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Designing a bottom-up professional development programme

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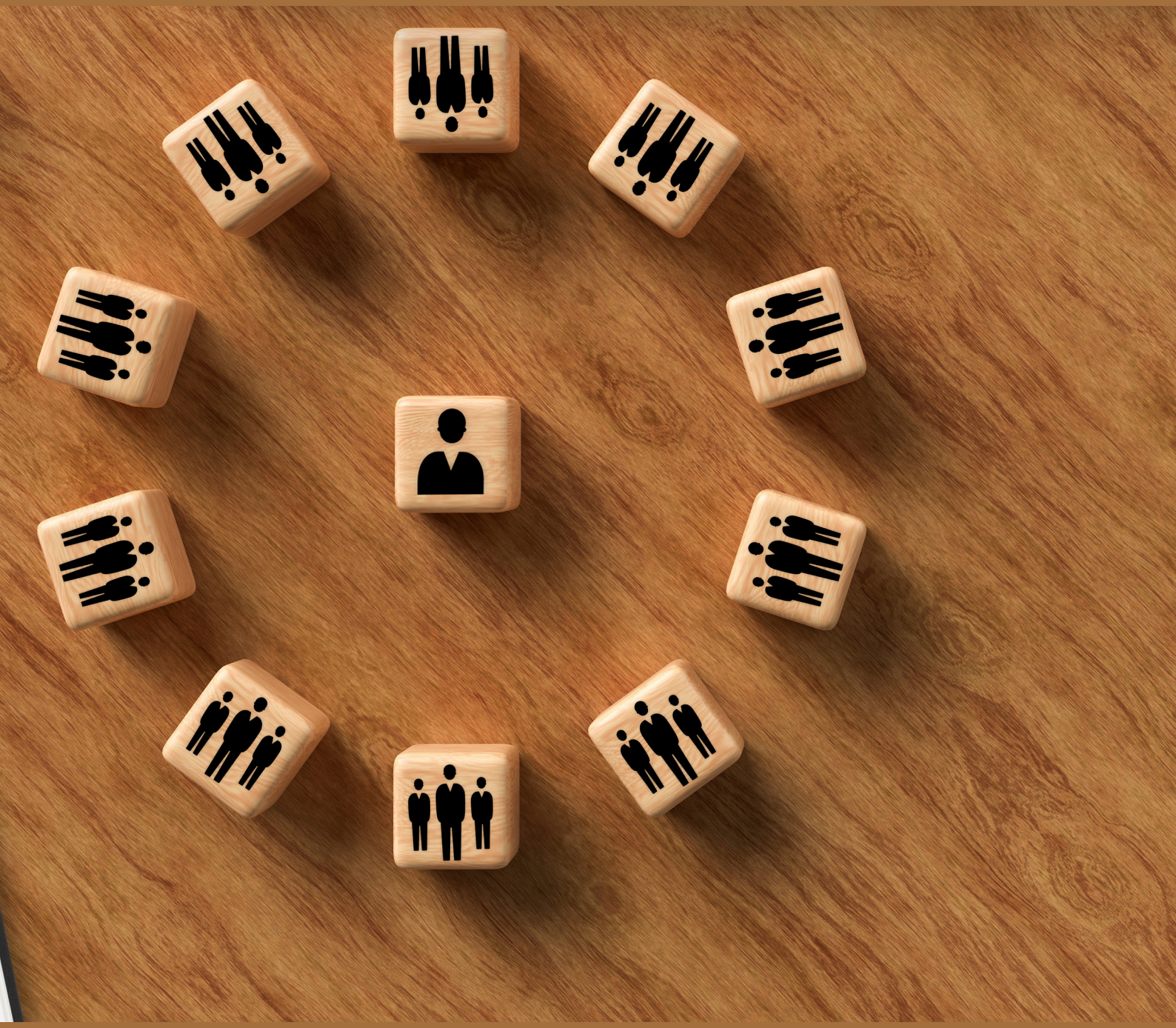
IN THIS EDITION

In this issue, Maya Menon discusses the need for teacher development in critical thinking pedagogy and other areas, Shilpi Banerjee writes about quality in classroom assessments, and Ashok Pandey talks about designing a bottom-up and empathy-based professional learning development programme. We also introduce two new sections: teacher resources and education resources on COVID-19. T



COVID-19: the need for teacher development in critical thinking pedagogy

THE PANDEMIC HAS INTENSIFIED THE LEARNING CRISIS AND HIGHLIGHTED SEVERAL EDUCATIONAL CHALLENGES. MAYA MENON DESCRIBES WHY IT IS IMPORTANT TO INVEST IN TEACHER DEVELOPMENT SO THAT TEACHERS ARE EMPOWERED TO DELIVER THE SKILLS REQUIRED BY NEP 2020.

The year 2020 will be seen as a watershed year for education across the world in general, and in India particularly, for two main reasons. Firstly, as the pandemic ravaged the entire world affecting some countries more than others, India, unlike many other countries, shut schools for more than nine months. UNICEF reported that the education of 247 million school-going children and 28 million children in *Anganwadi* centres in the country had been impacted by school closures. Children have been mainly indoors, and teachers — usually from private schools — have had to 'jump in at the deep-end' and teach their students from home, using a range of online platforms. In most cases however, teachers were inadequately supported even as they attempted teaching remotely students they could not see nor always hear, for genuine as well as feigned problems with cyberspace connectivity. Often, they attempted some well-meaning, but ineffective *jugaad*. Expectedly, a majority of teachers have continued to stick to familiar and traditional modes of teaching despite the new modes of interaction. Teachers were teaching virtually during this time, but learning was not always purposeful or visible.

Secondly in 2020, after 34 years, the new National Education Policy 2020 was announced by the Union Government. One recurring need the policy proposes is the development of critical thinking. The term is mentioned at least eight times in the 64-page document. This article attempts to explore the intersection of COVID-19 and critical thinking. What are the implications of the pandemic for learning the right pedagogy that fosters critical thinking?

Let us begin with what the virus has literally brought home to all school leaders, educationists, and even parents — endemic limitations to how we teach our children, even in the best of our schools. As reported in many leading newspapers, this has resulted in parents and many state governments questioning the need for private schools to charge full fees during the pandemic. The scapegoats have invariably been teachers, who have in many cases, been denied full salaries on the ground. Wage cuts were supported with the justification that teachers worked fewer hours and that too from the comfort of their homes. On the other hand, government school teachers, as CNN recently reported, have been performing COVID-19 frontline duties as their second job.

The pandemic has once again highlighted the crisis of education in India. However, instead of blaming teachers, everyone needs to take collective responsibility to improve learning among students — governments, parents, and school leadership. All of them have, in some way or other, condoned mediocre and often poor teaching in schools. For decades teachers have been allowed, even expected, to teach in a very exam-focussed, marks-oriented manner, catering mainly to the academically inclined segment of students who are in any case self-driven. Other students, especially those with special needs, tend to get neglected and left out of participating in personally fulfilling learning experiences.

Our teachers are not skilled and re-skilled on an ongoing and deliberate basis in the majority of our schools. Occasional exposure to some ideas of good teaching-learning practices does not necessarily mean that one has been skilled in using those fluently in a class — physical or virtual. Building one's competencies requires the meticulous persistence that we often see in sportspersons and athletes. The latter constantly craft their techniques and hone their skills. Teachers need to do that too, not for winning games but for gifting their students with skills and a value system to chart a lifetime of learning with enjoyment and understanding.

The pandemic exposed the fact that many of us as teachers have never really delved deeply into the true nature of learning and how learning with meaning can be enabled. It has also magnified the persisting flaws...and these flaws run deep, for example, excessive and often ineffectual teacher talk and rote-based questioning. COVID-19 managed to jolt teachers out of instructional inertia in a way many well-intentioned policies, curricular frameworks, or educationists have failed.

All forms of learning, whether physical or virtual, are an alchemy of people, processes, and principles of good pedagogy. They are about learner engagement, discussion and dialogue, reflection, and an occasional dash of the dramatic! Technology merely offers us exciting tools to make all of this possible in virtual mode.

