सत्यमेव जयते

Skill India
कौशल भारत-कुशल भारत

Skilling India
No Time To Lose

NCAER | SINCE 1956
QUALITY. RELEVANCE. IMPACT

Release of the Report
NCAER, New Delhi
30 October 2018

Skilling India
No Time To Lose

"We have no time to lose, and having no time we must scramble for a chance."

– Rabindranath Tagore

NCAER | SINCE 1956 | QUALITY. RELEVANCE. IMPACT

SUPPORTED BY J.P.Morgan

Previewing *Skilling India: No Time to Lose*

- India faces urgent skilling needs, a skilling paradox, and skilling uncertainty
- India must get rich before it gets old
- Of 468 million workers, many must move from “baskets” to “bytes” …
- … but are caught in a vicious cycle of low skills and few good jobs
- A virtuous circle of better skilling and good jobs is possible: How?
- Simplify skill definitions to better see what skilling outcomes are needed and should be promoted and regulated
- Use the 3-part framework of this report to make skilling work better:
  - *acquiring skills*
  - *matching skills*
  - *anticipating skills*

The urgency of skilling

"Our country presently faces a dual challenge of a paucity of highly trained workforce, as well as the non-employability of large sections of the conventionally educated youth, who possess few or no job skills."

—Ministry of Skill Development and Entrepreneurship

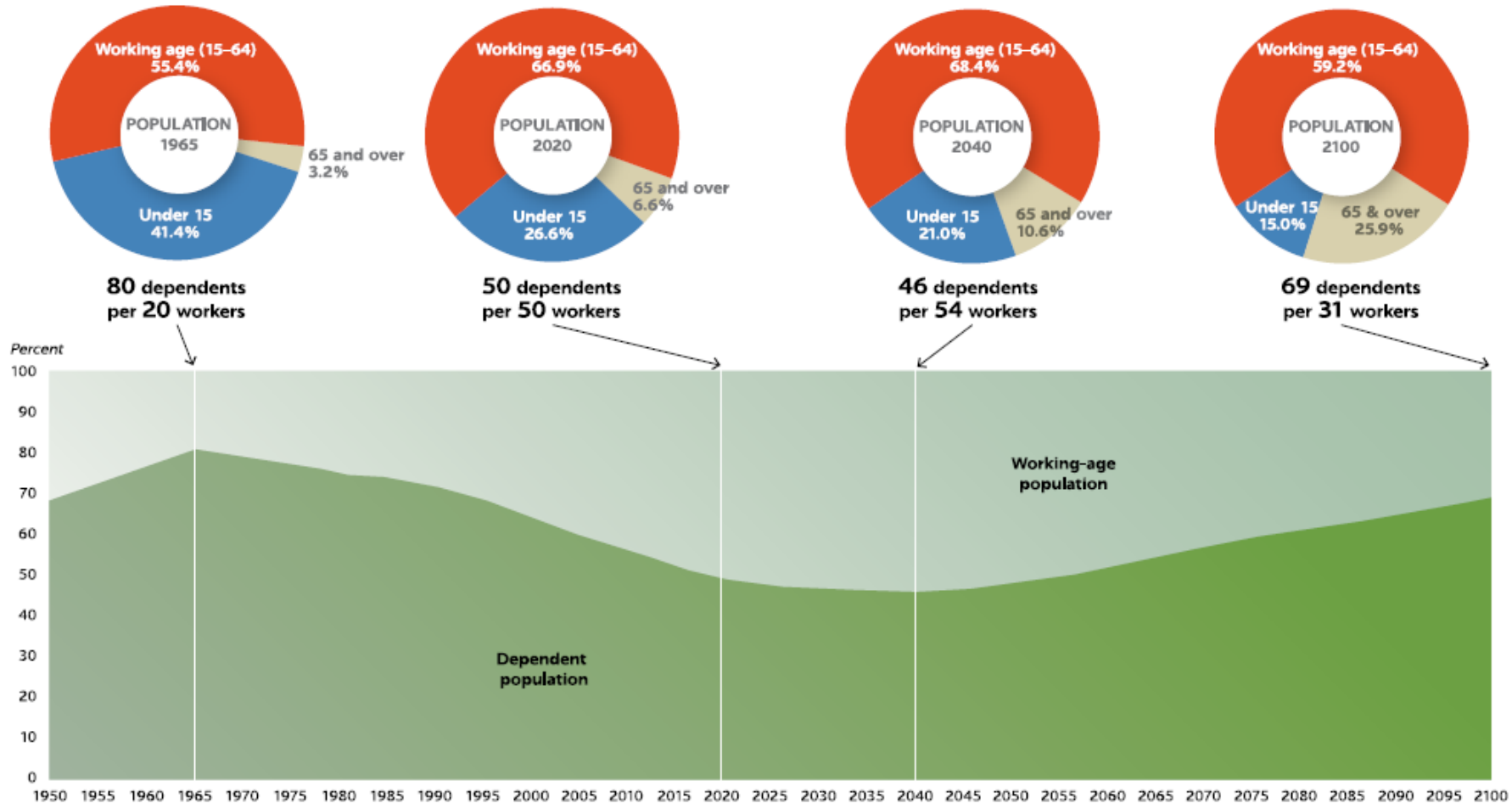
"India's labour force will soon overtake China's as the world's largest . . . the country is struggling to generate opportunities for a workforce with the wrong skills." —*The Economist*

Nearly 1.25 million new workers aged 15–29 are projected to join the workforce every month through 2022

The roughly 70 million workers entering the workforce between 2018 and 2022 will need to be skilled for a 21st century economy if India is to keep pace with technological change

India must get rich before it gets old

Share of population



Source: United Nations, Department of Economic and Social Affairs, Population Division, *2017 Revision of World Population Prospects*, data acquired at website.

India’s skilling paradox

IBM Now Has More Employees in India Than in the U.S.

IBM has shifted its center of gravity halfway around the world to India.

The New York Times,
28 September 2017

Ever More Indians Are Struggling to Find Work

The country is missing out on its “demographic dividend”

The Economist,
14 September 2017

The scale of India's skilling challenge is vast

- **Slightly more than half of India's workers have school attainment below secondary school with no vocational training**
- **Of India's current workforce, 31% are illiterate, 13% have a primary education and 6% are college graduates**
- **About 2% of the workforce have formal vocational training and 9% have nonformal vocational training**
- **Approximately 48 million workers in construction and 16 million in textiles and apparel have no vocational training**
- **The unemployment rate was 29% for graduates aged 20–24, 12% for those 25–29 and 4% for those 30–34**
- **Of the more than 500,000 final year bachelors students aged 18–29 who were surveyed, 54% were found to be unemployable**

NSS 2011–12, 68th Round; *India Skills Report, 2018*

India's skilling system: scale, but little strategy

2,000,000 Indian institutions imparting skills

300,000,000 Indians currently getting educated or skilled and will be looking for work

