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Policy for the Full Range of Employability Skills

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POLICY FOR THE FULL RANGE OF EMPLOYABILITY SKILLS

NCAER Skilling India Working Paper

Bornali Bhandari¹

Abstract The objective in this paper is to define the full range of employability skills from Pre-Kindergarten to Higher Education and integrate it to the ground-level realities in the Indian context. It clearly identified that there are four types of skills –cognitive, socio-emotional, physical or psychomotor and job-specific skills. Every job role requires a different permutation and combination of these skills. These skills are mapped across foundational and advanced skills. The third objective is to propose an integrated perspective on education and training for India, which provided the maximum flexibility to workers to determine their own path. Education up to Class X has to be made compulsory. There should be two pathways after that – general schools that offer general education with vocational education and vocational schools that offer vocational education with general education. Apprenticeships needed to be made compulsory in the latter. Internships could be offered in both types of schools. The quality had to be strengthened to deliver a full range of skills at all levels. Even after landing a job, options for re-skilling and upskilling had to be offered. However, a demand-supply side delineation of the full range of the skill set shows that the supply-side is only delivering part of the skill set and even that suffers from quality issues. For example, nowhere active listening and active learning are recognised as key foundational cognitive skills, neither in policy nor in literature. However, these are two skills that employers want. The matching, if at all, was either at the very low-end at the primary/middle school level or at the college level.

Keywords: Education, Employability, Employment, Skills, Vocational Skills, India

JEL Codes: J24

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1. Introduction

The skills that a person is equipped with represent a combination of knowledge, necessary training, and experience, which provide them with the special ability to perform a job. The key here is to link learning outcomes to job performance or productivity (Lane, 1992), which in turn, would help in improving firm, regional and macro labour productivity. The discussion for improving employability in India has focused on improving the attainment of vocational skills. Hitherto not enough attention has been paid to linking learning outcomes and life skills to job performance. Both are important for overcoming the education, employability and employment (3-E) challenge in the context of India.

The objective is to develop a holistic framework for examining skills from a demand-supply perspective and to delineate a detailed list of skills needed in the labour market. This framework will enable India to frame policies that would help address its medium- and long-run challenges posed by demographic transition, economic uncertainty, and technological changes. In the process, it would also be possible to identify the challenges faced by the current statistical system in measuring skills. On a cautionary note, the objective here is not to define skills required for each job role in each sector in India.² That task is outside the scope of this paper. Instead, the objective is to develop a generic framework that can be applied to any job. The advantage of developing a common integrated framework is that it would address key policy questions like what skills to impart, how to provide them, and for whom? It would also help identify various types of skills and distinguish between those skills that are common across various jobs and occupations, and those that are specific to a particular job role. Further, such a framework would help address the issue of financing or who would be paying for imparting the skills—the government, individuals, or firms. For example, if all firms want the basic entrants to have at least a basic set of skills, those skills could be incorporated in the educational system (Becker, 1962).

2. What Are Skills?

Educational attainment is a proxy measure of skills, albeit an inadequate one [Hanushek and Woessmann (2008; 2012) and Hanushek (2013)]. Balasubramanian (2016) shows provides empirical evidence in support of that for India. This implies that one cannot answer questions pertaining to either economic growth or labour market outcomes using *only* educational attainment as an indicator.

Green (2013, p. 10), uses the PES (Productive, Expandable, and Social) concept of skills, that is, he suggests that they are “*personal qualities with the following three key features*:

- *Productive: Using skills at work are productive of value;*
- *Expandable: Skills are enhanced by training and development and;*

² Using the definition prevalent in the United States of the skills that each job role entails, Balasubramanian (2016) has used Indian data to compute a measure of cognitive and physical skills. NCAER proposes the use of responses by domestic firms on the requisite cognitive, non-cognitive, and physical skills based on the framework developed in this NCAER report and use that to answer macro and labour market outcomes.

• *Social: Skills are socially determined.*”

Skills can be of various kinds, like literacy, numeracy, active listening, digital and communication, and a combination of these skills is used to perform any productive tasks.³ It is not necessary for all skills to be used in all tasks and to the same degree. Every job/task can be mapped to various scales of the specific skill that is used. Further, there are some common skills that are used in almost all tasks (routine) and there are also occupation-specific skills like technical or vocational skills that are used to perform a job (non-routine) (Green, 2013). Contextualising is also very important. In sum, any job role in India or in the world requires a combination of generic skills (of varying intensity) and specific skills.

Based on the available literature, including WHO (1997), Green (2013), Heckmann and Kautz (2012; 2013), OECD (2016a), the O*NET online website, and Pierre et al. (2014)), skills may be characterised into four broad domains. Here, our focus is on the use of skills at the workplace. While overall there are four broad domains of skills, in the literature there are various categorisations of skills along with the resultant impact on policy—foundational versus non-foundational, basic versus talent, routine versus non-routine, and core versus non-core (Green, 2013).

“Foundational skills are the fundamental, portable skills that are essential to conveying and receiving information that is critical to training and workplace success” (ACT website). There are two key words in this definition—fundamental and portable. The word ‘fundamental’ signifies that it serves as a foundation for supporting additional operations/tasks and learning (ACT website). For example, all job roles necessitate the ability to read to obtain additional job knowledge and skills (ACT website). A detailed comparison of the description of job roles by the National Skills Quality Framework (NSQF) across various sectors shows that all of them require a minimum basic level of reading.⁴

The second key word ‘portable’ signifies that it is not job-specific but can be applied at some level across a wide variety of occupations (see Box 1 for an expanded discussion on portable skills). For example, all job roles require listening skills (ACT website). This portability aspect of skills is labelled as ‘generic skills’ by Green (2013), that is, they are transferrable and not occupation-specific, thereby having implications for who is going to finance the acquisition of these skills.

³ OECD (2016b) distinguishes between the words, “skills” and “competency” because the latter has been given a specific definition in the European context. “Competency is often presented as a capacity that can be applied to a relatively wide range of ‘real’ contexts, while ‘skill’ is considered a constituent unit of competency, that is, a specific capacity, often technical in nature, relevant to a specific context” (OECD, 2016b). Following OECD (2016b), we use the word “skills” in this report.

⁴ “The NSQF is a competency-based framework that organises all qualifications according to a series of levels of knowledge, skills, and aptitude. These levels, graded from one to ten, are defined in terms of learning outcomes which the learner must possess regardless of whether they are obtained through formal, non-formal or informal learning.” (NSQF website).