We do not know how schools will function in the approaching months of 2021. We are still caught in the crisis! But as Rahm Emanuel wisely said, 'You never let a serious crisis go to waste...it's an opportunity to do things you thought you could not do before.' Thus, the pandemic could be a great opportunity for catalysing learning for all teachers, regardless of the kind of schools in which they teach. In addition, teachers have become understandably concerned about the absence of learner engagement, because they have now begun to recognise that they may not have the tools to check for learning and understanding.

Shifting from teaching in COVID-19 times to NEP's call for fostering critical thinking feels like a natural transition. The deficiencies made evident in our teaching can certainly be addressed with a greater focus on critical thinking. However, the NEP document does not explain what is critical thinking and how it should be manifested in our teaching-learning processes. As the *Foundation for Critical Thinking* explains, critical thinking is the objective analysis of facts to arrive at a judgement or decision. It calls for the demonstrable use of five skills — analysis, interpretation,

interpretation, inference, explanation, self-regulation, open-mindedness, and problem-solving. Developing these skills is a heuristic process and needs to begin early for all learners so that by the time they leave school and are ready for higher or vocational education, they have acquired reasonably sophisticated ease with them. These are skills for being able to engage with an ever complex, interconnected, and challenging world. They are also a part of the key skill set necessary for sustaining humanity on our planet.

So the obvious question that comes up is — are our teachers ready to teach these skills? Without being pessimistic, the short and simple answer is NO! They are not ready, because they have never been called upon to use these skills through their own schooling, college, and teacher education. Therefore, they will require deliberate and consistent practise of using these skills at study, work, or in their personal life to gather a certain level of ease. For example, if a teacher wants to encourage students to be more vocally participative in an online class, there are a number of ways she could do this – pose a probing question and call upon three to four students to come up with a plausible answer either verbally or using the chat option; use digital tools like Whiteboard.fi or Mentimeter to instantly record all student responses; or conduct an online poll using Google Forms, Kahoot, etc. Another concern for teachers could be the challenge of relating to students emotionally, which is in fact a vital pre-requisite to developing their cognitive skills. This could be addressed by setting up simple routines for students that help them share their feelings privately and confidentially. However, these and many other strategies, remain just good ideas, unless teachers are exposed to them and are provided with the opportunity to hone their skills for using them with a high degree of fluency. Departments of Education, school examination boards, and private school managements need to recognise the urgency of equipping our teachers with the required skills to lead India's children into a more promising future.

To quote the American philosopher Will Durant, 'We are what we repeatedly do. Excellence is not an act, but a habit.' The same holds true for critical thinking. Indeed, it also applies to sustaining the lessons from online teaching-learning during the pandemic. T

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Ensuring quality in classroom assessments

HOW CAN TEACHERS MAKE CLASSROOM-BASED ASSESSMENTS MORE VALID, RELIABLE, AND FAIR? SHILPI BANERJEE SHARES SOME GUIDING PRINCIPLES TO HELP TEACHERS DESIGN QUALITY CLASSROOM-BASED ASSESSMENTS AND USE THEIR RESULTS EFFECTIVELY.

According to the Standards for Educational and Psychological Testing by the American Educational Research Association (AERA), validity, reliability, and fairness are critical attributes of the quality of any assessment. These measures are mostly statistical in nature and hence the availability of a large data set is essential. They have been effectively used in estimating the quality of large-scale assessments.

Unfortunately, statistical measures are not applicable in a similar manner to classroom assessments as a limited number of students take the tests. So what would validity, reliability, and fairness mean in the context of classroom-based assessments? What are the guiding principles for the evaluation of quality? The guidelines provided in this article, although coarse-grained, can provide helpful insights to teachers for ensuring quality in the assessments they design.

AERA defines **validity** as the degree to which evidence and theory support the interpretation of test scores for proposed uses of tests. This definition stresses the use of scores – assessments should be primarily conducted to assign scores to students based on their level of proficiency against learning outcomes. However, the purpose of conducting classroom assessment which is mostly formative in nature is to gain feedback on the entire teaching and learning process. Therefore, validity here is related to the accuracy and quality of inferences made about student learning outcomes. Valid assessments are aligned to both content domains and cognitive skills as indicated in learning outcomes.

AERA defines **reliability** in terms of consistency with regards to replication of the testing procedures. Reliability in the classroom context is understood in terms of the properties of consistency and uniformity. Classroom assessments comprise a series of informal and formal assessments including observation, projects, portfolio, debate, and exhibition. Consistency is ensured when there is uniformity in students' performance across multiple methods of assessment. Also, sharing clearly defined assessment expectations in the form of rubrics ensures consistency in students' performance and uniformity in teachers' evaluation.

AERA defines **fairness** as responsiveness to individual characteristics and testing contexts so that testing scores yield valid interpretations for intended uses. In the context of classroom assessment, assessments should provide students with opportunities to best demonstrate their achievement of learning outcomes through various methods of assessment without any explicit or implicit teacher bias. Also, for assessments to be fair, students should be aware of learning outcomes, assessment content, and their usage.

In practice, validity, reliability, and fairness indicators overlap each other. Ensuring one attribute may also help in achieving another attribute and vice versa. For example, while multiple methods of assessment are required for ensuring reliability and fairness, they also give accurate information on student achievement. The following four important questions can serve as guiding principles to help a teacher ensure validity, reliability, and fairness in classroom assessments and thus enable more effective use of assessment results.

Why am I assessing?

Classroom assessments are tools used for collecting, analysing, and using evidence of student learning for a variety of purposes, including diagnosing student strengths and weaknesses, monitoring students' progress towards meeting desired levels of proficiency, assigning grades, and providing feedback to students and parents. Stiggins mentioned in his 2014 study that inept assessments may lead to inefficient decisions about students learning.

Guiding principle 1: Begin by defining the purpose of assessment clearly, understanding the users of assessment, and the kinds of decisions that will be taken based on assessment information.

What am I assessing?

Learning outcomes guide both pedagogy and assessment. They indicate what a student will be able to do at the end of an instruction unit by precisely breaking down broad goals of education such as problem solving and critical thinking to more measurable and observable behaviour for each grade. For example, critical thinking in language for a Grade 4 child is the ability to ask questions on read texts while for a Grade 5 child, it is the ability to draw conclusions on a text read. Having a good understanding of these outcomes helps a teacher design an accurate assessment to measure student abilities and know what they need to attain. These outcomes should also be communicated to students to ensure a fair assessment.

Guiding principle 2: Chalk out specific learning outcomes and closely align pedagogy and assessment with learning outcomes.

How will I assess?

Teachers have to design an instrument that assesses the attainment of learning outcomes. A proper assessment method should be identified based on the nature of a learning outcome. For example, for a learning outcome like 'constructs Newton's colour disc using materials from surroundings and explains their working', project-based assessment will yield the most valid information about its attainment by students. High quality assessment items that are factually and conceptually correct and free of sensitivity issues should be designed. Comprehensive rubrics in alignment with the cognitive level of the learning outcome should be created and then shared with the students to ensure fairness in assessment.

Guiding principle 3: Design high quality

assessment to elicit evidence of student learning.

How am I going to communicate assessment results?

The purpose of communicating classroom assessment results is not merely to report results but to support learning. Students need descriptive feedback focused on strengths and weaknesses that target specific misconceptions and learning gaps. The idea is to tell students how they progress towards their individual learning goals and help teachers understand the kind of scaffolding that is needed to support students in achieving the desired level of proficiency. Results can be communicated through words, pictures, illustrations, examples, and many other means aimed at conveying descriptions of student performance and helping pupils improve.

Guiding principle 4: Communicate assessment results efficiently. T

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Designing a bottom-up professional development programme

ASHOK PANDEY DESCRIBES A RECENT PROFESSIONAL DEVELOPMENT ACTIVITY UNDERTAKEN AT HIS SCHOOL.