468,000,000 Indians now in jobs may (or may not) be acquiring skills on the job

Ages 24+

ACADEMIC
DOCTORATE
126,500 enrolled

TECHNICAL
DOCTORATE IN ENGINEERING
30,600 enrolled

ON THE JOB
MEDICAL RESIDENTS
JUNIOR RESEARCH FELLOWS

EXAMPLES OF JOBS
SCIENTISTS
ECONOMIC ADVISERS
UNIVERSITY FACULTY
ASTRONOMERS
POLICY EXPERTS

Ages 22+

MASTER'S
3,900,000 enrolled

MASTER'S IN ENGINEERING
257,000 enrolled

ADVANCED TRAINING
28 institutions
350,000 have enrolled since 2007

MASTER'S OF VOCATIONAL EDUCATION
Launched 2015, no data available as yet

ENGINEERS
MANAGERS
DATA ANALYSTS
TEACHERS
STOCK BROKERS
JOURNALISTS
ARCHITECTS
LAWYERS

Ages 19–21

BACHELOR'S
800 universities
27,400,000 students

ENGINEERING COLLEGES
3,200 colleges
4,200,000 enrolled

POLYTECHNIC 3-YEAR DIPLOMA
3,900 institutes
1,500,000 enrolled

INDUSTRIAL TRAINING AT ITIs
13,550 institutions
1,200,000 enrolled

BACHELOR'S OF VOCATIONAL EDUCATION
162 institutions
10,200 students

COMMUNITY COLLEGES
157 colleges

APPRENTICESHIP AND INTERNSHIPS
(2–4 year certificate)
2,400,000 apprentices and interns