Box 1. Portable Skills

ILO (2007) cites Human Resources Development Recommendation, 2004 (No. 195) to define portability of skills along the following two dimensions:

- (a) employable skills which can be used productively in different jobs, occupations, industries; and
- (b) certification and recognition of skills within national and international labour markets.

Transferability of skills + credible information on skills = Portability of skills

Transferrable skills could be technical/vocational skills and non-vocational/technical core skills (ILO, 2007). For example, language skills (languages you communicate in and understand—both written and oral), laboratory skills, construction skills (useful in work related to design, theatre, building, etc.), acting/dancing/performance techniques, certifications and proficiencies in a variety of areas and computer/IT skills. Listed below are common computer/IT skills that are transferrable: Arts and Graphics, Desktop Publishing, Presentation, Spreadsheet, Word Processing, Programming, Client Server/Networking/Hardware, Operating Systems, Database/Statistics, Engineering Software and Web Page Design (Carleton University Skills Handout).

Transferrable skills comprise cognitive and non-cognitive/soft/socio-emotional skills including Communication Skills; Critical Thinking Skills, Human Relations and Interpersonal Skills, Information Management Skills, Management and Leadership Skills, Research and Investigation Skills and; Valuing Skills (Carleton University Skills Handout).

Transferrable skills are abilities that can be acquired through informal life experiences (volunteering or activities) or formal education and training (like classroom work or an internship). Typically, the employer has little or no incentive in providing training for transferrable skills. Therefore, transferrable skills have to be provided on the supply side and not on the demand side.

The second aspect is the challenge of certification and recognition of skills in the labour market (ILO, 2007). *“While skills cannot be directly observed and ‘inspected’, they need to be identified, assessed, and communicated to employers. Skills and their implicit and explicit knowledge elements differ, however, in the degree to which they are easily recognizable by others and require various methods of identification and assessment. While explicit knowledge can be observed, tested, codified, and certified relatively easily through written or oral exams and practical tests, implicit or tacit knowledge—such as the ability to learn or to work in teams—is more difficult to assess, codify, and certify. Human capabilities such as intuition, insight, creativity, and judgment, resist codification. Therefore, skills in these areas can only be ascertained through observation of work performance”* (ILO, 2007).

Skills may have various degrees of complexity and may be mapped at varying scales (Green, 2013). There may be a low threshold level of skills called ‘basic skills’ (Green, 2013) and advanced ones in each domain.

At the workplace, the tasks may be differentiated between routine and non-routine ones (Autor, Levy, and Murnane, 2003). The impact of technology and automation are closely related to it. Routine activities are those that can be accomplished by following explicit rules, and are, therefore, easily programmable and replaceable by computers (Green, 2013). They can be both analytical and interactive tasks like record-keeping, calculation, and repetitive customer service, and manual tasks like

picking or sorting, and repetitive assembly (Autor, Levy, and Murnane, 2003). Amongst the analytical and interactive tasks, non-routine activities include testing hypotheses, medical diagnosis, legal writing, persuading/selling, and managing others (Autor, Levy, and Murnane, 2003). Within manual tasks, non-routine activities would include janitorial services (Autor, Levy, and Murnane, 2003).⁵

A related point, which is pertinent to this report, is that it focuses on the 3-E challenge that is, learning outcomes are related to labour market outcomes such as employment and wages. Therefore, skills have to be examined both from a learning perspective and its usage at work. Although broadly similar and overlapping, there may be differences.⁶ The definitions of various skills are sourced from the literature (defined in Appendix A1) and then placed in the Indian context.

There are four types of skills – cognitive, socio-emotional, physical, and occupation-related skills that are applied to a job. Following OECD (2016b), we also look at the action-oriented or functional concept of skills. Since this literature is currently at a nascent stage in India, more space and time has been devoted in this paper to explaining the concept of skills prevalent in India. We take the four types of skills and explain the type of domain they would belong to.

1. **Cognitive Skills:** These are attributes which are used for “thinking activities” (Green, 2013). The first two skills are ‘communication’ and ‘language skills’. Communication and language skills include the critical skill of reading, which can range from ‘literacy’ to more complex forms. Reading literacy is a foundational/basic or core cognitive skill required for every job and building up the foundation for acquisition of other skills. Appendix 1 defines these skills in detail.

Indian context: Given the multilingual environment of India, the challenge is: Which language should be promoted to develop one’s reading and writing ability? While Ball (2011) indicates that early learning in the mother tongue of the children helps improve their overall language and cognitive development, and their academic achievement, fluency in English has a premium in the Indian job market (Azam, Chin, and Prakash, 2011; Rani, 2014). Nair (2015) and Gupta and Pelkonen (2017) argue that learning outcomes are better, on the margin, if the medium of instruction is in the native language. In order to overcome such language issues, Kendriya Vidyalayas (Central Schools) use the bilingual medium of instruction (Usha, undated). Bilingualism has also been used successfully in Maharashtra semi-English Government-aided schools (Sardana, 2020). However, those lessons need to be extended to tribal schools in Maharashtra where tribal languages need to be incorporated in schooling (Sardana, 2020).

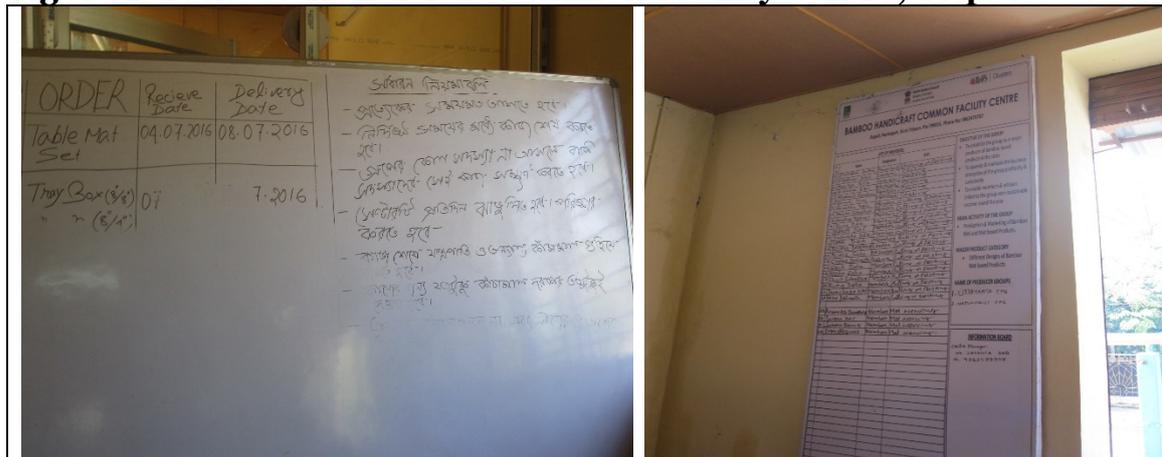
Almost all vocational training providers that NCAER interviewed have incorporated functional English language skills as part of their vocational training courseware. However, from the job perspective, a basic knowledge of reading and writing English