The benefits of a well-structured professional development programme (PDP) for teachers are well known. The challenge lies in the design, structuring, and execution of such a programme. Externally driven engagements have limited success when it comes to the achievement of long-term professional development goals. Instead, collaborative problem solving, holistic development approaches, and a school-wide culture of continuous learning among teachers have significant advantages. Such measures are however, driven by teachers' self-motivation, persuasive rationale, and a commitment to acquiring new skills.

This article presents one such approach to engaging teachers in learning groups to reflect on professional development challenges and suggests some solutions. A workshop was organised in our school for sixteen participants, including both newly inducted and veteran teachers. Additionally, mid-level educational leaders included in the groups brought their own perspectives and those of the school's top management.

The workshop was devoted to the issue of problem-solving. Using one's own rationale and through arguments and consensus-building, teachers participated in sessions moderated by the facilitator. Four case scenarios typically depicting PDP barriers emerged as a result of preliminary brainstorming in the group.

- Play the role of a group of new teachers and passionate learners. The school management has asked the group to chalk out a PDP for the faculty. Prepare a blueprint for the same.
- The group observes that senior members of the school management committee (SMC) are not interested in investing in teachers' professional development. Prepare a pitch to convince SMC members to invest in PDP.
- Fairness and transparency are the hallmarks of any organisation. However, some faculty members get preference over others in professional development opportunities. Prepare a presentation for remedying the situation that makes a case to the management.
- Some teachers have developed inertia over the years, and are not interested in learning new skills. The challenge is to bring a shift in their mindsets through a useful, sustainable PDP. Prepare a presentation for the target group to bring out the desired results.

The workshop commenced with an ice-breaking activity. In an exciting game, participants picked one item of utility from a tray containing several everyday items. They were asked to share one usage of the item selected but different from that item's ordinary and dominant usage. Each participant creatively thought about it and shared new ideas. One participant who chose a Moserbaer CD shared that she will use it as the proverbial Sudarshan Chakra to ward off all evils. Another participant who chose a white cricket ball said that the ball was a replica of the mother earth, and she would appeal to all to keep it green. A third participant who picked a paper clip said it represented diversity as a paper clip embraces papers of all hues and colours.

Once all participants had shared their thoughts on the items they had selected, a short reflection session followed. The ability to reflect, imagine, and communicate positive and divergent thinking came across as the main outcomes of the ice-breaker. The action was a perfect energiser for the activity that followed.

Each of the four groups selected one of problems described above and deployed a 'peel the fruit' visible thinking routine to get under the skin of the problem, with more in-depth questions and a finally evaluation of the core issue. Each group devoted an hour to discuss the topic and work out a solution collaboratively. Once the discussions were over, the groups presented their case to the larger plenary for 15 minutes each.

The discussions indicated a need to develop a compelling roadmap for school-based in-service education and training (INSET) of teachers. For such an INSET program to succeed, schools need:

- INSET planning
- Leadership commitment
- Investment in teacher education
- Developing a culture of learning
- Reflection, mentoring, and monitoring.

In their presentations, groups provided suggestions such as 'what is in it for me' (WIIFM) as a starting point to ensure onboarding of all teachers in the INSET programme. WIIFM is instrumental in bringing senior teachers on board who may have lost the motivation and will to relearn. One group emphasised that role models and ambassadors for change make a difference in all professional development programmes. Another insight highlighted the need to set clear expectations on both sides, participants and resource persons, with the revitalisation of skills, engagement, and innovation setting a tone for 'learners first' instead of 'teachers first'. Another group emphasised current status analysis under three categories – first, identifying the essential attributes, i.e., presentation, communication, punctuality, meeting expectations, subject matter expertise, and interpersonal relationships. Second, going a little extra distance to include enthusiasm, reflection on self-practices, pedagogical innovation, and engaging students in various meaningful ways. Third, examining how students and teachers connect, the level of technology use, assessment practices, and students' feedback and choices.

One of the teachers, in the fourth year of her career and a workshop participant, summed it up succinctly. 'Working in groups with seniors gave me the "experience of twenty years" as they all presented their perspectives and listened to me with respect and empathy,' she said. All groups agreed that when schools design such a road map for on-the-job learning, and teachers are designers of the content and methodology of professional learning, they become accountable for the implementation and success of PDP. T

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Peer observation: enhancing the experience of giving and receiving feedback

IN THIS ARTICLE, DEEPALI DHARMARAJ EXPLORES THE ROLE OF FEEDBACK IN THE CONTEXT OF PEER OBSERVATION AND IDENTIFIES KEY PRINCIPLES AND PRACTICES THAT ENABLE THE EXPERIENCE TO BE MUTUALLY BENEFICIAL FOR BOTH THE OBSERVER AND OBSERVED.

In the previous issue of *Teacher,* we looked at peer observation as an important component of collaborative continuing professional development. Feedback, in the context of peer observation, should be different from that of an evaluative observation where feedback can be directive and provide suggestions for improvement in order to meet predetermined performance indicators. In addition to the difference in purpose — development versus evaluation — three components can strengthen feedback, make it more robust, and enable feedback to 'stick' with both colleagues. The objective is to ensure that feedback stays on with colleagues and results in improving practice. Ultimately, this will raise the quality of teaching and learning in the classroom, which in turn will have consequent benefits for learners. Before delving into the process of feedback, it is important to outline these prerequisites that enhance the process.

Relationship

Having an established professional relationship before engaging in peer observation is important. Colleagues, for example, may be from the same institution, or have worked on a project together, attended the same training course, shared reading materials, or collaborated on a lesson study. A shared history is the foundation of being able to have an open and honest discussion following the lesson observation. Taking it one step further, is playing the role as a critical friend whom Costa and Kallick define as 'a trusted person who asks provocative questions, provides data to be examined through another lens, and offers critiques of a person's work as a friend. A critical friend takes the time to fully understand the context of the work presented and the outcomes that the person or group is working toward. The friend is an advocate for the success of that work'.

Credibility

Defined as the quality of being trusted and believed in, credibility is a key principle for giving feedback. Sharing our own lived experiences and what we have done in practice builds credibility and enables the uptake of feedback: i.e. of having 'walked the talk'. At the same time, credibility also involves being able to acknowledge and admit gaps in our own experience and knowledge and having an attitude of lifelong learning.

Review

Michael Chiles highlights the importance of not stopping at the event of giving feedback. According to him, follow-up determines the power of feedback. In the context of peer observation, this could include the obvious direct follow-up in the form of a discussion after some time has elapsed. However, follow-up can also be a reversal of roles in a subsequent peer observation or sharing learnings from the process with other colleagues. Follow-up is thus intended not as a way of policing but of strengthening the relationship between two colleagues and improving their teaching practices further.

In a study conducted in 2012, Hendry and Oliver cautioned that 'receiving feedback was also perceived to be useful but not more beneficial than watching a peer teach'. Thus, a feedback session has to be designed carefully to ensure that both teachers mutually learn from each other and becomes as important as the exercise of peer observation. The post-lesson feedback discussion can be a space for colleagues to have an open and honest discussion about a peer observation session and requires active involvement from both parties. This phase of the cycle can be further divided into three separate units: before, during, and after the discussion and there are some useful practices that can be adopted to make the process mutually beneficial.

Enhancing benefits of feedback

As an observer, before the discussion, consult your colleague to understand whether the post-lesson discussion should be conducted immediately after the lesson or whether the teacher would like to delay it, perhaps by a couple of days, to reflect on the lesson. Refer to the pre-lesson discussion and focus on areas that were identified and prepare what you are going to say by writing down your reflections and observations. It is common to be drawn towards giving suggestions or advice and feeling that you need to have all the answers ready. As a teacher, it is common to be overly self-critical, but it is equally important to articulate what went well.

In addition, think about the students when planning the post-lesson discussion. As an observer, you may, for example, have noticed that a learner was distracted or had a 'blank stare'. Sometimes communicating classroom observations to the observed teacher is useful. A teacher may have intuitively felt that a learner was struggling with a concept but being in the moment could not address it. Peer observation provides the opportunity of having had an additional resource in the classroom to help teachers unpack missed nuances.