JUNIOR ENGINEERS
TECHNICIANS
CONSTRUCTION SUPERVISORS
OFFICE WORKERS
TV CAMERA OPERATORS

Ages 17–18

HIGHER SECONDARY (Grades 11–12)
112,600 institutions
24,700,000 students

VOCATIONAL HIGHER SECONDARY
7,400 schools provide
472,000 students

PLUMBERS
ELECTRICIANS
CONSTRUCTION WORKERS

Ages 15–16

SECONDARY (Grades 9–10)
239,100 schools
39,100,000 students

VOCATIONAL SECONDARY
108 schools provide

TEXTILE WORKERS
RETAIL CLERKS
HOSPITALITY WORKERS
BEAUTY THERAPISTS

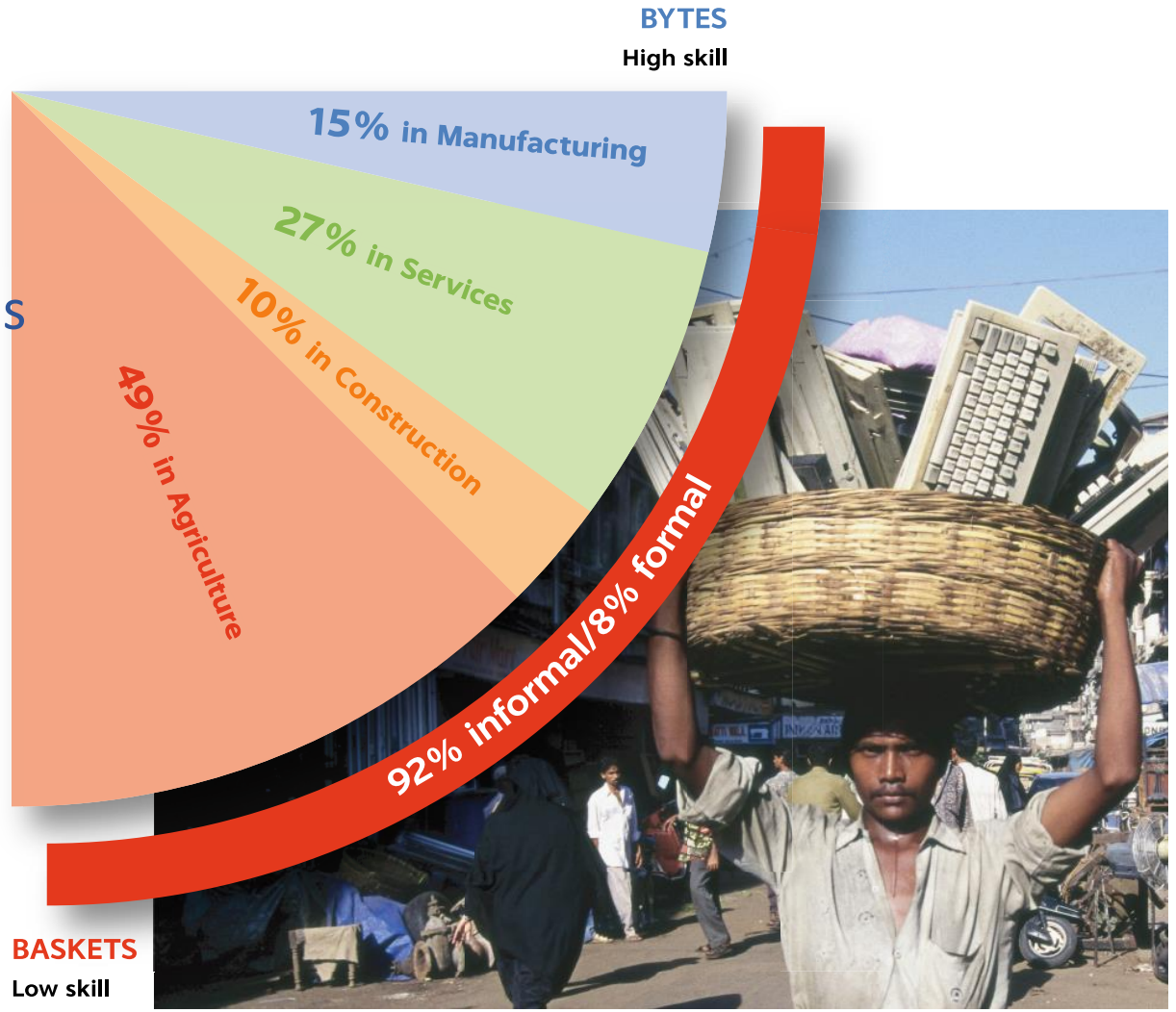
Ages 6–14

ELEMENTARY (Grades 1–8)
1,450,000 schools
196,716,500 students

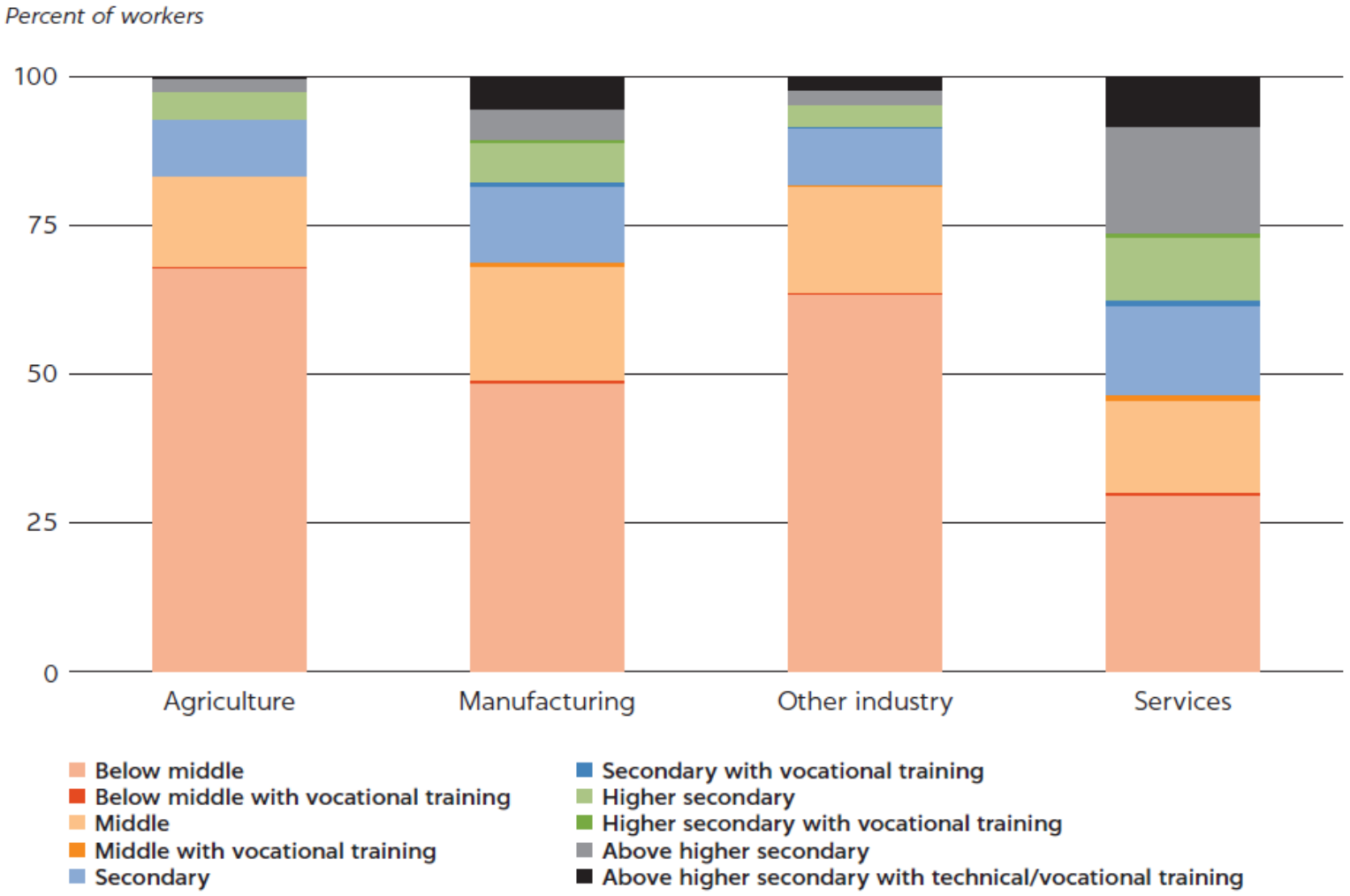
LOW-SKILLED WORKERS

From baskets to bytes?

- **Worker transition has been slow**
  - from agriculture to
  - small, unregistered, informal firms to
  - small, medium-size and large formal firms
- **How to move from baskets to bytes?**
  - skill informal workers (many female) and new workers based on industry requirements
  - deploy them in rapidly growing formal sectors
  - transform “informal” from a vice to a virtue
- **But this has been difficult and slow in practice**
- **Why?**



Many workers still have little education

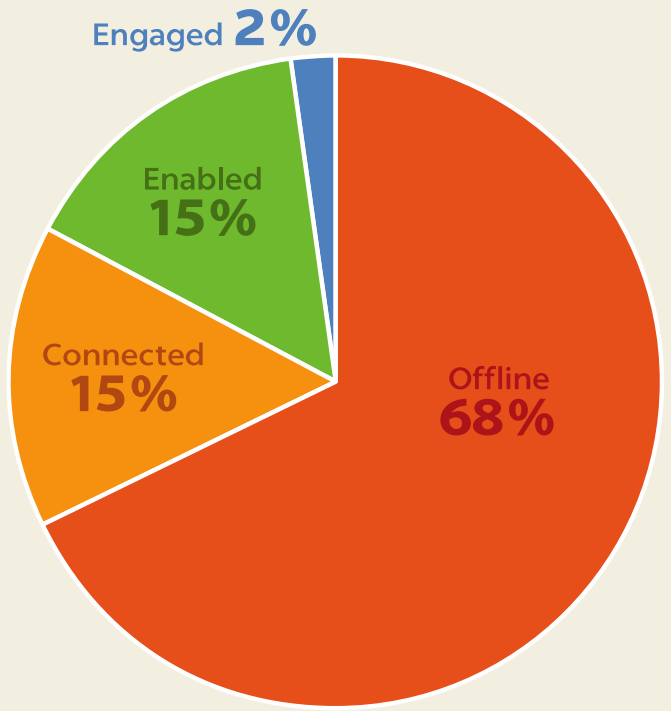


Source: NCAER computations using National Sample Survey Office data (2011–12) and the employment-unemployment survey (National Sample Survey Office 2013).

Small and medium-size firms are not yet digitally engaged

- Increasingly, firms are at risk if they
  - remain offline
  - are less likely to adopt and use digital services
- They run the risk of
  - declining market share
  - suffering from greater disconnect with consumer preferences

Percent of firms



Note: Offline = no internet connectivity, connected = use internet for general information only, enabled = own website or social media for business purposes, engaged = active use of digital technologies for business purposes.
Source: Analysis by KPMG and Google (2017), based on Kantar IMRB's ITOPS Business 2015 and Business 2016 data.


Slower growth of good, formal jobs
Greater workforce informality
Lower incentives to acquire or impart skills
More poorly-skilled and fewer well-skilled workers
Higher cost of skilled workers relative to capital costs

A vicious cycle of low skills and few good jobs

- Inadequately skilled workers, out-of-date labour laws, a rising ratio of wages to the price of capital and persistent informality
- Greater informality drives poor skilling, employers choose machinery over men, and few good jobs are created, driving India's burgeoning labour force further into informality


Faster growth of good, formal jobs
Less workforce informality
Greater incentives to acquire or impart skills
Fewer poorly-skilled and more well-skilled workers
Lower cost of skilled workers relative to capital costs

A virtuous circle of better skilling and more good jobs

Needs a multi-pronged approach

- ***Skill the workforce***: Cover both existing and new workers, to match employers' needs and promote "formal" jobs
- ***Regulate more rationally***: Undo dysfunctional and out-of-date labour and industrial laws and regulations so they no longer keep firms small and impede transitions from informal to more "formal" jobs; make social security portable
- ***Invest in job-promoting sectors***: Promote and facilitate public and private investment in most promising sectors for generating jobs
- ***Ensure success:*** Workers get skills that find them jobs, employers find workers they need, and both can confidently face changing futures

Moving from the vicious cycle to a virtuous circle: How?

