as measured by the Friendly Math Test:* We found that acquiring higher skills is associated with, on average, the equivalent gain in numeracy score of a student moving from the 50th percentile of (reported) performance up to the 60th percentile, everything else being constant.

[9] The Essential Skills Taskforce members were: Business in the Community, the Careers & Enterprise Company, the CBI, the CIPD, the EY Foundation, the Gatsby Foundation, and Skills Builder Partnership.

- *Higher levels of mathematics qualifications at secondary school, as measured by O-Level and CSE results:* We found that, for example, increasing skills score from median to maximum score (score 20 to 30) the probability of the same students attains a higher mathematics qualification increases by 50%.
- *Higher academic performance, as perceived by teachers:* We found that an increase in essential skills increases the likelihood that teachers will judge the cohort member to relatively higher academic performers. To give an example if a young person acquires more essential skills during teenage years and reports an increase from the median skills score of 20 to 25, they are 55% more likely to be perceived a high performer by their teacher.
- *Higher levels of career aspiration:* We found that participants with higher essential skills were more likely to be clear on their career aspirations, and to have higher career aspirations. In general, the analysis indicated that individuals who have higher levels of skills are more likely to end up in professions in the top brackets.

It is assumed that children and young people who have the opportunity to develop these essential skills and report higher levels of competence across a range of interpersonal skills, communication skills, self-management and creative problem-solving start to show higher levels of self-efficacy and therefore believe in their potential and what they can achieve. This is then shown to be linked with learning outcomes and academic performance throughout the academic literature.

However, the literature suggests that to strengthen the links between skills development and education outcomes we can't rely on one-off interventions and uneven access to opportunities by children and young people to learn and grow. Most successful approaches focus on skills development on a daily basis, use a systematic, intentional approach for teaching critical skills, and acknowledge the skills in context. Programmes that contained a direct teaching component (including explicit lessons in curriculum format) and those that were of greater intensity and longer duration has a bigger positive effect on outcomes.

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Appendix A: Universal Skills Builder Framework

Version: Final, May 2020

Skill: Listening

The receiving, retaining and processing of information or ideas

Step	Statement
0	I listen to others without interrupting
1	I listen to others and can remember short instructions
2	I listen to others and can ask questions if I don't understand
3	I listen to others and can tell someone else what it was about
4	I listen to others and can tell why they are communicating with me
5	I listen to others and record important information as I do
6	I show I am listening by how I use eye contact and body language
7	I show I am listening by using open questions to deepen my understanding
8	I show I am listening by summarising or rephrasing what I have heard
9	I am aware of how a speaker is influencing me through their tone
10	I am aware of how a speaker is influencing me through their language
11	I listen critically and compare different perspectives
12	I listen critically and think about where differences in perspectives come from
13	I listen critically and identify potential bias in different perspectives
14	I listen critically and use questioning to evaluate different perspectives
15	I listen critically and look beyond the way speakers speak or act to objectively evaluate different perspectives

Skill: Speaking
The oral transmission of information or ideas

Step	Statement
0	I speak clearly to someone I know
1	I speak clearly to small groups of people I know
2	I speak clearly to individuals and small groups I do not know
3	I speak effectively by making points in a logical order
4	I speak effectively by thinking about what my listeners already know
5	I speak effectively by using appropriate language
6	I speak effectively by using appropriate tone, expression and gesture
7	I speak engagingly by using facts and examples to support my points
8	I speak engagingly by using visual aids to support my points
9	I speak engagingly by using tone, expression and gesture to engage listeners
10	I speak adaptively by changing my language, tone and expression depending on the response of listeners
11	I speak adaptively by planning for different possible responses of listeners
12	I speak adaptively by changing my content depending on the response of listeners
13	I speak influentially by changing the structure of my points to best persuade the listeners
14	I speak influentially by changing the examples and facts I use to best persuade the listeners
15	I speak influentially by articulating a compelling vision that persuades the listeners

Skill: Problem Solving
The ability to find a solution to a situation or challenge

Step	Statement
0	I complete tasks by following instructions
1	I complete tasks by finding someone to help if I need them
2	I complete tasks by explaining problems to someone for advice if I need
3	I complete tasks by finding information I need myself
4	I explore problems by creating different possible solutions
5	I explore problems by thinking about the pros and cons of possible solutions
6	I explore complex problems by identifying when there are no simple technical solutions
7	I explore complex problems by building my understanding through research
8	I explore complex problems by analysing the causes and effects
9	I create solutions for complex problems by generating a range of options
10	I create solutions for complex problems by evaluating the positive and negative effects of a range of options
11	I analyse complex problems by using logical reasoning
12	I analyse complex problems by creating and testing hypotheses
13	I implement strategic plans to solve complex problems
14	I implement strategic plans to solve complex problems and assess their success
15	I implement strategic plans to solve complex problems and draw out learning to refine those plans over time

Skill: Creativity
The use of imagination and the generation of new ideas

Step	Statement
0	I imagine different situations
1	I imagine different situations and can say what I imagine
2	I imagine different situations and can bring them to life in different ways
3	I generate ideas when I've been given a clear brief
4	I generate ideas to improve something
5	I generate ideas by combining different concepts
6	I use creativity in the context of work
7	I use creativity in the context of my wider life
8	I develop ideas by using mind mapping
9	I develop ideas by asking myself questions
10	I develop ideas by considering different perspectives
11	I innovate effectively when working in a group
12	I innovate effectively by seeking out varied experiences and stimuli
13	I support others to innovate by sharing a range of tools
14	I support others to innovate by evaluating the right creative tools for different situations
15	I support others to innovate by coaching them to be more creative