⁵ Autor, Levy and Murnane (2003) included the task of truck driving as a non-routine manual task. However, with the advent of driverless cars, this task may not fall in this category any more. With technological changes, the classification of tasks may change.

⁶ For example, OECD (2016b) compares literacy, numeracy, and problem-solving skills both from a learner (school-going) perspective (Programme for International Student Assessment, PISA) and a worker’s perspective (Survey of Adult Skills, PIAAC). While the literacy and numeracy skills are broadly similar, problem-solving skills differ across the two surveys (OECD, 2016b).

is required. An Assistant Beauty Therapist is tested on the ability to file routine reports, and complete routine documentation, among other things etc. Even livelihood programs such as the Tripura Bamboo Mission use two languages to deliver instructions (Figure 1). Migration further complicates issues in a linguistically diverse country like India, where a migrant worker from East India may not know the local language at work, which becomes a constraint for labour mobility. It is not surprising that ASER tests for reading skills in both the main regional language of the State concerned and English.

Figure 1: Bamboo Handicraft Common Facility Centre, Tripura



Source: Author’s field visit to Agartala, Tripura, November 2018.

Other cognitive skills include numeracy/mathematics, problem-solving, complex problem-solving, information, communication and technology (ICT) literacy, ICT skills, financial literacy, self-learning, active (independent) learning, active listening, science, learning strategies, critical thinking, creativity, and systems thinking (Green, 2013; Anderman and Sinatra, undated). Appendix A1 defines each of these terms.

The Indian context: Reading and numeracy skills have been analysed in India to a limited extent. The ASER Reports, through their surveys of rural schools, are reporting on cognitive skills, including reading and numeracy for classes one to eight. However, they are not linked to labour market outcomes because they are focused on school-going children. For that, one would need either longitudinal panel data or an assessment of adult skills to link to labour market outcomes such as wage, employment, and productivity.

Blom and Saeki (2011) show that engineers in India do not know how to apply their knowledge in a workplace due to lack of imagination, inability to filter out information, and little training in “systems thinking”. The India Skills Report, 2017, shows that cognitive and socio-emotional skills are valued in the Indian labour market which Indian graduates do not necessarily have (Box 2).

Box 2. India Skills Report 2017

The Wheebox Employability Skills Test (WEST) included all 29 States and 7 Union Territories and 3,000 educational campuses across India, and assessed about 5.6 lakh candidates on parameters like domain knowledge, computer skills, numerical and logical aptitude, critical thinking, behavioural traits including learning agility, adaptability, inter-personal skills, emotional intelligence, conflict resolution, and self-determination.

The employability of final year students (in the age group of 18–29 years) were tested using the WEST, including majors like engineering, Master of Business Administration (MBA), Bachelor of Arts (BA), Bachelor of Commerce (BCom), Bachelor of Science (BSc), Master of Science (MSc), Industrial Training Institute, Polytechnics and BPharma. All those who scored more than 60 per cent were considered employable. Candidates showed an improvement in employability from 33.1 per cent in 2016 to 40 per cent in 2017. Interestingly, the employability of engineers, and those with MBA, BSc, and MSc degrees had come down as compared to the previous year. Others showed an improvement since the previous year. Engineering students were found to be the most employable at 50 per cent.

The best performers in English as a second language were West Bengal and Maharashtra; in numerical performance, were West Bengal and Delhi; in critical thinking, were Delhi and West Bengal, and in computer skills were Rajasthan and Delhi.

The India Hiring Intent 2017 Survey shows that the skills required by employers include domain expertise, integrity and values, learning agility, cultural fitment, communication, numerical and logical agility, result orientation, adaptability, and inter-personal skills.

Source: Wheebox, PeopleStrong, AICTE, and CII (2017).