A three-part framework to realise India's skilling potential

- acquiring skills
- matching skills
- anticipating skills

Acquiring skills

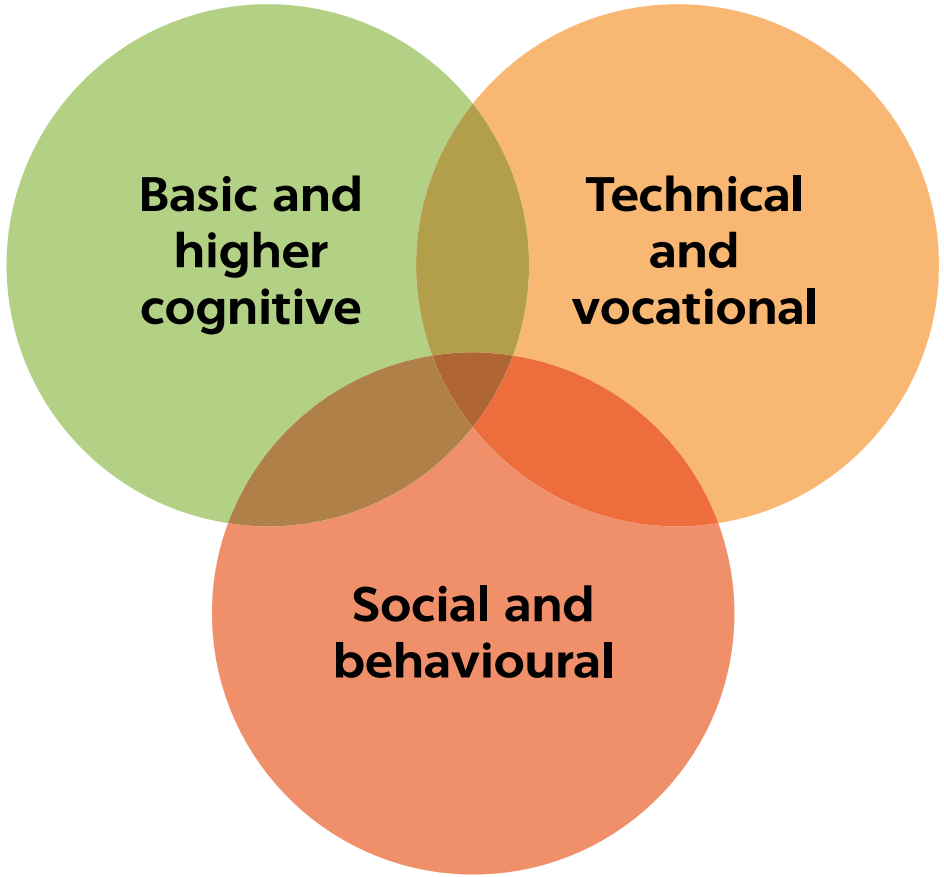
How best to impart them

Simplifying skills

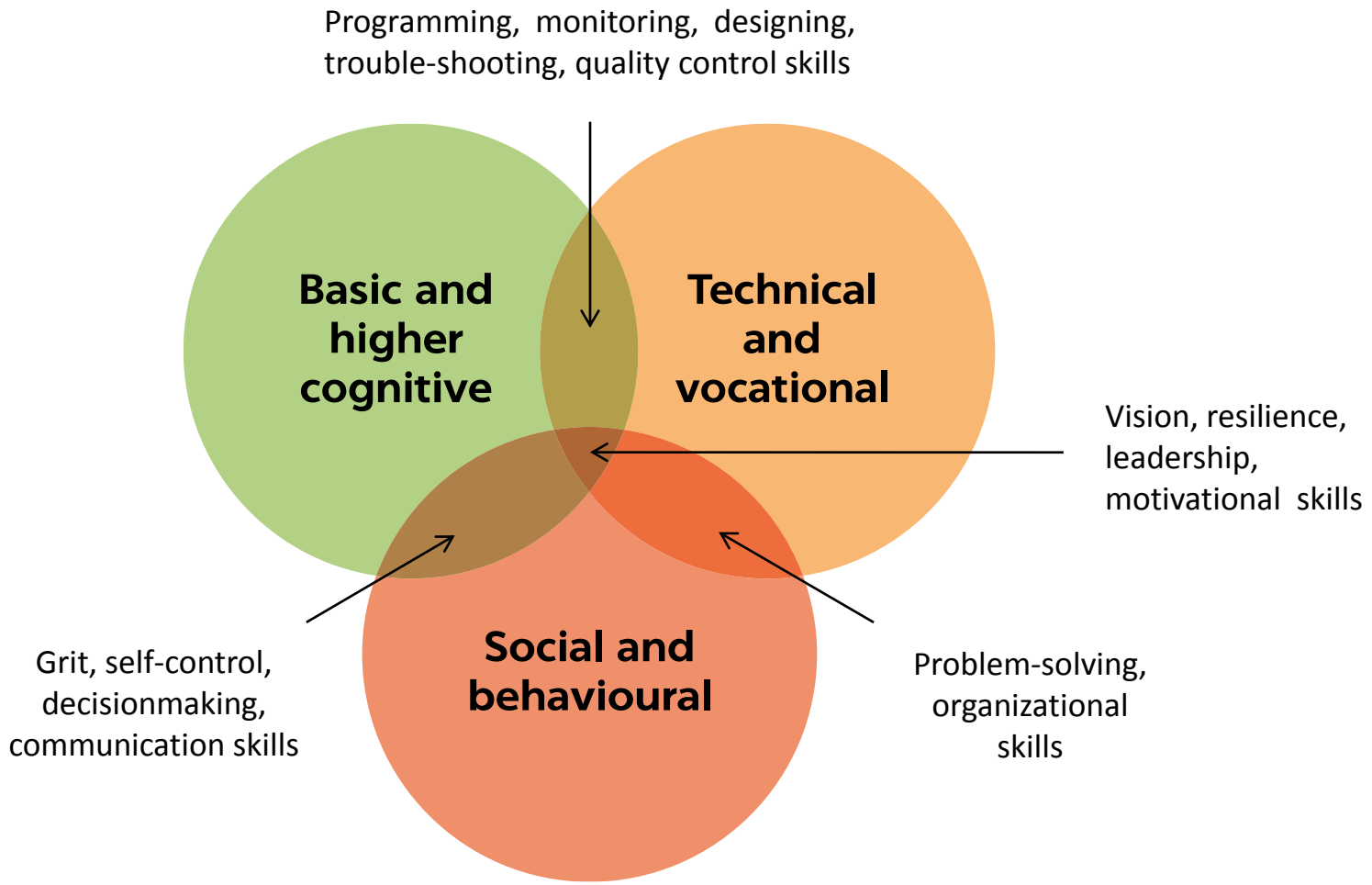
Cognitive skills are *basic skills* of literacy and numeracy, applied knowledge and problem-solving aptitudes and *higher-order skills* such as experimentation, reasoning and creativity

Technical and vocational skills are the physical and mental ability to perform specific tasks using tools and methods in any occupation

Social and behavioural skills include working well with others, communicating and listening well, and being agreeable and outgoing