During the discussion, as an observer, seek to understand and listen instead of starting by giving your opinion. It can be useful to begin a feedback discussion by asking your peer to reflect on the lesson and describing to what extent learners met the outcomes defined. This enables the observee to have more control and accountability in the process. For both colleagues, using tentative language and modals – 'Could you have/I could have…', 'You may be able to…' – can help the process be less like a value judgement. As an observer, using open-ended questions such as, 'How could you have given your instructions differently?' instead of saying 'Did you give clear instructions?' facilitates further discussion in a non-threatening manner.

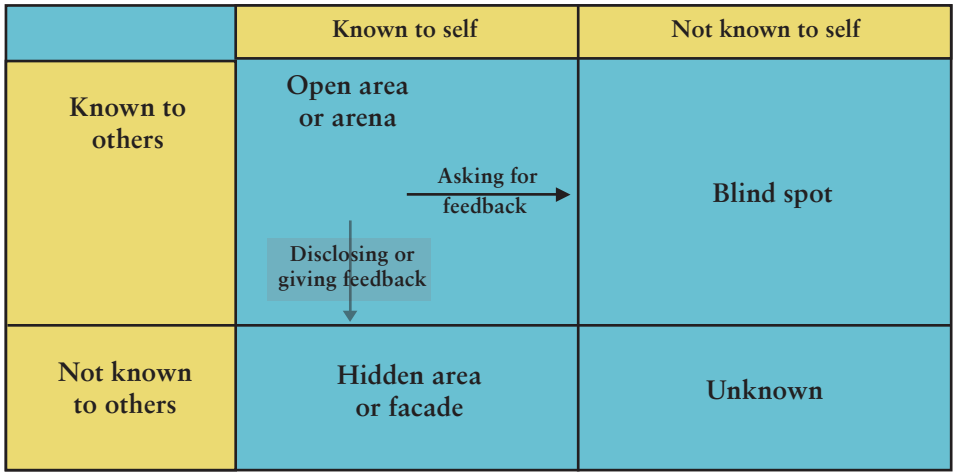

Fig 2: Johari Window

As the observed teacher, make use of the additional expertise to find out what is actually going on in your classroom. For example, what were students doing when your back was turned? The Johari Window principle (shown above) can be used effectively in this situation by enabling us to see our blind spots and increases our open area. Finally, do not hesitate to go off-script or disagree during the discussion if that is necessary. The notes both teachers make can serve as a guide but discussions that are organic and spontaneous can be richer and more meaningful.

After the discussion, both teachers should come up with a collaborative action plan. It is common to have the observed teacher list out actions they will take, but in the context of peer observation, it is equally important that the observer does that too. A useful format to follow is identifying one exercise or practice that you could start doing, one that you should continue doing, and another one that you should stop doing.

By following such routines, peer observation can become a rich source of continuing professional development, for both the observer and the observed to collaboratively support each other in improving their practice and becoming better teachers.

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Inquiry-based science education in India: prospects and challenges

DR GARIMA BANSAL DISCUSSES THE HISTORICAL DEVELOPMENT OF SCIENCE EDUCATION IN INDIA, THE EMERGENCE OF INQUIRY-BASED EDUCATION, THE CURRENT STATE OF SCIENCE EDUCATION AT THE SCHOOL LEVEL, AND THE ROLE OF SCHOOL LEADERS IN MAKING INQUIRY-BASED LEARNING A REALITY.

As Agarkar highlights in his 2017 study, there has been a constant thrust on the inculcation of scientific attitude and a spirit of inquiry in the country's populace post-independence. He observed that several national policies have consistently focussed upon the development of scientific temper among the masses, looking at it as a means to eradicate obscurantism and superstition. For example, India's Scientific Policy Resolution (SPR 1958) committed to foster scientific research in all aspects of development. The National Policy on Education first formulated in 1968, and the second one in 1986 and later modified in 1992, recognised science education as a precondition for making developmental progress. Other policies including the Science, Technology and Innovation Policy 2013 have acknowledged science, technology, and innovation as drivers that have the potential to accelerate India's sustainable and inclusive growth. In addition, the recently launched National Education Policy 2020 has once again urged to implement inquiry-oriented pedagogy in classrooms.

The Indian government has initiated several science and technology programmes to foster scientific inquiry among school students. Sharma and Yarlagadda while examining Science, Technology, Engineering, and Mathematics (STEM) policies in 2018 have identified a number of government initiatives that aim to facilitate scientific inquiry:

- Science Exhibition by the National Council of Educational Research and Training (NCERT) started in 1971
- National Children's Science Congress (NCSC) by the Department of Science and Technology (DST) started in 1993
- Initiative for Research and Innovation in Science (IRIS) launched in 2006 – a public-private partnership initiated by Intel Technology India Private Ltd (Intel) and DST
- Innovation in Science Pursuit for Inspired Research (INSPIRE) launched by DST in 2008 inviting young talent to join science-related careers
- Atal Tinkering Laboratories designed to provide a workspace with equipment and tools where young minds (years 6-10) can engage in hands-on scientific experiments to develop a deeper understanding of STEM concepts.

Other than government initiatives, the country has witnessed concerted efforts from several non-governmental and non-profit organisations in this direction. People's Science Movement (PSM) that desired to disseminate science among the masses as a means for social transformation was initiated in the country by professionals from different fields in the early 1970s. A large number of organisations emerged since then, such as *Bharatiya Gyan Vigyan Samiti, Jana Vignana Vedika,* Delhi Science Forum, and *Eklavya* among others that relentlessly worked towards spreading a spirit of inquiry among the masses (for details, see Sahoo & Pattnaik, 2012). Teachers were supported with inquiry-oriented science textbooks, training, and other resource materials to initiate inquiry-oriented teaching in their classrooms. A few of these initiatives are running successfully to date, for example, *Eklavya*. Unsurprisingly, not all initiatives could sustain. In 2019, Koul, Verma & Nargund-Joshi identified some active non-government organisations committed to the cause: Science Society of India, the International Movement for Leisure Activities in Science and Technology (MILSET), and Connected Learning Initiative (CLIx).

Despite these efforts by government and non-governmental sectors that aim to infuse a spirit of inquiry among India's populace, published research suggests that newly inducted teachers often fail to conduct inquiry-oriented lessons in their science classrooms. Bansal while studying pre-service teachers' conceptualisation and enactment of inquiry-based science education in Indian primary schools in 2021 has found that despite pedagogical support provided by mentor teachers during field internship of pre-service education, newly inducted teachers find it difficult to design and implement inquiry-oriented lessons in real classrooms. The reasons for that range from a lack of high-quality pedagogical training in pre-service teacher education programmes to institutional constraints placed on teachers by schools. School administration, in-service teachers, and students are reluctant to work on developing scientific inquiry and perceive it as a non-academic endeavour that will not lead to success in high-stakes summative assessments. Furthermore, the ways in which pre-service teachers implemented inquiry-based teaching in their classrooms lacked coherence. They were found to be lacking skills for utilising available resources for inquiry, conducting group work, and orchestrating dialogic conversations which are at the heart of scientific inquiry. All the more, their belief system rooted in didactic teaching prevented them from translating skills learnt in methods course in teacher preparation program into classroom practice.

Therefore, it emerges that though education policies recognise the importance of inquiry-oriented science education, education of science in schools continues to be transacted in a didactic manner. Overhauling teacher education programmes and building schools' and public trust in inquiry-oriented science teaching are essential prerequisites for earning the benefits of inquiry-oriented science. At the moment, an important step in this direction would be to invest in inquiry-oriented science teacher professional development at the in-service stage. If teachers develop the necessary skills in planning innovative lesson plans, they will be able to guide students appropriately. Further, school leaders need to understand that investing in inquiry-based science education requires appropriate changes in teacher and student

timetable, provision of resources, and continuous support to teachers. To begin with, initiatives such as science fairs for students are acceptable ways to engage students in inquiry-oriented science. Also, teachers should be awarded for successfully executing high-quality inquiry-based science lessons in their classrooms. Such activities would foster a culture of inquiry in schools which is essential for witnessing a sustainable change in this direction.