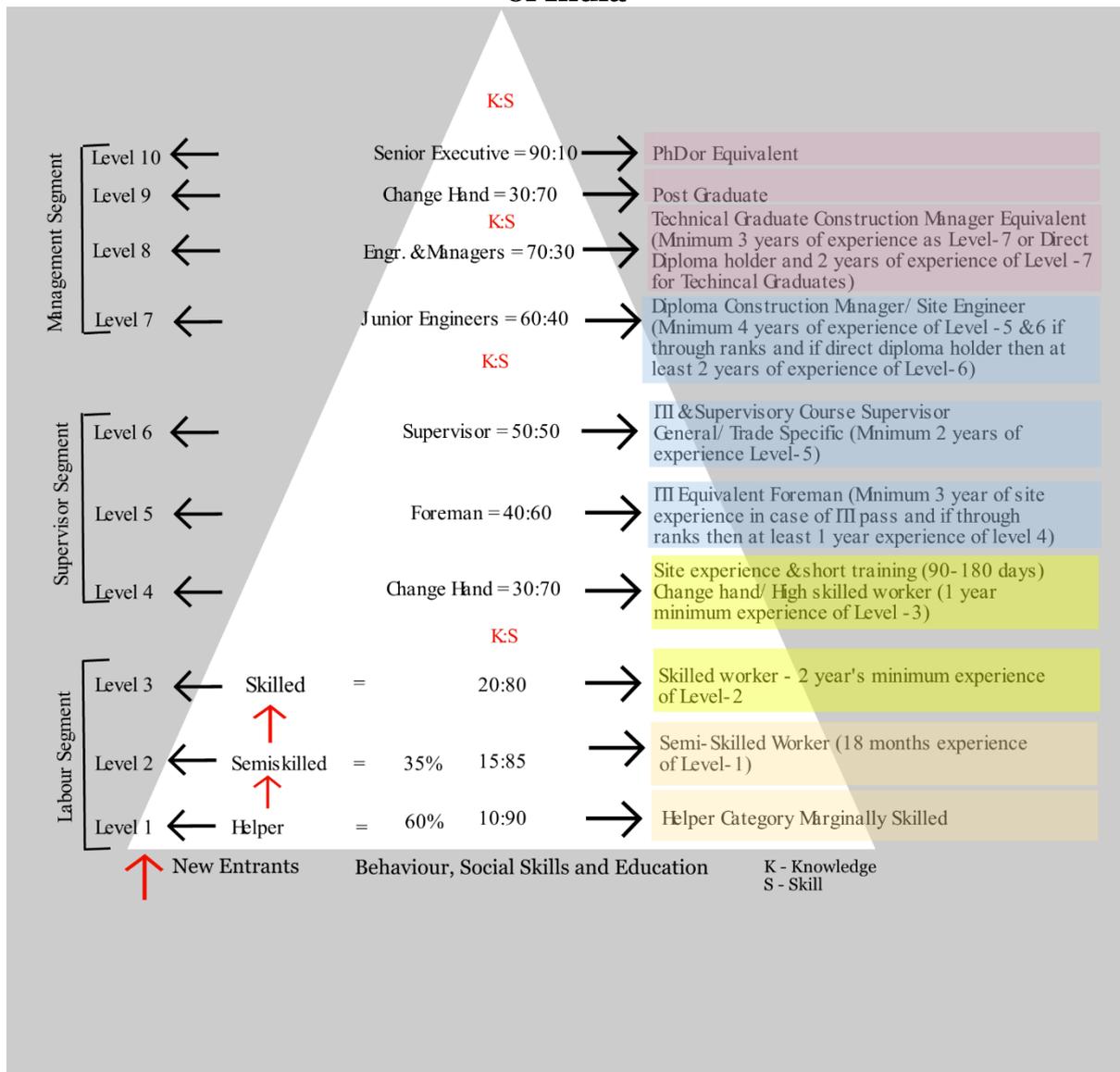
- 2. Non-cognitive/Soft/Socio-emotional Skills:** Personality traits also matter for achieving success in the job marketplace. One has to use one's emotions to get the job done by others (Green, 2013). International literature has identified from the psychology literature that there are Big Five Personality factors that matter for success in the job market—conscientiousness, openness to experiences, extraversion, agreeableness, and neuroticism/emotional stability that encompass the idea of soft skills (Heckman and Kautz, 2012; Pierre et al. 2014). These five attributes are defined in Appendix A2 from Heckman and Kautz (2012).

The Indian Context

- Problem-solving skills in the unpredictable Indian economic environment may involve *jugaad*. This is “a Hindi word meaning an innovative fix; an improvised solution born from ingenuity and resourcefulness” (Radjou, Prabhu, and Ahuja, 2012). The authors identify six job skills, including resilience, frugality, flexibility, simplicity, empathy, and passion (Radjou, Prabhu and Ahuja, 2012). These six skills can broadly be mapped on to the five personality traits. Empathy is a trait that would fall under agreeableness (Appendix A2). Flexibility would fall under openness to experience. Resilience would fall under emotional stability, and so on.

- Further, a common problem that emerged from NCAER interviews with industrialists/employers pertained to the attitude to work or work ethic, or discipline. Conscientiousness would capture that. Team work and cooperation would fall under agreeableness.
 - Interviews with vocational training providers reveal that they routinely teach anger management skills in India as part of their vocational curriculum.
 - In the Indian context, there is one particular sentiment that deserves special mention, though it could be mapped on to the Big Five Personality Traits. And that is, adjusting to work in a diverse environment or to gender diversity, as one's co-workers may be from different social, religious, and regional backgrounds, which may require adjustment in a diverse work place. Attitudes to gender equality may be addressed in school (Dhar, Jain and Jayachandran, 2018).
3. ***Physical or Psychomotor Skills:*** These cover areas which require strength and dexterity (Green, 2013, p. 22) and involve manual skills. Pierre et al. (2014) also treats it separately.
 4. ***Occupation-specific or Technical/Vocational Skills:*** These are specific technical or vocational skills that are required to carry out particular jobs like those of a welder, plumber or an assistant beauty therapist. Figure 2 shows the NSQF for the construction sector, and the domain-specific technical and vocational skills that are required. Bairagya (2018) finds that both educated and uneducated individuals with vocational training are more likely to find jobs.

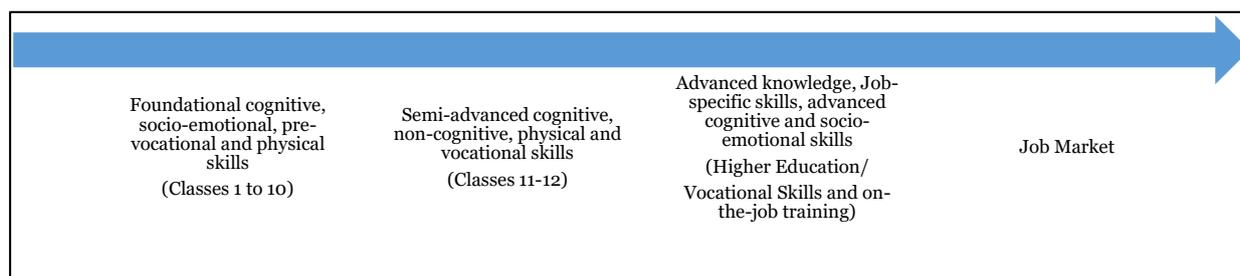
Figure 2: NSQF for the Construction Sector Skill Development Council of India



Source: Construction Sector Skill Development Council of India.

International evidence suggests that “skills beget skills through a multiplier process” (Cunha et al., 2006; p. 698, via Hanushek and Woessmann, 2012). Therefore, if one misses the attainment of basic literacy, numeracy, and reading skills, it will constrain their future ability to attain more advanced skills, thereby, in turn, affecting labour market outcomes (Figure 3).

Figure 3: Attainment of Skills: A Step-wise Approach



Source: Author's conceptualisation.

The NSQF,⁷ can be mapped on to this general framework (Figure 2). Further, the National Classification of Occupations–2015 may also be mapped on to this framework (GoI, 2016).