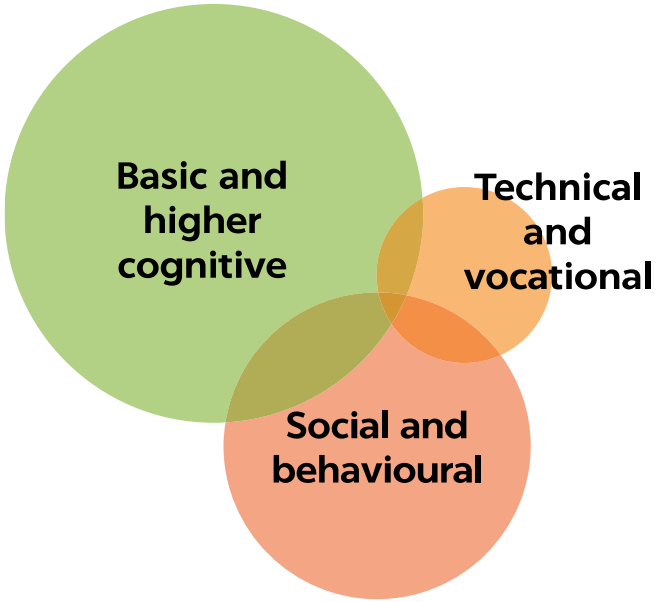


How skills interact: Combining key attributes

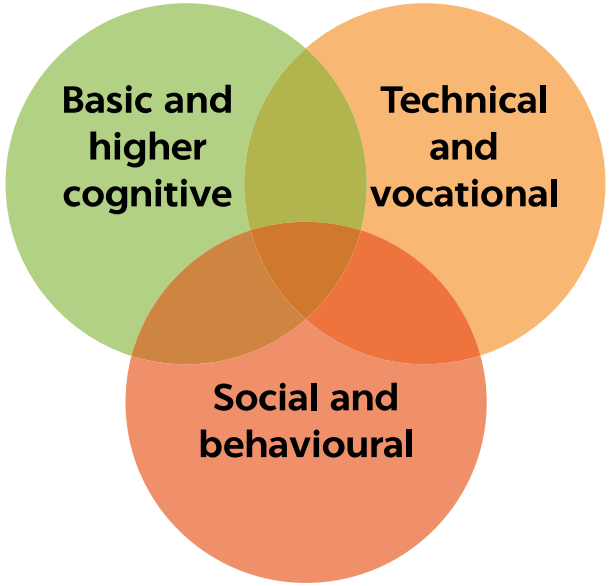


Skills: Foundational, Employability, Entrepreneurial

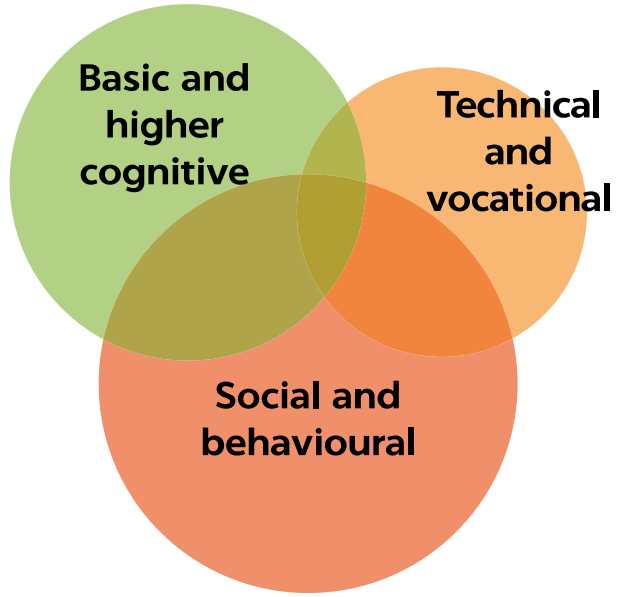
Foundational skills



Employability skills



Entrepreneurial skills



Each element of the three-part framework is needed to realise India's skilling potential

- acquiring skills
- matching skills
- anticipating skills

Rating skilling schemes: Acquiring, matching, anticipating

Each scheme is rated by its performance on each element of the three-part framework

✓ Good

× Needs improvement

? Unknown/too new

— Not applicable

Scheme
Name, description,
cost, scope, and so on

Performance ratings
Ratings for scheme design,
implementation and impact

	SCHEME (ANNUAL SPENDING 2017–18, UNLESS OTHERWISE NOTED)		PERFORMANCE ON ACQUIRING	MATCHING	ANTICIPATING
General education					
1.	**Mid-Day Meal Scheme** Improving nutrition among primary school children to enhance enrolment, attendance, cognitive achievement and retention. (Rs 10,000 crore; $1.5 billion)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	✓	—	—
2.	**Rashtriya Madhyamik Shiksha Abhiyan** Universal secondary education with goal of universal retention by 2020. Subschemes improve access for disabled students, construct girls' hostels in educationally	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	×	—	—

	SCHEME (ANNUAL SPENDING 2017–18, UNLESS OTHERWISE NOTED)		PERFORMANCE ON ACQUIRING	MATCHING	ANTICIPATING
General education					
1.	**Mid-Day Meal Scheme** Improving nutrition among primary school children to enhance enrolment, attendance, cognitive achievement and retention. (Rs 10,000 crore; $1.5 billion)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	✓	—	—
2.	**Rashtriya Madhyamik Shiksha Abhiyan** Universal secondary education with goal of universal retention by 2020. Subschemes improve access for disabled students, construct girls' hostels in educationally backward blocks for retaining girls in secondary education and build information and communications technology skills. (Rs 3,914 crore; $602 million)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	×	—	—
3.	**Rashtriya Uchchatar Shiksha Abhiyan** Improving the quality of teaching-learning processes to produce employable and competitive graduates, post-graduates and PhDs. This scheme involves central government funding for state higher educational institutions. (Rs 1,300 crore; $200 million)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	×	—	—
4.	**Saakshar Bharat** Improving adult education: skill development; equivalency to formal education and functional literacy and numeracy for nonliterates. Promoting a learning society through continuing education. Between August 2010 and March 2017, 66.9 million adults passed exams given by the National Institute of Open Schooling and National Literacy Mission Authority; the effective passing rate was 75.1%. (Rs 320 crore; $49 million)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	✓	—	—
5.	**Sarva Shiksha Abhiyaan** Universal enrolment and retention in primary education up to class 8. The scheme includes reaching out to "hardest to reach" girls for upper primary level education; community mobilisation and gender sensitisation; and setting up upper primary level residential schools for girls in the Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Classes (OBC) and minority communities. (Rs 23,500 crore; $3.6 billion)	DESIGN	✓	—	—
		IMPLEMENTATION	✓	—	—
		IMPACT	✓	—	—
Technical and vocational education					
6.	**Sub-mission on Polytechnics** Creating technically skilled manpower. Students after class 10 are eligible to apply. Polytechnics offer three-year diploma courses in civil, electrical and mechanical engineering; electronics; computer science; medical lab technology; hospital engineering; architectural assistantship; leather technology; sugar technology; printing technology; garment technology; beauty culture; textile design and other areas. India had 3,867 polytechnics in 2017–18. (Rs 50 crore; $7.7 million)	DESIGN	✓	✓	—
		IMPLEMENTATION	✓	✓	—
		IMPACT	✓	×	—

✓ GOOD × NEEDS IMPROVEMENT ? UNKNOWN OR TOO NEW — NOT APPLICABLE

Acquiring skills: A short-term, medium-term and long-term agenda

- Ensure that all children in K–12 education are literate and numerate — Acquiring
- Change curricula and teaching practices based on evidence about what is working
- Ramp up assessments to know whether and what skills are imparted with what success
- Adopt international learning standards focused on outcome, not inputs
- Focus and consolidate technical and vocational education — Matching
- Reach special groups
  - Skilling entrepreneurs
  - Skilling informal workers
  - Skilling workers for lifelong learning — Anticipating
- Ensure that skills are portable across other jobs and sectors