Please refer to the ACER India website https://www.acer.org/in/professional-learning to learn more about ACER's professional learning programmes in science and other subjects for in-service teachers.

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Gender parity in science: the intersection of the National Education Policy 2020 and the draft Science, Technology, and Innovation Policy

WITH INTERNATIONAL WOMEN'S DAY OBSERVED ON 8 MARCH, JYOTI SHARMA'S REVIEW OF THE NATIONAL EDUCATION POLICY 2020 AND THE DRAFT SCIENCE, TECHNOLOGY, AND INNOVATION POLICY THROUGH THE LENS OF GENDER PARITY IS A TIMELY REMINDER OF THE NEED TO SUPPORT IMPROVED PARTICIPATION OF WOMEN IN SCIENCE.

Science and technology are rapidly changing the world. Future jobs will need a skilled workforce with expertise in areas such as engineering, big data, machine learning, and artificial intelligence. An emerging scarcity of resources, water, and food, climate change, and the rise of infectious diseases will require multidisciplinary research and trained manpower, especially in the areas of Science, Technology, Engineering, and Mathematics (STEM).

Quality education and gender equality are two of the UN's most important Sustainable Development Goals (SDGs) . The provision of quality education to both boys and girls is a significant indicator for every nation's growth and its capacity to tackle global challenges. Economic development and sustainability targets may become difficult to achieve without addressing the issues of diversity, gender, equity, inclusion, and equal opportunity for all. Recent studies by the UN and McKinsey show that women's participation in education can enhance creative thinking, innovation, productivity, and add approximately USD 13 trillion to the global Gross Domestic Product by 2025.

According to the *All India Survey on Higher Education (2018-19)*, women have achieved parity at the bachelor's (53 per cent) and master's levels (55 per cent) in India over time. However, the Department of Science & Technology estimates that active women researchers are only about 18.8 per cent in Indian research and development establishments. This data indicates that there is a need for revolutionary gender-inclusive educational reforms that span the life cycle of women from early education to professional courses in science.

In India, the new National Education Policy (NEP) 2020 was released in July 2020 and a Science, Technology, and Innovation Policy (STIP) is on its way. The NEP and draft STIP reflect a self-confident and *Atmanirbhar* (self-reliant) India. The spirit behind both policies seeks to inculcate innovation, creative thinking, and problem-solving attitudes at all levels, especially in young students, and facilitate the development of scientific prowess. The base of both policies is clear and broad: supporting grassroots innovation and promoting scientific literacy at all possible levels.

On the one hand, NEP provides a comprehensive framework for enhancing the quality of education in our country. It focuses on overhauling learning from pre-school to higher education. On the other, the draft STIP targets achieving technological self-reliance, and aspires for India to be among the top three scientific superpowers in the decade to come. The draft STIP is decentralised, evidence-based, experts-driven, and inclusive, and has been developed after 300 consultations with the involvement of over 43 000 national and international stakeholders.

National Education Policy 2020

NEP encourages student-centric pedagogies with a focus on active learning, design thinking, and higher-order analytical skills. It recognises the need for early participation in research at the frontiers of innovation. To achieve that, the quality of institutions has to be strengthened to make them competitive and at par with the global best. In addition, the policy recognises the special and critical role that women play in society and in shaping the economy. NEP recommends that policies, programmes, and schemes designed to include students from Socially and Economically Disadvantaged groups (SEDGs) should especially target girls.

The NEP recommends the constitution of a Gender-Inclusion Fund and its utilisation through states to build the nation's capacity to provide equitable quality education to girls as well as transgender students. The fund will focus on ensuring 100 per cent enrolment of girls in schools, record high participation rates in higher education, decreasing gender gaps at all levels, gender equity and inclusion in society, and improving the leadership capacity of girls through positive civil dialogue. For equal and full participation of girls, *Kasturba Gandhi Balika Vidyalayas* will be strengthened and expanded to increase the participation of girls from SEDGs in quality schools (up to Grade 12).

According to the *Children in India 2018* report, released by the Ministry of Statistics and Programme Implementation, India's dropout rates for girls are as high as 57 per cent by Grade 11. The Times of India reported that a lack of proper menstrual hygiene management facilities, poor infrastructure, and sexual harassment are some of the reasons for girls being frequently absent or dropping out of secondary school altogether. NEP underscores the need for an effective, timely, and widely known mechanism for reporting, with due process for any infractions against students' rights or safety – particularly girl children and the various difficult issues faced by adolescents.

Science, Technology, Innovation Policy 2020

The topic of inclusion of women in science or science for women is not new for the Indian government. The Government of India had adopted the National Policy for Empowerment of Women in 2001 which emphasised the involvement of women in science and technology. Subsequently, the government implemented a scheme, Science and Technology for Women (S&T for Women) through the Department of Science and Technology (DST). Later, the S&T policy 2003 aimed at ensuring full and equal participation of women in science. The Science, Technology, and Innovation (STI) Policy 2013 introduced new and flexible schemes under the broad umbrella KIRAN - Knowledge Involvement in Research Advancement through Nurturing with the primary goal of utilising the full potential of women to empower the nation.

DST is working proactively to bring gender parity to the S&T domain through a multifaceted approach. It runs many women-centric programmes to support women from an early age in building a successful career in STEM. Apart from schemes like *Vigyan Jyoti* for school girls, WOS A, B & C schemes for women with career-break, training in international laboratories through the Indo-US Fellowship for Women in STEMM (WISTEMM), and the establishment of state-of-the-art research facilities in women-centric universities through the Consolidation of University Research for Innovation and Excellence in Women Universities (CURIE) programme are some of its other initiatives. A pilot programme Gender Advancement for Transforming Institutions (GATI) has been launched in 20 Indian institutions. Further, DST is organising theme-based training programmes and establishing laboratories for women scientists to prepare them for future jobs.

In the context of the draft STIP, the thematic group Equity and Inclusion is one of 17 thematic groups that dealt with the issues of under-representation of women and other minority groups in Indian science during the development of the policy (https://dst.gov.in). The draft policy states that equity and inclusion are foundational pillars of the science ecosystem. Dr Yarlagadda and I have highlighted in one of our articles in *Teacher* (volume 14, issue 4) that this policy addresses the existing gaps and challenges that are responsible for pushing back women in the field of S&T. The article describes low institutional support, leadership issues, age-barrier issues, leaky pipeline, societal stereotypes, the importance of role models, need for flexible support, and funding for women-led start-ups.

For developing holistic individuals, an identified set of skills and values must be incorporated at each stage of learning. STIP takes forward the idea of engaging students with real world problems by synergising schools, higher education institutes, corporate entities, and local communities. STIP has made recommendations on the mandatory representation of 30 per cent of women in all apex committees and decision-making groups, addressing issues related to career breaks due to family and social responsibilities, a dual recruitment policy for couples, and the institutionalisation of equity and inclusion by the implementation of the successful Athena SWAN Charter in Indian institutions (see reference list for further reading).

The *Vigyan Jyoti* programme was launched by DST in 2018 for supporting girl students in pursuing higher studies and careers in STEM, eventually leading to a higher representation of women in research. The pilot project was extended further in 2019 with the participation of about 2 900 students. Recently, it commenced a second phase, with a partnership with IBM India on the International Day of Women and Girls in Science on 11 February 2021 to cover 50 more districts, in addition to the existing 58 districts across the country. *Vigyan Jyoti* activities involve student-parent counselling, interaction with role models, visits to national research laboratories, science camps, scholarships, and career counselling.

Apart from Vigyan Jyoti, MANAK (Million Minds Augmenting National Aspirations and Knowledge) for schools, National Children Science Congress (NCSC), Initiative for Research & Innovation in STEM (IRIS), and the Atal Tinkering Laboratories are other pathways for creating a research environment in schools and encouraging school students to find a solution for real world challenges. These specific programmes are aimed at fostering a culture of innovation among school children and attracting talented young students to study science and pursue research as a career. The DST website reports that programmes like MANAK and *Vigyan Jyoti* may help girl students to improve their confidence in STEM subjects as so far out of a total of 1.386 Million MANAK awards sanctioned till 2018, about 47 per cent of the awardees were girls.