3. Demand and Supply of Skills

Based on literature review and NCAER interviews with employers, Figure 4 shows the proposed integrated framework for skills showing different flexible pathways to acquire education and training. The colour yellow in the figure shows supply side efforts to impart education and training. The blue colour shows demand side efforts to impart education and training.

However, the exact skills that employers want are shown in Table 1. The boxes marked in light green in the figure show the skills that employers want (though the levels of skills required will differ across job roles), which the supply-side is able to provide to some extent. The supply side is shown in greater detail indicating which skills ought to be supplied at what levels, across the entire spectrum of the Indian education and training system.

The boxes marked in lime green in Table 1 show the existing evidence about skills in India:

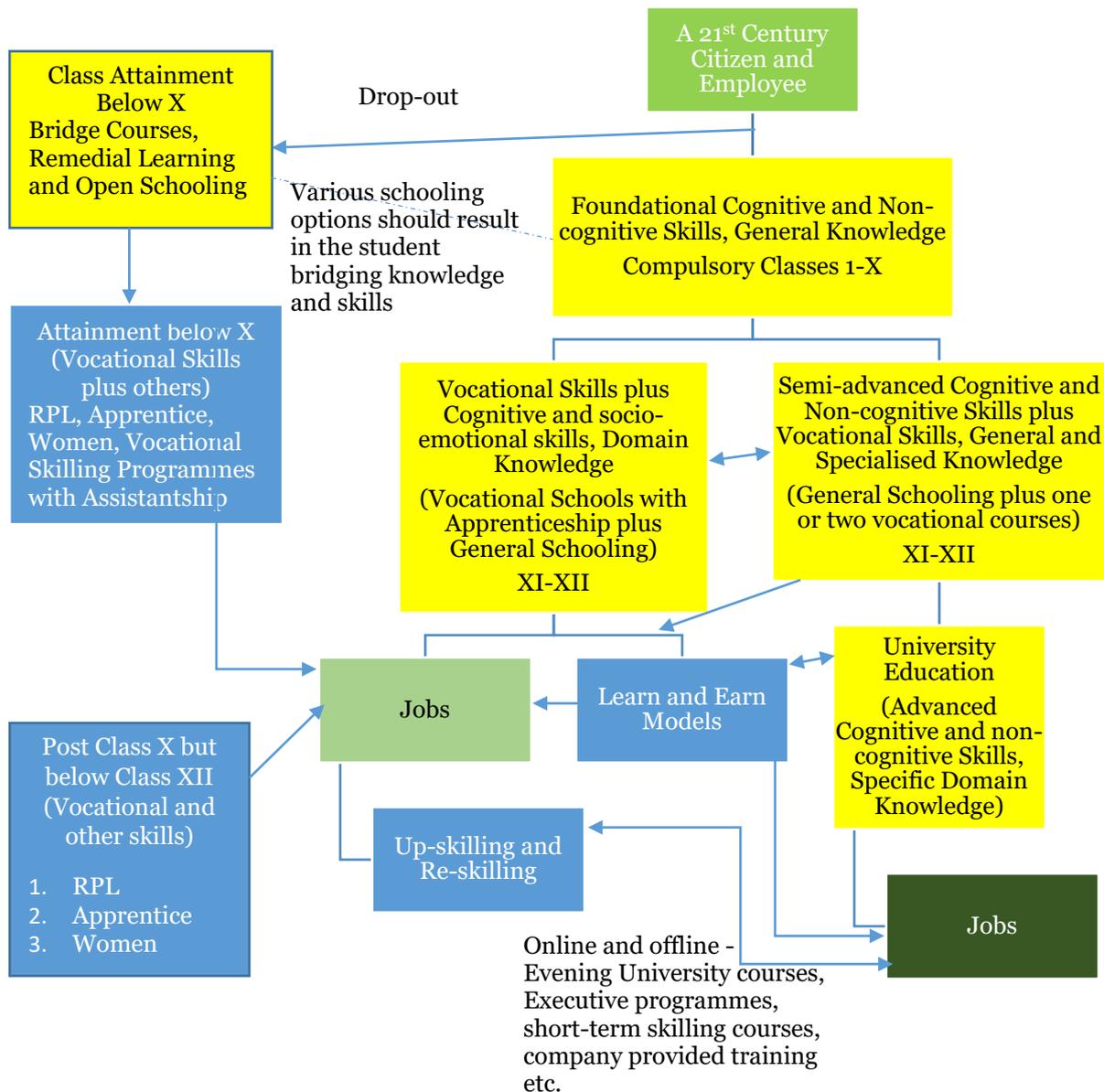
- The ASER tests provide evidence about reading and numerical ability of rural school students from classes one to eight.
- Educational Initiatives has undertaken a broader study of skills for students up to Class VIII.⁸

⁷ “The NSQF is a competency-based framework that organises all qualifications according to a series of levels of knowledge, skills, and aptitude. These levels, graded from one to ten, are defined in terms of learning outcomes which the learner must possess regardless of whether they are obtained through formal, non-formal, or informal learning.” (NSQF website).

⁸ The research study is titled ‘Quality Education Study (QES)’ and is a large-scale research effort supported by WIPRO (Educational Initiatives and WIPRO, 2010-11). This study was conducted across all the five metro cities in India, viz., New Delhi, Mumbai, Kolkata, Chennai, and Bengaluru, between 2010 and 2011. Overall, about 23,000 students, 790 teachers, and 54 Principals from 89 schools participated in the study, spanning six schools recommended by experts as schools offering different learning environments. Three different background questionnaires—one each for the student, teacher, and school principal were developed on the basis of detailed secondary research. The test consisted of questions carefully selected from a pool of ASSET items, which have already been extensively tested with thousands of students. These questions checked if students are learning with understanding and are able to carry out higher order cognitive tasks, such as critical thinking. A few questions were also selected from international studies such as Trends in Mathematics and Science Study (TIMSS),

- The India Skills Report tells us about the employability skills of a few majors and of a few skills that are needed at work.
- We know from the various educational parameters that Indian students have knowledge though it may or may not be relevant.
- The NSQF framework is supposed to develop domain-specific knowledge and vocational skills but the quality of these skills varies.

Figure 4: Integrated Perspective on Skills



Note: The colour yellow in the figure shows supply side efforts to impart education and training. The blue colour shows demand side efforts to impart education and training.