Matching skills

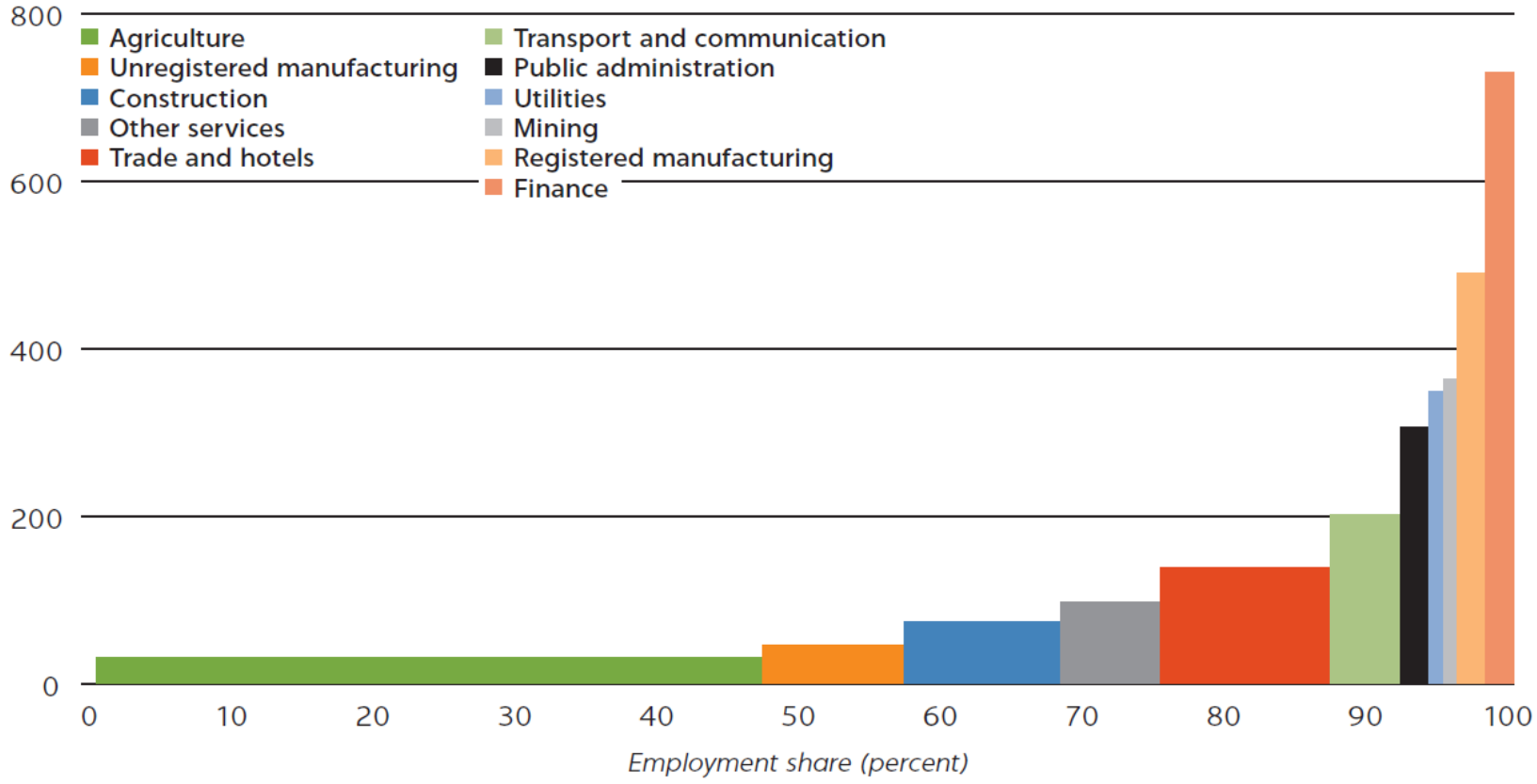
How best to adjust them

Mismatches are big between skill supply and demand

SUPPLY OF SKILLS		DEMAND FOR SKILLS			DEMAND FOR SKILLS				
		HIRED WORKERS			HIRED WORKERS		ENTREPRENEURS AND SELF-EMPLOYED PERSONNEL		
Skills	**Educational attainment**	**Low-skilled casual worker**	**Medium-skilled operative/trade worker**	**Medium-high-skilled worker/ associate professional**	**High-skilled worker/ specialist trainer/ professional**	**High-skilled manager**	**Self-employed livelihood/necessity entrepreneur**	**High-skilled, self-employed professional**	**CEO/director/ opportunity entrepreneur/ employer**
Routine cognitive skills	Primary and middle school education	🟡	🟡	🔴	🔴	🔴	🟡	🔴	🔴
Routine cognitive skills, ICT and language skills	Secondary education	🟡	🟡	🔴	🔴	🔴	🟡	🔴	🔴
Routine cognitive skills, ICT and language skills, financial literacy	Higher secondary education	⚫	🟡	🟡	🔴	🔴	🟡	🔴	🔴
Routine cognitive, nonroutine cognitive skills, core socioemotional skills, ICT skills, language skills, financial literacy and knowledge and ability to apply	College education and above	⚫	⚫	🟡	🟢	🟢	🟡	🟢	🟢
Routine cognitive skills, nonroutine cognitive skills, ICT skills, financial literacy knowledge and ability to apply, sector and job-specific skills	Technical education	⚫	🟡	🟢	🟢	🟡	⚫	🟢	🟡
Job-specific skill, one ICT skill, English language skill and some financial literacy	Short-term skilling programmes	🟡	🟡	🟡	🔴	🔴	🟡	🔴	🔴
Routine cognitive skills, knowledge and ability to apply and job-specific skill	Long-term skilling	⚫	🟡	🟡	🔴	🔴	🟡	🔴	🔴

Low-productivity sectors employ more of the workforce, and high-productivity sectors less

Sectoral labour productivity as a percentage of average labour productivity



Note: Other services includes education, health and social work.

Source: Hasan et al. 2012, Bhandari and Srinivasan 2016; estimates based on Central Statistical Organisation and National Sample Survey Office 2011–12.