Conclusion

Both policies are parallel by design, complementary, and offer cross-cutting priorities to achieve gender equality and inclusion. The Gender Inclusion Fund proposed in the NEP aims to ensure 100 per cent enrolment of girls in schools and reduction of the dropout rate at every level. The STIP recommendations and ongoing programmes are expected to facilitate the conversion of these enrolments into sustainable skilled manpower and future leaders. The safe and secure environment promised by NEP will be nurtured by a vibrant science, technology, and innovation ecosystem following the recommendations of STIP.

NEP emphasises the need for increasing the number of women in leadership positions including principals, teachers, wardens, and other staff; similarly, STIP supports a programme for engaging students, and training teachers, principals, and leaders of schools to develop a scientific temper and foster a culture of continuous learning with creative thinking. The short-term courses, workshops, mentoring, and online science content communication will help to integrate science and technology in the education ecosystem and introduce women STEM experts as role models for girl students. NEP promises to revise the school curriculum and make it gender-neutral, technology-oriented, and more relevant for sustainable employment. These steps may support the goals of STIP to achieve 30 per cent participation of women in STEM careers and help them reach leadership positions.

The success of the popular global model roll-out by the DST in Indian institutions will rest on the collective efforts and coordination of implementing agencies, administration of a particular institution

and more critically the Ministry of Education. However, the proposed vocational courses under NEP may not be fully successful without the active participation of the Ministry of Science and Technology and the involvement of start-ups incubated by DST which generated 65 864 jobs as cumulative direct employment and created a wealth of INR 272 620 million from 2014-19 (see *The Times of India* report to learn more about start-ups incubated by DST). We look forward to the two policies working in harmony to bring about far reaching changes to our education system. T

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Underachievement of gifted students – effective interventions

IN THIS ARTICLE, MICHELLE LUCAS DISCUSSES THE BENEFITS OF MENTORING, PARTICULARLY FOR UNDERACHIEVING GIFTED STUDENTS WITH DISADVANTAGE.

Knowing the students and their needs

The starting point is to successfully identify your gifted students. This identification must include considerations for the inclusion of under-represented sub-groups. Once identified, it is important to understand each student – identifying strengths and weaknesses and assessing their needs. Research supports the use of interviews and surveys to understand students (McCoach & Siegle, 2003).

Providing daily challenge

Since many gifted students have already mastered as much as 40-50 per cent of the regular curriculum (Reis & Renzulli, 2012) and also learn at a fast pace (Imbeau, 2018), a significantly differentiated curriculum is required. Withdrawal programs offering enrichment have been shown to have positive effects (Little, 2012), but are only a part-time provision and may not arrest boredom in the regular classroom (Rogers, 2007).

Acceleration is a favourable alternative, either in the form of subject acceleration or grade-skipping (Callahan & Plucker, 2013). Both forms of acceleration commonly include some curriculum compacting or telescoping to minimise gaps in skills and knowledge outcomes (Rogers, 2015).

The effectiveness of acceleration to boost achievement is well-documented (Assouline et al., 2018; Gross, 2006) and acceleration programs have been well-received by parents in the Australian context (Dare et al., 2016). There have been some concerns that acceleration could have a negative social impact on gifted students, however, research evidence has shown no such effect (Assouline et al., 2018; Rogers, 2015). On the contrary, accelerated students have been shown to have increased engagement, positive self-concept, higher motivation and ambition, and have been found to be well-adjusted later in life (Rogers, 2007 & 2015).

Creating safe environments and a sense of belonging

In order to create a supportive learning environment for gifted students it is important that teachers have some knowledge and experience of gifted students and that misconceptions are addressed. From my own experience, I can't help thinking of a teacher's response to an invisible underachiever – 'he couldn't possibly be gifted' – and also wonder at their opinion of the identified underachievers.

Negative teacher attitudes can be a confirmation of student's own self-evaluations (Rimm et al., 2018), and include low expectations of gifted students which are strongly tied to achievement and motivation (Cohen et al., 2000). The best way to address misconceptions is through effective professional development, collaborative work to develop a shared understanding, and communication to engage teachers with research literature and important aspects of gifted education. Research identifies engagement with research, years of teaching experience, and professional development in gifted education as favourable factors to improve teacher attitudes and expectations (McCoach & Siegle, 2007).

I recall the low-achieving gifted students from my own school who felt they had little in common with their age peers. Literature suggests that some gifted children have more in common with their mental peers (Steenbergen-Hu et al., 2016).

With this in mind, grouping high ability students together can help students build connections with those who may have more similar character traits. There may be some negative impact to student's self-concept, often referred to as 'Big Fish Little Pond' syndrome (Fang et al., 2018), where students compare themselves unfavourably to other high potential learners. Recent research suggests these effects are short-term (Gross, 2006; Rosman et al., 2020), however, earlier studies reported long-term effects (Marsh, 1987). The negative effects have been shown to be much less significant for part-time and flexible grouping options (Card, 2015) and therefore it is recommended that vertical grouping of high ability students be used as a part-time provision to allow for social interaction and peer tutoring. This can be easily implemented with a lunchtime gathering or an after school club for gifted students, or more effectively embedded as a withdrawal program during timetabled classes.

Supporting socio-affective needs

Related to intervention three above, it is important to cater specifically to the socio-affective needs of gifted students, especially since there may be social skill deficits and asynchronous development among those identified (Cross & Coleman, 2014). Research evidence suggests direct social skills instruction in small groups run by the school counsellor is effective to address social and emotional development (Landy, 2002). Not only has this been shown to increase engagement and motivation, but also increase retention of students from diverse backgrounds (Ford et al., 2014). The literature supports embedding preventative counselling that caters to the unique needs of individual gifted students.

Another provision is mentoring. This can be used to provide extension and enrichment as well as for social and emotional support and clarity of goals and purpose. Research has found this intervention to be especially effective for underachieving gifted students with disadvantage (Rimm et al., 2018). Mentors could be teachers, parents or professionals, however, mentors with experience in a student's talent area are especially useful to extend students and provide relevance for their learning (Bowen & Shume, 2018). Professional mentors can also provide access to higher level outcomes and are an effective means of developing innovation capabilities (Burns et al., 2018). T

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Online school assessments: lessons from the COVID-19 pandemic

KAVITA SANGHVI SHARES FINDINGS FROM AN ACTION RESEARCH PROJECT AIMED AT UNDERSTANDING HOW STUDENTS RESPONDED TO ONLINE ASSESSMENTS ADMINISTERED BY THEIR SCHOOL DURING THE COVID-19 PANDEMIC.

Millions of school-going students across the world have been affected by the closures of educational institutions during the COVID-19 pandemic. Many such institutions shifted to online learning in the past year with the help of virtual teaching-learning platforms.

Assessments play a crucial role in the teaching-learning process. A well-designed assessment instrument can provide insights into a student's understanding of concepts, application, and skills. It helps teachers reflect on the curriculum design and execution and provides inputs for modifications and revisions. It also measures an institution's academic progress and how well its students are learning.

Till March 2019, as teachers we could confidently say that we were familiar with effective student assessment methods administered in physical classrooms. However, the pandemic forced us to assess students online, often through unfamiliar means. Formative assessments included e-book/poster projects, presentations, quizzes, and online discussions and debates. Summative evaluations initially began with simple Google or MS Teams forms for objective evaluations with one camera monitoring students, and Exam.net or other media with two cameras for subjective assessments. However, the reality is that even after 10 months, we are still wondering if students have actually learnt what they were taught.