Source: Author.

Progress in Reading Literacy Study (PIRLS), and national studies by EI such as the Student Learning in Metros (SLIM) Study.

The integrated framework of education and skilling proposed in the paper has the following policy implications:

1. Education up to Class X has to be made compulsory (Figure 4). Education up to Class X should provide the full range of foundational skills that have been proposed in Table 1. Pre-vocational skills will be provided up to Class X. Foundational skills are needed across job profiles should be provided in schools from Classes 1 to 10.
2. There should be two pathways after that – general schools that offer general education with vocational education and vocational schools that offer vocational education with general education. Apprenticeships needed to be made compulsory in the latter. Internships could be offered in both types of schools. The quality had to be strengthened to deliver a full range of skills at all levels. Flexibility should be ensured so that people can switch between the two.
3. Even after landing a job, options for re-skilling and upskilling had to be offered.
4. Vocational skills post-Class X should be demand-driven for large firms. For the micro, small and medium sector, supply-side models of vocational skilling would be needed. Apprenticeships and internships would play a key role there. Plus, multi-skilling would also be needed for the MSME sector.

However, a demand-supply side delineation of the full range of the skill set shows that the supply-side is only delivering part of the skill set and even that suffers from quality issues. For example, nowhere active listening and active learning are recognised as key foundational cognitive skills, neither in policy nor in literature. However, these are two skills that employers want. The matching, if at all, was either at the very low-end at the primary/middle school-level or at the college level.

4. Concluding Thoughts

This paper discusses the full range of skills that a 21st century worker must imbibe. This chapter provides an integrated perspective on the various paths that a worker can take to skill, reskill and upskill themselves in their journey of work. The government is in the process of building a flexible system, which will enable that.

There are four types of skills – cognitive, socio-emotional, physical and vocational/job-specific skills. They can be put into domains of foundational and advanced skills. Foundational skills that are needed across job profiles should be provided in schools from Classes 1 to 10. They need to be strengthened. After Class X, systems should be placed so that students can choose the path of vocational education or general education. There should be pathways to interchange those choices too. Vocational skills post-Class X should be demand-driven for large firms. For the micro, small and medium sector, supply-side models of vocational skilling would be needed. Apprenticeships and internships would play a key role there. Plus, multi-skilling would also be needed there.

A demand-supply delineation of skills show that employers need a vast range of skills whereas the supply-side (education and training) is only providing a limited range of skills and that also not of sufficient quality. There is some degree of matching between what employers want and employees are supplying at primary and middle school level or at the college level. Vocational skilling can help to fill missing middle. An integrated framework from the workers' perspective is proposed here for a lifecycle of 3-E.

Table 1: Demand-Supply of Skills in India: A Proposed Framework

| Domain | Sub-domain | Traits | Demand | Supply | | | | | | | | |
|-----------|---------------------|--|---|----------------------|--------|--|--|---|---------|---------------------------------------|--|--|
| | | | | Compulsory | | Propose to be made Compulsory | | Option A (for children scoring above 90 th percentile) | | Option B (Linking back to Option A) | | |
| | | | | Primary | Middle | Secondary School plus vocational courses | Vocational education through ITIs with supplementary courses to pass 10 th Grade with assistantship | Higher Secondary School | College | TVET including Apprenticeship in ITIs | | |
| Cognitive | Foundational | Reading Literacy (R) | | | | | | | | | | |
| | | Writing (R) | | | | | | | | | | |
| | | Numeracy/Mathematics (R/N) | | | | | | | | | | |
| | | Communication | | | | | | | | | | |
| | | Language Skills | | | | | | | | | | |
| | | ICT Literacy to Skills (R/N) | | | | | | | | | | |
| | | Financial Literacy (R) | | | | | | | | | | |
| | | Self-learning to Active (Independent) Learning | | | | | | | | | | |
| | | Active Listening | | | | | | | | | | |
| | | Science | | | | | | | | | | |
| | Problem Solving | | | | | | | | | | | |
| | Advanced | Non-routine | Learning Strategies | | | | | | | | | |
| | | | Critical Thinking | | | | | | | | | |
| | | | Complex Problem Solving | | | | | | | | | |
| | | | Creativity | | | | | | | | | |
| | | | Independent research | | | | | | | | | |
| | | System skills | Judgement and Decision-making | | | | | | | | | |
| | | | Systems Analysis | | | | | | | | | |
| | | | Systems Evaluation | | | | | | | | | |
| | | | Resource Management | Financial Resources | | | | | | | | |
| | | | | Management Resources | | | | | | | | |
| | Personnel Resources | | | | | | | | | | | |
| | Knowledge | General | Time Management | | | | | | | | | |
| | | | Specialised (Sector, Occupational, and Trade) | | | | | | | | | |

| Domain | Sub-domain | Traits | Demand | Supply | | | | | | |
|----------------------------|--|---|-------------|------------|------------|--|--|---|-----------|---------------------------------------|
| | | | | Compulsory | | Propose to be made Compulsory | | Option A (for children scoring above 90 th percentile) | | Option B (Linking back to Option A) |
| | | | | Primary | Middle | Secondary School plus vocational courses | Vocational education through ITIs with supplementary courses to pass 10 th Grade with assistantship | Higher Secondary School | College | TVET including Apprenticeship in ITIs |
| Socio-emotional | Foundational | Civic and Digital Citizenship | Grey | Green | Green | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue |
| | | Seek and Value Diversity | Grey | Green | Green | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue |
| | | Conscientiousness (including attitude towards work) | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue |
| | | Openness to Experiences | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Green | Dark Blue |
| | | Extraversion | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Green | Dark Blue |
| | | Agreeableness | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Green | Dark Blue |
| | | Neuroticism/Emotional stability | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Green | Dark Blue |
| | Social Skills at Work | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Green | Dark Blue | |
| | Advanced | Instructing | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue |
| | | Negotiation | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue |
| Persuasion | | Light Green | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | |
| Sector/Job-Specific Skills | Cognitive, Non-cognitive and Physical Skills | Occupation-specific skills | Light Green | Grey | Grey | Grey | Grey | Grey | Dark Blue | Dark Blue |
| | | Sector-specific technical skills | Light Green | Grey | Grey | Grey | Grey | Grey | Dark Blue | Dark Blue |
| | | Innovation skills, | Light Green | Grey | Grey | Grey | Grey | Grey | Dark Blue | Dark Blue |
| | | Physical skills, including job-specific complex psychomotor skills, | Light Green | Grey | Grey | Grey | Grey | Grey | Dark Blue | Dark Blue |
| Knowledge | | General | Light Green | Green | Green | Green | Green | Green | Green | Green |
| | | Domain-specific | Light Green | Green | Green | Green | Green | Green | Green | Green |
| Global Competence | | | Light Green | Grey | Grey | Grey | Grey | Grey | Dark Blue | Dark Blue |

Source: Conceptualised by Author.