Fixing the mismatches

- Requires more than vocational skill training
- India's economy is transforming into a knowledge economy, with computers performing routine tasks
- Collaborative work takes on greater importance, along with sifting vast amounts of information to separate signal from noise
- Employers want to hire people who can identify and solve problems—and work in teams. These needs are at odds with the way India's educational system teaches a body of immutable facts
- Entrepreneurs need system skills and resource management skills. They also need advanced noncognitive skills such as instructing and negotiating

Connecting women to work

- Between 2004–05 and 2011–12, 15 million women dropped out of India's labour force
- The percentage of working-age women enrolled in education fell from 12% to 7% (though their number grew by 16 million)
- Skill training for women should prepare them for working in male-dominated industries
- Increasing opportunities for part-time work would bring more women into the labour force

“Formalising” the informal

- Informal labour is increasingly hired even in the formal sector, raising concerns about the quality of employment
- Formally evaluating previously unrecognised skills, which have been acquired outside formal educational and vocational training, can lead to skill certification and further skill improvement

Anticipating skills

How best to adapt them

Skill demand varies tremendously across occupations

SKILLS		HIRED WORKERS					ENTREPRENEURS/SELF-EMPLOYED PERSONNEL		
		Low-skilled casual worker	**Medium-skilled operative/trade worker**	**Medium-high skilled worker/ associate professional**	**High-skilled worker/specialist/ trainer/professional**	**High-skilled manager**	**Self-employed livelihood/ necessity entrepreneur**	**High-skilled, self-employed professional**	**CEO/director/opportunity entrepreneur/employer**
		Semi-skilled construction worker/helper	Welding technician, assistant beauty therapist, power loom operator	Automotive service technician, shuttleless weaving machine operator, junior accountant	Economist, engineer, scientist, lawyer, surgeon, consultant, chartered accountant	Operations manager, HR manager, finance manager, research manager, team manager	Hawker, one-person shop, handicraft/handloom weaver, cab driver	Lawyer, doctor, consultant, stock broker, chartered accountant, freelance artist, content developer	CEO, MD, director-general, secretary to government, board member, employer
Equivalent NSQF levels developed by NSDC		1 or 2	3 or 4	5 or 6	7 and above	8 and above	1 through 6	7 and above	8 and above
COGNITIVE SKILLS	Routine cognitive	Read & write short sentences & numerical figures, understand drawings, basic math, communicate with team, supervisor	Read & write long sentences, numerical figures, understand drawings, perform basic math calculations, communicate with clients/supervisor	Reading comprehension (e.g. manuals/drawings/ graphs), write short paragraphs, perform basic calculations, communicate with clients.	Reading comprehension (concepts in books, articles, technical manuals), writing (policy notes, reports, articles), mathematical reasoning (for scientific assessment)	Reading comprehension (reports/compliance manuals), writing (reports), mathematical reasoning (evaluating team submission)	Read, write short sentences, perform basic calculations, communicate with clients	Reading comprehension (books, articles), writing (reports, prescription) mathematical reasoning (stock trader, programmer)	Reading comprehension (books, articles, policy papers), writing (reports, articles), mathematical reasoning (for critical assessment of projects, products, markets)
	Nonroutine cognitive	Active learning based on assigned duties (trade skills)	Active learning latest welding techniques (welding technician), latest wellness products and safety measures (beauty therapist)	Active learning (latest on-demand trade skills), escalate anomalies/defects to supervisor for prompt redressal, problem solving in different contexts	Cognitive flexibility (adapt to unforeseen market trends); learning to learn; complex communication (gathering/ processing/presenting concepts at scientific conference); complex (technical) problem solving & critical thinking; creativity (product, design, and process innovation)	Cognitive flexibility (steer team to adapt to unforeseen trends), active learning, complex interpersonal communication with team members/clients, complex (technical) problem solving & critical thinking, resource management	Active learning (trade skills), problem solving (while sourcing products, interacting with clients), creativity	Cognitive flexibility (for adapting to sectoral trends), active (independent) learning of trade skills; complex communication (gathering/processing/conveying information); complex technical problem solving & critical thinking (finding solution to ailments/trouble-shooting); creativity (e.g. content development)	Cognitive flexibility (adapting across business cycles/market trends); learning to learn; complex communication (processing/presenting information, interpersonal communication); complex technical problem solving (abstract reasoning, critical thinking for company level problems); creativity; resource management
	Language	Local language skills for semi-skilled migrant workers, daily wage earners	Local and regional language skills for client servicing, conveying messages	Bilingual/multilingual requirements as per work place duties for effective communication	Bilingual/multilingual skills for independent learning, communicating, adapting	Bilingual/multilingual skills for communicating with team members/clients from different regions/ countries	Skills in local and official (English, Hindi) languages for communicating with clients across platforms	Skills local and official languages for communicating with clients/ stakeholders across platforms	Skills local, official languages for outreach across multiple stakeholders across geographical boundaries
	Information & communications technology(ICT)	Read/type on mobile	Read/type on computer / mobile, use e-wallet on phone	Basic computing skills (research assistant, junior accountant); perform computerised diagnostics (automotive service technician), use e-wallets.	Advanced ICT/programming skills in R/Stata/SAS (data scientist), Tally (Senior Accountant), Python (senior consultant working on artificial intelligence/neural networks)	Advanced ICT skills in Stata/ SAS (research manager), Tally (accounts manager), Neuroph/ Python (tech manager) for supervising team progress.	ICT skills for sourcing product orders (garments) via e-commerce platforms (e.g. IndiaMart); operate e-wallets for payments	Advanced ICT skills in R/Python (independent AI consultant); source clients via e-commerce platforms (e.g. UrbanClap); operate e-wallets for payments	Advanced ICT skills across respective tech-platforms based on Company structure/sector (IT/BPO, manufacturing, research, consulting, hospitality)
	Financial literacy	Basic financial literacy (operating savings bank account, basic knowledge of financial products)	Basic financial literacy (operating bank account, knowledge of financial products, calculate interest from savings)	Financial literacy (knowledge of financial products, manage own finances, calculate interest rates); basic financial management (junior accountant)	Advanced financial literacy (managing own finances/ retirement planning); advanced financial management (financial economist, Chartered accountant, investment consultant)	Advanced financial literacy (HR manager, research manager; advanced financial management (finance manager/accounts manager)	Financial literacy to manage earnings/ cash-flow/credit repayment (handloom weaver); basic financial management (one-person retail shop owner)	Advanced financial literacy to manage earnings/profit (doctor/ lawyer); financial management (chartered accountant); investment management (stock broker)	Advanced financial management to understand earnings/cash-flow analysis/financial ratios/corporate restructuring
	Knowledge & ability to apply it	Basic building and mechanical knowledge (semi-skilled construction worker); ability to assist supervisor (helper)	Knowledge of welding techniques (welding technician); Basics of beauty therapy, medical safety, hygiene, beauty products (beauty therapist)	Knowledge of engines, transmission, braking, steering (automotive service technician); knowledge of fibre/ yarn, functioning of mill (shuttle-less loom weaver)	Medical knowledge (surgeon), scientific knowledge (scientist), knowledge of GAAP (generally accepted accounting principles)—(chartered accountant)	Sector (e.g. breakfast food), product knowledge (cereals, probiotic yoghurt), managerial ability (manage product development team)	Sector knowledge (handloom), product knowledge (handloom sarees), market knowledge (latest trends)	Sector (ailments—doctor, legal knowledge—lawyer), product (medicines, laws), occupational knowledge (ethical practices)	Sector (consumer goods/agricultural machinery), products (food, ag. tools), market knowledge (regional, national, international), managerial ability (manage firm, subsidiaries, clients—e.g. CEO of FarMart, Amul, Dabur)

Cognitive skills
Sector or job-specific technical skills
Noncognitive skills

NSQF = National Skills Qualification Framework. NSDC = National Skills Development Corporation.
Note: The colour gradations reflect different levels of complexity across three broad categories of skills, with darker shades indicating higher levels of complexity.
Source: NCAER conceptualisation.