We would like to believe that learning experiences were well constructed by educators and students attempted all assessments honestly, but we cannot ignore foul play in certain instances. Moreover, as the transition was sudden, many teachers were not fully equipped to teach online and were consequently apprehensive, leaving learners to learn in isolation. Also, using different information technology platforms led to different levels of competencies and proficiences among students (for more information, read Little-Wiles & Naimi, 2011; Rucker & Downey, 2016; Schmidt et al., 2016; Thorsteinsson, 2013).

Educators and school leaders need to know if the learning curves of individual students have moved up or down as a result of online teaching and assessments, and understand how they can modify their assessment approach to improve the validity and reliability of online assessments. With board examinations arriving in a few months, the major challenge is for Grade 10 and 12 teachers who are preparing students for examinations that have significant meaning for them.

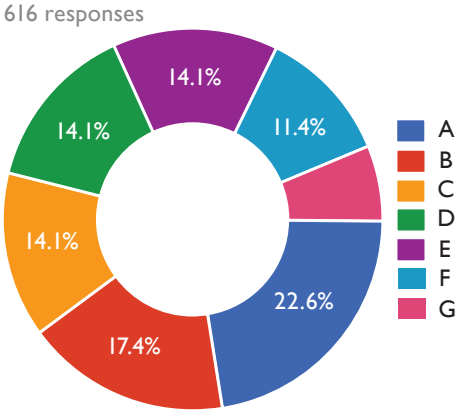
Action research project

An action research project was designed in my school to understand students' perspectives on:

- the efficacy of school online assessments and their impact on learning
- students' trust in e-assessment
- concerns and inputs for online assessment.

An online survey (Google form) was administered to 616 students in Grades 9–12 of a school. The first two questions of the questionnaire were two closed Likert scale questions. The third question was a simple yes/no question followed by six Likert scale questions and one yes/no question. The final question was an explanation for the last yes/no question. A total of 11 questions were asked of students via the survey.

616 responses



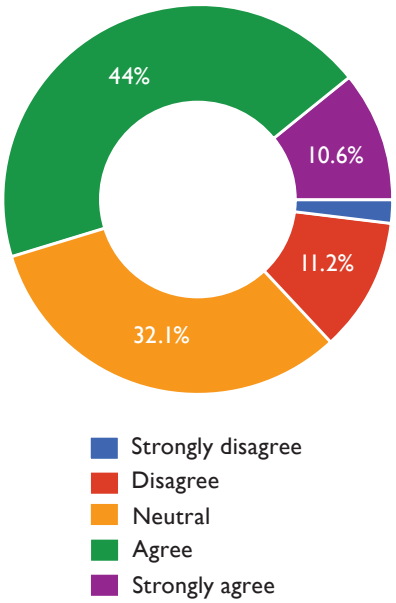
The findings of the project helped our teachers understand the strengths of the online assessment practices in our school and the areas that would require further improvements. It also helped them to reflect on specific problems of students and take action to change the situation.

Findings

1) Students were asked whether they felt that their learning progress had been adequately measured through online assessments and only about 11 per cent strongly agreed. This is rather surprising given the advantages and flexibility inherent within an online learning environment including wide-ranging opportunities for conducting effective assessments through technological platforms (see Benson & Brack, 2010; Broadbent & Poon, 2015; Crawford-Ferre & Weist, 2012; Napier et al., 2011). This finding indicates that our teachers have to investigate in-depth why our students are dissatisfied with such assessments and work towards improving their assessment experience.

My progress in learning can be adequately measured through online assessments.

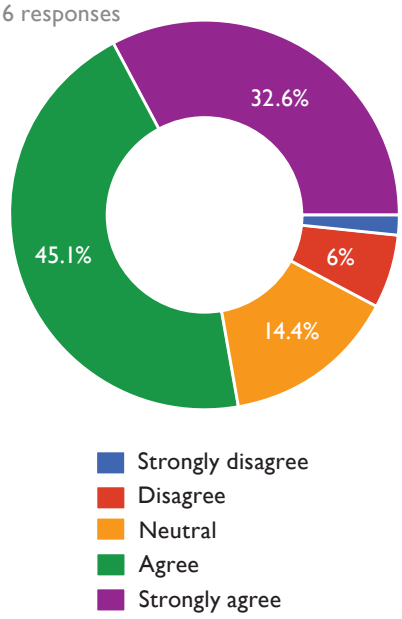
616 responses



2) When students were asked if their study space and movements were effectively monitored during invigilation, around 33 per cent strongly agreed. They felt that their teachers were highly vigilant and monitored student actions with great scrutiny.

My study-space and movements can be effectively monitored during online invigilation by my teachers.

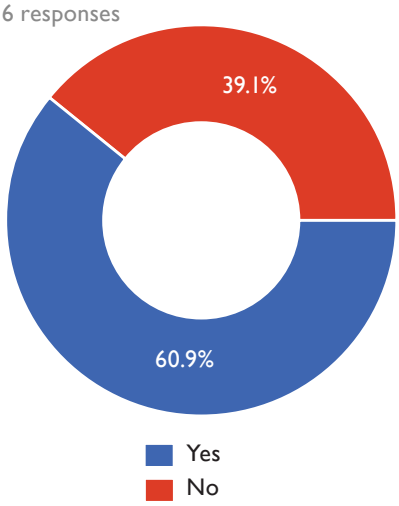
616 responses



3) Teachers in our school began by assessing students with one camera and then started using two to ensure effective monitoring of movement. Students were asked if using two monitoring cameras instead of one was more effective during online assessments. Almost 61 per cent of them felt that using two cameras was more effective. This indicates that our teachers have made an appropriate move by switching to invigilating with two cameras.

Using two cameras instead of one is more effective during online assessments.

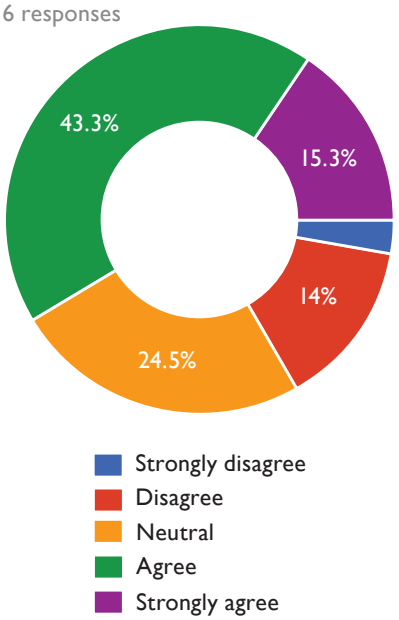
616 responses



4) Online assessments demand more time. Students have to download papers and upload their submissions and our teachers often have to stretch the assessment time limit from 15 to 30 minutes depending on a student's internet status at home. When students were asked whether the time given to complete assessments was sufficient, only 15 per cent strongly agreed, which caused our teachers to reconsider the time given to students to upload assessments online.

I found the time alloted for online assessments adequate.

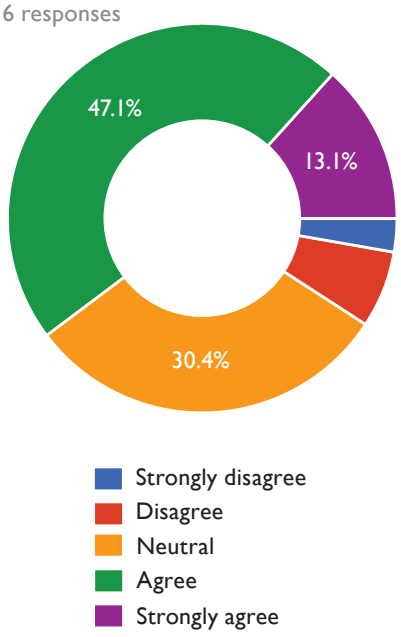
616 responses



5) Students were also asked if the assessment feedback given to them helped improve their understanding and application of concepts taught. Only 13 per cent of students strongly felt that feedback from teachers helped to address concept gaps. So, where did we go wrong? In face-to-face learning, a teacher can understand a student's body language and gauge how well students have accepted any feedback and are ready to improve. This is not possible in an online learning environment. Thus, our teachers realised that they had to reconsider their method of evaluating student assignments and offer feedback that would be considered constructive by students.