Note: The green colour in the table shows what is in demand by employers, which matches with the supply. Markings in blue: the darker the blue, the higher is the level of advance knowledge required. Grey indicates that those skills are not required at that level.

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Appendix A1: Definition of Skills in Alphabetical Order

Cognitive Skills

Active Learning: It involves “understanding the implications of new information for both current and future problem-solving and decision-making” (O*NET OnLine website). It can be either independent or self-directed. “Active learning is defined as a form of learning in which the learner uses opportunities to decide about aspects of the learning process. A second definition of active learning connects it to mental activity in another sense: it refers to the extent to which the learner is challenged to use his or her mental abilities while learning. Thus active learning on the one hand has to do with decisions about learning and on the other hand making an active use of thinking. The first kind of active learning is called self-directed learning and the second independent work” (van Hout-Wolters B., Simons and Volet, 2000).

Active Listening: “Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times” (O*NET OnLine website).

Adaptability (Anderman and Sinatra, undated, p. 8): “Recognising the need to change and the willingness to change one’s thinking are hallmarks of adaptability. This requires a view of knowledge as changing and an open-minded attitude toward knowledge change”.

Attention (Northeastern University website): “Ability to concentrate”.

Civic and Digital Literacy: Civic literacy involves the following and is cited from the P21 website:

- “Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
- Exercising the rights and obligations of citizenship at local, state, national and global levels
- Understanding the local and global implications of civic decisions.”

Digital citizenship means “knowing how to participate productively and responsibly online” (Scott, 2015).

Communication skills: “Cognitive Communication skills are those thought processes that allow humans to function successfully and interact meaningfully with each other like orientation, attention, memory, problem solving, and executive function” (Northeastern University website)”.

Complex Communication Skills (Anderman and Sinatra, undated) are oral and written skills to transmit complicated ideas.

Creativity: From a learning perspective (P21 website), creativity involves the following:

- “Think Creatively
 - Use a wide range of idea creation techniques (such as brainstorming)

- Create new and worthwhile ideas (both incremental and radical concepts)
- Elaborate, refine, analyse and evaluate their own ideas in order to improve and maximise creative efforts
- Work Creatively with Others
 - Develop, implement and communicate new ideas to others effectively
 - Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
 - Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
 - View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes”

From job perspective, creativity involves “developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions” (O*NET OnLine website).

Critical Thinking (P21 website) involves the following:

- “Reason Effectively
 - Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
- Use Systems Thinking (defined below)
 - Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems
- Make Judgments and Decisions
 - Effectively analyse and evaluate evidence, arguments, claims and beliefs
 - Analyse and evaluate major alternative points of view
 - Synthesize and make connections between information and arguments
 - Interpret information and draw conclusions based on the best analysis
 - Reflect critically on learning experiences and processes”.

At the workplace, *critical thinking* would involve using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

Entrepreneurial Skills: “An entrepreneurial mindset is the ability to recognize and act on opportunities and the willingness to embrace risk and responsibility – enables individuals to create jobs for themselves and others (P21, 2008, p. 10). Learners must therefore be taught to ‘think on their feet’. They must also be coached on inventive thinking and to observe and evaluate opportunities and ideas that may be new to them, but which hold merit or promise to positively affect the organizations and communities in which they work and live (Metiri Group and NCREL, 2003). Entrepreneurial activities in school should be designed to enable students to lead and cultivate greater autonomy (P21, 2008)” Scott (2015).

Executive Function (Northeastern University website): “Ability to plan, initiate, complete, and oversee goal-directed behaviour; coordinates attention, memory, and problem solving abilities to function creatively, competently, and independently”.

Financial Literacy: In the P21 framework (P21 website), “Financial, Economic, Business and Entrepreneurial Literacy is defined as

- Knowing how to make appropriate personal economic choices
- Understanding the role of the economy in society
- Using entrepreneurial skills to enhance workplace productivity and career options”

Global Competence: “Globally competent learners are able to take action in many ways, they tend to think of themselves as world citizens, rather than citizens of their particular nation or homeland” (Scott, 2015).

Information Communication and Technology (ICT) literacy skill: It is the “capacity to use ICT tools and applications” (OECD, 2016b). From a job perspective, tasks would include “using e-mail, Internet, spreadsheets, word processors, programming languages; conducting transactions online; participating in online discussions (conferences, chats) (OECD, 2016b)”. From the perspective of a learning skills, ICT literacy involves the following:

- “Use technology as a tool to research, organize, evaluate and communicate information
- Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies” (P21 website).

Here are some ICT Skills which are portable/transferrable across jobs (Carleton University website): Computer/IT Skills: Arts & Graphics, Desktop Publishing, Presentation, Spreadsheet, Word Processing, Programming, Client Server/Networking/Hardware, Operating Systems, Database/Statistics, Engineering Software and Web Page Design.

Language Skills: This includes “auditory comprehension, verbal expression (content), speech intelligibility, reading, writing, and social skills. Developmentally, thinking affects language, and language affects thinking” (Northeastern University website). From the learning perspective 21st century requires knowledge of English, reading or language arts and World languages (P21 website). Knowledge of any language includes. From work perspective, knowledge of language includes “knowledge of the structure and content of the language including the meaning and spelling of words, rules of composition, and grammar” (O*NET OnLine website).

Learning Strategies: “Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things” (O*NET OnLine website).

Memory (Northeastern University website): “Ability to remember”.

Numeracy/Mathematics: “Numeracy is defined as the ability to access, use, interpret and communicate mathematical information and ideas in order to engage

in and manage the mathematical demands of a range of situations in adult life. To this end, numeracy involves managing a situation or solving a problem in a real context, by responding to mathematical content/information/ideas represented in multiple ways” (OECD, 2016b).