continued

Skill demand varies tremendously across occupations

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		Low-skilled casual worker	**Medium-skilled operative/trade worker**	**Medium-high skilled worker/ associate professional**	**High-skilled worker/specialist/ trainer/professional**	**High-skilled manager**	**Self-employed livelihood/ necessity entrepreneur**	**High-skilled, self-employed professional**	**CEO/director/opportunity entrepreneur/employer**
SECTOR OR JOB-SPECIFIC, TECHNICAL SKILLS	Cognitive, noncognitive & psychomotor	Follow instructions, assist supervisor in designated tasks based on sector-specific job duties.	Operating welding equipment, assist welding engineer (welding technician); Perform depilation, manicure, pedicure (beauty therapist)	Identify and repair mechanical problems (automotive service technician); run loom efficiently, motor skills, visual skills (shuttleless loom weaver)	Manual dexterity, visuo-spatial awareness, surgery skills (surgeon); research & technical skills, post-doctoral competency (scientist)	Supervise research team (research manager); manage accounts department in company (accounts manager); manage project related technical team (project manager)	Multi-tasking; weave garments (handloom weaver); manage shop (kirana store vendor)	Multi-tasking; application of trade kills such as (a) accountancy (chartered accountant), (b) medicines (general physician)	Multi-tasking; launching of company/ programme; mergers/acquisitions; product diversification; implementing lean management techniques
NON-COGNITIVE SKILLS	Core noncognitive	Interpersonal skill (team effort), attitude to work (discipline, follow instructions), social sensitivity	Interpersonal skill (work with team), attitude to work (discipline, commitment to work), social sensitivity	Interpersonal skill (compassionate responsiveness), attitude to work (time management, promptness), social sensitivity	Interpersonal skill (congeniality thoughtfulness), attitude to work (self-discipline, promptness, determination), social sensitivity (gender/racial)	Interpersonal skill (managing team, sociability), attitude to work (determination, respect for others), social sensitivity (gender/racial/cultural sensitivity)	Interpersonal skill (respectful, helpful), attitude to work (time management, promptness), social sensitivity (gender/caste/racial differences)	Interpersonal skill (social responses), attitude to work (self-motivated, time management), social sensitivity	Self-confidence, Interpersonal skill (responsiveness towards various stakeholders), attitude to work (stress management), social sensitivity (gender/racial/cultural sensitivity)
	Other noncognitive			Basic problem solving—assuaging difficulties faced by customers/ clients/other team members	Judgement and decision-making (project feasibility), problem solving (negotiating terms and conditions), emotional intelligence (coping with work related stress)	Judgment and decision making (e.g. communication strategy), leadership & coordination with team members, problem solving and negotiating with, clients, emotional intelligence (coping with stress/emotion)	Problem solving (e.g. working through delivery mechanisms for buyers), basic decision making (product offerings)	Judgement and decision-making (sourcing new contract), negotiating payments, coordinating with clients, troubleshooting client dissatisfaction, emotional intelligence (self-awareness, coping)	Judgement and decision-making (e.g. expanding market share), negotiating deals, leadership, coordination, problem solving, emotional intelligence (emotional stability, empathy, coping)

Cognitive skills
Sector or job-specific technical skills
Noncognitive skills

NSQF = National Skills Qualification Framework. NSDC = National Skills Development Corporation.
Note: The colour gradations reflect different levels of complexity across three broad categories of skills, with darker shades indicating higher levels of complexity.
Source: NCAER conceptualisation.

Elements of future jobs

- The Internet has changed how people connect to work, with more workers using cloud computing, video conferencing and other means to work anywhere and anytime
- Technological cycles are shorter than ever, and digital disruption is likely to recur with greater frequency
- The e-commerce sector could create 14 million jobs in logistics and delivery, and 6 million in customer care, information technology and management
- Customer-facing jobs with nonroutine interactive tasks that depend on soft skills can be expected to grow. So can jobs depending on higher order cognitive skills
- Transferable skills relevant to multiple workplaces are the key to promoting workforce agility

Stalled adaptations

- Even though services are booming, only unorganised manufacturing and construction are absorbing much labour released from agriculture
- Technological changes are boosting the capital intensity of manufacturing sectors, threatening their future demands for labour
- Trainees just a couple of years after graduating from industrial training institutes (ITIs) face high unemployment
- Although industrial on-the-job training and public–private training partnerships (PPPs) promise to match skills and work better, they face high dropout rates

Transitioning from skills to 21st century jobs

SKILLS		JOBS
TRADITIONAL REQUIREMENTS: JOB-SPECIFIC SKILLS	NEW REQUIREMENTS	EXAMPLES
Business skills, managerial skills, product knowledge	Higher-order cognitive skills such as critical thinking, creativity, cognitive flexibility, digital skills, research skills, technical problem-solving skills, digital skills, financial literacy Noncognitive skills such as emotional intelligence, interpersonal skills Ability to cater to and knowledge of local economy	Innovation-led entrepreneur
Nursing, basic care services, literacy, numeracy	Noncognitive skills such as empathy, compassion, patience, flexibility, teamwork	Compassionate health worker
Driving, literacy	Digital literacy (for accessing smartphone) and map reading for GPS Financial literacy (for operating payment wallet) Language and communication skills—include both local and English language skills (interacting with tourists and local customers) Noncognitive skills such as empathy, politeness, time to report for 5-star rating	Uber driver
Computing skills	Cognitive skills such as critical thinking, creativity, cognitive flexibility, advanced analytical skills, technical problem-solving skills, business intelligence, advanced digital skills, Noncognitive skills (client and customer orientation, team work, leadership) Advanced technical degree, consulting experience	Data scientist, artificial intelligence expert
Crafts skills	Literacy and numeracy Digital literacy (for app-based sales) Financial literacy (for operating payment wallet) Language and communication skills—include both local and English language skills (for connecting to markets across borders and connecting to digital platforms such as Flipkart or Myntra where content is provided in English) Awareness of latest market trends and customer pulse	Rural handicraft entrepreneur

Source: NCAER compilation based on literature review and stakeholder discussions.

Recommendations for adapting and anticipating skills

NCAER Skilling India working papers

1. *Where are the Jobs? Skill-based Input-Output Employment Linkages by Sector for India*
   Tulika Bhattacharya and Bornali Bhandari
2. *Is India's Education System providing 21st Century Basic and Employability Skills?*
   Mousumi Das
3. *India's Employment Challenges and the Demand for Skills*
   Pallavi Choudhuri
4. *The 3–E Challenge in India: Education, Employability and Employment*
   Bornali Bhandari
5. *Providing the Full Range of Employability Skills in India*
   Bornali Bhandari
6. *The Role of Pedagogy in Developing Life Skills in India*
   Renu Gupta
7. *How do Technical Education and Vocational Training Impact Labour Productivity in India?*
   Seema Sangita
8. *An Exploratory, State-wise Education-Employability-Employment Index for India*
   Saurabh Bandyopadhyay, Bornali Bhandari, Ajaya K Sahu and Praveen Rawat
9. *Viewing Skilling India from the ground up: Project case studies*

Available soon from http://www.ncaer.org/skillingindia/workingpapers.

सत्यमेव जयते

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