Skill: Staying Positive

The ability to use tactics and strategies to overcome setbacks and achieve goals

Step	Statement
0	I can tell when I feel positive or negative
1	I can tell when others feel positive or negative
2	I keep trying when something goes wrong
3	I keep trying and stay calm when something goes wrong
4	I keep trying when something goes wrong, and think about what happened
5	I keep trying when something goes wrong and help cheer others up
6	I keep trying when something goes wrong and encourage others to keep trying too
7	I look for opportunities in difficult situations
8	I look for opportunities in difficult situations, and share these with others
9	I look for opportunities in difficult situations, and adapt plans to use these opportunities
10	I look for opportunities in difficult situations, and create new plans to use these opportunities
11	I identify risks and gains in opportunities
12	I identify risks and gains in opportunities, and make plans to manage them
13	I support others to stay positive, by managing my own responses
14	I support others to stay positive, by helping others to see opportunities
15	I support others to stay positive, by helping others to see opportunities and creating plans to achieve them

Skill: Aiming High

The ability to set clear, tangible goals and devise a robust route to achieving them

Step	Statement
0	I know when I am finding something too difficult
1	I know what doing well looks like for me
2	I work with care and attention to detail
3	I work with pride when I am being successful
4	I work with a positive approach to new challenges
5	I set goals for myself
6	I set goals informed by an understanding of what is needed
7	I set goals, ordering and prioritise tasks to achieve them
8	I set goals and secure the right resources to achieve them
9	I set goals and plan to involve others in the best way
10	I create plans that are informed by my skill set and that of others
11	I create plans that include clear targets to make progress tangible
12	I create plans that are informed by external views, including constructive criticism
13	I develop long-term strategies taking into account strengths, weaknesses, opportunities and threats
14	I develop long-term strategies that use regular milestones to keep everything on track
15	I develop long-term strategies that include feedback loops to support flexibility and adaptability

Skill: Leadership
Supporting, encouraging and developing others to achieve a shared goal

Step	Statement
0	I know how I am feeling about something
1	I know how to explain my feelings about something to my team
2	I know how to recognise others' feelings about something
3	I manage dividing up tasks between others in a fair way
4	I manage time and share resources to support completing tasks
5	I manage group discussions to reach shared decisions
6	I manage disagreements to reach shared solutions
7	I recognise my own strengths and weaknesses as a leader
8	I recognise the strengths and weaknesses of others in my team
9	I recognise the strengths and weaknesses of others in my team, and use this to allocate roles accordingly
10	I support others through mentorship
11	I support others through coaching
12	I support others through motivating them
13	I reflect on my own leadership style and its effect on others
14	I reflect on my own leadership style, and build on my strengths and mitigate my weaknesses
15	I reflect on my own leadership style, and adapt my approach according to the situation

Skill: Teamwork
Working cooperatively with others towards achieving a shared goal

Step	Statement
0	I work with others in a positive way
1	I work well with others by behaving appropriately
2	I work well with others by being on time and reliable
3	I work well with others by taking responsibility for completing my tasks
4	I work well with others by supporting them if I can do so
5	I work well with others by understanding and respecting diversity of others' cultures, beliefs and backgrounds
6	I contribute to group decision making
7	I contribute to group decision making, whilst recognising the value of others' ideas
8	I contribute to group decision making, encouraging others to contribute
9	I improve the team by not creating unhelpful conflicts
10	I improve the team by resolving unhelpful conflicts
11	I improve the team by building relationships beyond my immediate team
12	I influence the team by reflecting on progress and suggesting improvements
13	I influence the team by evaluating successes and failures and sharing lessons
14	I support the team by evaluating others' strengths and weaknesses, and supporting them accordingly
15	I support the team by bringing in external expertise and relationships

Appendix B: Full BCS Statements used for Skills Score construction at age 10 and 16

Age 10

Variable	Answer options
Do you like team games?	Yes, No, Don't know
Are there lots of things about yourself you would like to change?	Yes, No, Don't know
Please try to describe yourself, using each of the descriptions listed below: I prefer to be on own	Often or usually, Sometimes, Not at all
Do you do well or not so well in the following subjects? Ability in creative writing	Well, Not Well
Do you feel that most of the time it's not worth trying hard	Yes, No, Don't know
Do you like taking part in plays or concerts?..	Yes, No, Don't know
Do you usually feel that it's almost useless to try in school	Yes, No, Don't know
Are you the kind of person who believes that planning ahead	Yes, No, Don't know
When bad things happen to you is it usually someone else's fault?	Yes, No, Don't know
When you get into an argument is it usually the other person's fault?	Yes, No, Don't know
Do you think studying for tests is a waste of time?	Yes, No, Don't know

Age 16

Variable	Answer options
Which of the following statements apply to you: I am punctual I am a responsible person I am independent I am reliable	Very much, Somewhat, Doesn't apply to me
Here is a list of things that you might feel about yourself. Read each statement and decide which one of the possible answers is the one most nearly applies to you: I am able to concentrate on what I am doing I am capable of making decisions about things I am able to face up to my problems I feel I am playing useful part in things I feel I couldn't overcome my difficulties	Much more than usual, Same as usual, Less than usual, Much less than usual
Here you find a list of questions about how you feel about yourself. Please read and choose which one applies to you: I agree it's not worth trying-never turn out anyway I agree bad things happen-usually others' fault I agree studying for tests is a waste of time I like writing stories-creative writing I find it difficult to do things I understand communications	Yes, No, Don't know
Below is a list of things that some people of your age have said about how they feel about school. Read each carefully and say whether true in your case: I feel school is largely a waste of time I find it difficult to keep mind on work I never take work seriously Plans are pointless, I take things as they come I am always willing to admit mistakes I am always willing to help the teacher	Very true, Partly True, Not true at all