Numeracy, a necessary skill for all occupations (OECD, 2000; OECD, 2006), is basic mathematical literacy, and indicates basic ability to work with numbers.

Mathematics: At the workplace, this would involve “using mathematics to solve problems” (O*NET OnLine website).

Mathematical Reasoning is “the ability to choose the right mathematical methods or formulas to solve a problem” (O*NET OnLine website).

Problem Solving (Northeastern University website): “Ability to think or reason about things; may involve decision making. Problem solving involves five components:

- Identify the problem
- Identify all possible solutions to the problem
- Select the best solution
- Solve the problem
- Make sure that the solution is working/worked and adapt as needed”

Problem-solving skills may happen in technology rich environments like in developed countries (OECD, 2016a) or poor ones of developing countries. In the former, one would require IT skills too and in the latter one may not.

From an education framework, problem solving involves the following (P21 website):

- Solve different kinds of non-familiar problems in both conventional and innovative ways
- Identify and ask significant questions that clarify various points of view and lead to better solutions

Non-routine Problem Solving Skills (Anderman and Sinatra, undated): Thinking outside the box.

Complex Problem Solving Skills (O*NET OnLine website): Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Reading Literacy: Broadly, it is a part of language and communication skills. “Reading literacy is defined as the ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one’s goals, and to develop one’s knowledge and potential. Literacy encompasses a range of skills from the decoding of written words and sentences to the comprehension, interpretation, and evaluation of complex texts” (OECD, 2016b). From a learner’s perspective, “reading is decoding written words and images in order to understand what their originator is trying to communicate” (Thoughtful Learning website). From a work perspective, O*Net OnLine website has defined “reading comprehension as understanding written sentences and paragraphs in work related documents.”

Resource Management Skills: “Developed capacities used to allocate resources efficiently” (O*Net OnLine website). They consist of the following:

- **“Management of Financial Resources:** Determining how money will be spent to get the work done, and accounting for these expenditures.
- **Management of Material Resources:** Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
- **Management of Personnel Resources:** Motivating, developing, and directing people as they work, identifying the best people for the job.
- **Time Management:** Managing one's own time and the time of others. (O*Net OnLine website)”

Seek and Value Diversity: Students must learn the value of not only *welcoming*, but also *seeking out* and *engaging* the talents and ideas of diverse participants. This is an essential skill that learners must cultivate and practise frequently. It involves respecting and valuing the concerns of people and cultures different from their own and acquiring the social and cross-cultural skills to seek out the views of others” Barrett et al., 2014 via Scott (2015).

Self-development/Self-regulation (Anderman and Sinatra, undated, p. 13): “Self-regulation refers to the ability of students to control, regulate, and monitor their use of various learning strategies”.

Self-directed learning: From a work perspective learning at work would include “learning new things from supervisors or co-workers; learning-by-doing; keeping up to date with new products or services” (OECD, 2016b). From a learner’s perspective, this would involve, the following:

- “Go beyond basic mastery of skills and/or curriculum to explore and expand one’s own learning and opportunities to gain expertise
- Demonstrate initiative to advance skill levels towards a professional level
- Demonstrate commitment to learning as a lifelong process
- Reflect critically on past experiences in order to inform future progress” (P21 website).

Science: “Using scientific rules and methods to solve problems” (O*NET OnLine website).

Systems thinking (Anderman and Sinatra, undated, p. 15): “Abstract reasoning about systems to appreciate their intricacies” to solve complex issues.

Orientation (Northeastern University website): “Awareness of person, place, time and circumstance”.

Writing: This is part of both language and communication skills. Production of text (OECD, 2016b). From a learning perspective, “writing involves encoding messages into words, sentences, and paragraphs for the purpose of communicating to a person who is removed by distance, time, or both (Thoughtful Learning website)”. From the (O*NET OnLine website), it is “communicating effectively in writing as appropriate for the needs of the audience”.

Appendix A2: The Big Five Domains and Their Facets

| Big Five Personality Factor | American Association Description | Facets (and Correlated Trait Adjective) | Related Traits | Analogous Childhood Temperament Traits |
|--|--|--|---|---|
| <i>Conscientiousness</i> | "The tendency to be organized, responsible, and hardworking" | Competence (efficient), Order (organized), Dutifulness (not careless), Achievement striving (ambitious), Self-discipline (not lazy), and Deliberation (not impulsive) | Grit, Perseverance, Delay of gratification, Impulse control, Achievement striving, Ambition, and Work ethic | Attention/(lack of) distractibility, Effortful control, Impulse control/delay of gratification, Persistence, Activity* |
| <i>Openness to Experience</i> | "The tendency to be open to new aesthetic, cultural, or intellectual experiences" | Fantasy (imaginative), Aesthetic (artistic), Feelings (excitable), Actions (wide interests), Ideas (curious), and Values (unconventional) | | Sensory sensitivity, Pleasure in low-intensity activities, Curiosity |
| <i>Extraversion</i> | "an orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience; characterized by positive affect and sociability" | Warmth (friendly), Gregariousness (sociable), Assertiveness (self-confident), Activity (energetic), Excitement seeking (adventurous), and Positive emotions (enthusiastic) | | Surgency, Social dominance, Social vitality, Sensation seeking, Shyness*, Activity*, Positive emotionality, and Sociability/affiliation |
| <i>Agreeableness</i> | "the tendency to act in a cooperative, unselfish manner" | Trust (forgiving), Straight forwardness (not demanding), Altruism (warm), Compliance (not stubborn), Modesty (not show-off), and Tender mindedness (sympathetic) | Empathy, Perspective taking, Cooperation, and Competitiveness | Irritability*, Aggressiveness, and Willfulness |
| <i>Neuroticism/Emotional Stability</i> | Emotional Stability is "predictability and consistency in emotional reactions, with absence of rapid mood changes." Neuroticism is \a chronic level of emotional instability and proneness to psychological distress." | Anxiety (worrying), Hostility (irritable), Depression (not contented), Self-consciousness (shy), Impulsiveness (moody), Vulnerability to stress (not self-confident) | Internal vs. External, Locus of control, Core self-evaluation, Self-esteem, Self-efficacy, Optimism, and Axis I psychopathologies (mental disorders) including depression and anxiety disorders | Fearfulness/behavioral inhibition, Shyness*, Irritability*, Frustration (Lack of) soothability, Sadness |

Source: Reproduced from Heckman and Kautz (2012).