Feedback given to me on the basis of online assessments has been useful in improving my understanding and application of concepts taught.

616 responses

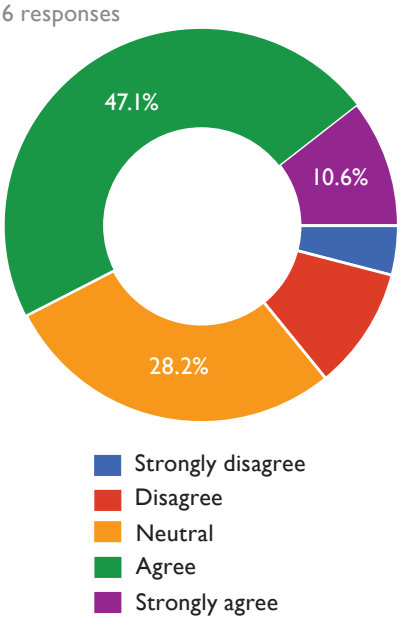


6) Only 11 per cent of students felt that online assessments helped improve their academic performance. This result was a little surprising for our teachers – many students scored much more in online assessments than they usually do in paper and pen tests. However, the data raises concerns; our teachers have to plug large learning gaps when students return to

physical classrooms. Moreover, teachers supplemented written exams with viva voce examinations that helped identify a significant difference in written and oral examination performance of students. Such variations also indicate that the area of online school assessment needs more work – an important learning for teachers and the management of our school.

I believe that online assessments have been beneficial to me in my endeavour to improve my academic performance.

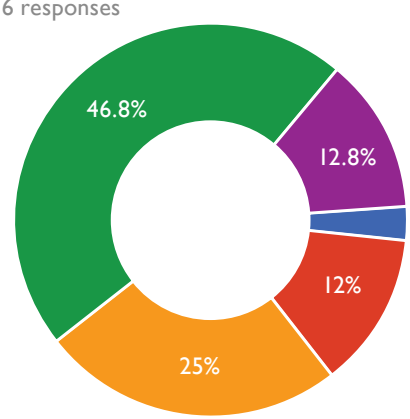
616 responses



7) Around 25 per cent of students were unsure if online assessments measured and reflected their academic progress correctly.

I believe that the outcome of online assessments correctly measures reflects my academic progress.

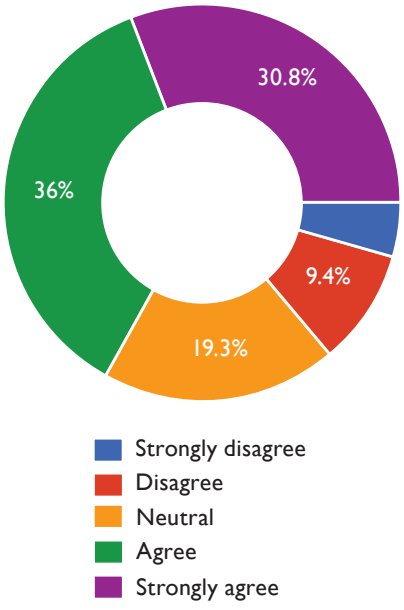
616 responses



8) The investigation also sought to examine if online assessment leaves more scope for cheating. If 31 per cent of students agreed strongly and 36 per cent agreed, it indicates that our school should look into minimising the use of unfair means in online exams. Academic research has also highlighted this point – students often search for answers on other devices and social media, and seek help from friends during online assessments (see for instance, Owens, 2015 and Best & Shelley, 2018). However, Golden and Kohlbeck in 2020 found that proctoring technology can help prevent such distortions and this could be a solution in the future.

The process of online assessments which has been followed leaves no scope for cheating.

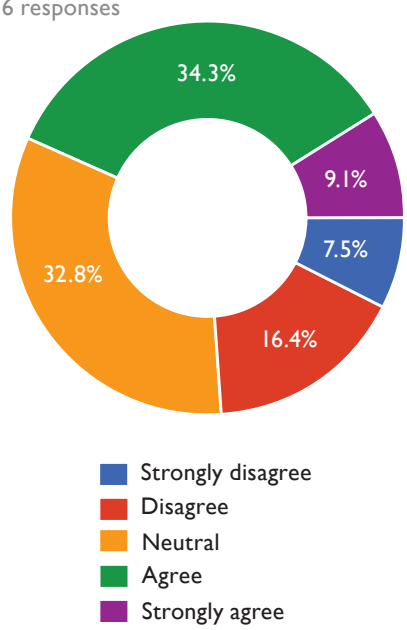
516 responses



9) With the Board exams around the corner, one wonders whether students are confident about appearing for offline exams. Only 9 per cent students showed confidence and that is again a worrisome figure.

My confidence at attempting an offline examination has been strengthened after the online assessments.

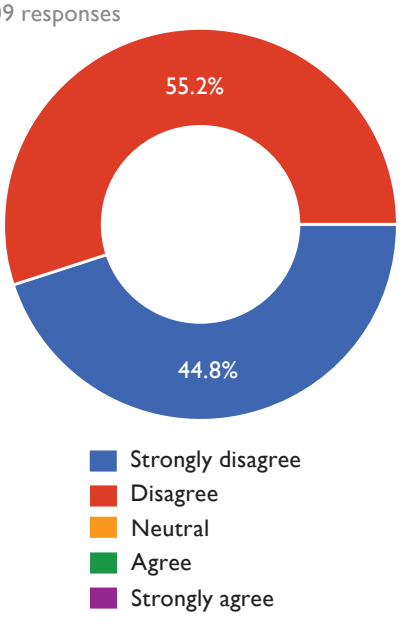
616 responses



10) Around 45 per cent of students preferred online exams even though only around 13 per cent felt that online assessments reflect their academic progress. This is a conundrum for our teachers – why do students still prefer online assessments?

I prefer online assessments to offline assessments.

609 responses



Conclusion

Students highlighted concerns such as 'online assessments are hectic', 'it was difficult to create exam like atmosphere at home', 'too many distractions', 'online not close to real exam situation', 'lots of malpractices', 'network issues', and 'strain on the eyes'. They preferred paper and pen exams in which students comprehended questions better, felt more confident, and believed that physical tests measure their skills more proficiently.

On the other hand, online tests helped them feel safe and less worried about COVID-19 infections. They also believed that their teachers had supported them during these confusing times. Recording of paper discussions helped them work on their misunderstandings. The online environment offered better utilisation of time and effort, helped avoid exam phobia, and offered assessments in the comfort of their homes.

Students feel that online learning is only a temporary solution. Nevertheless, it has offered many advantages like going back to recordings of paper discussions and lessons till one is confident about a concept, different modes of assessment, less stressful environments, and better utilisation of space and time. Thus, teachers and the school management of our school will have to take into account all these points when students return to physical classrooms. Should we move to blended forms of teaching-learning and assessments? T

AUTHOR
Kavita Sanghvi is the Principal of CNM School & ND Parekh Pre-Primary School.

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- Participants should be able to undertake basic mathematics (numeracy) operations and use a laptop/computer.
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Week-8	Commonly used methods for ranking and scoring – scale scores
Week-9	Applying data literacy at work

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Debunking the equity myth in education

ACER CHIEF EXECUTIVE PROFESSOR GEOFF MASTERS SAYS TRADITIONAL CURRICULUM AND ASSESSMENT SYSTEMS ARE ‘FUNDAMENTALLY INEQUITABLE’.

In an article published in *Teacher* online, Professor Masters says the well-intentioned desire to deliver the same year-level curriculum to all students needs a fundamental re-think if we are to improve educational outcomes in Australia.

Professor Masters' article explains how the current school curriculum and assessment model creates an illusion of providing a level playing field on which every student has an equal opportunity to learn and succeed, regardless of their background.

'For example, the Year 5 curriculum spells out what every Year 5 student is expected to be taught and to learn. All students commence this curriculum at the same time and have the same amount of time to master its content," Professor Masters writes.

With every student then assessed against the same year-level standards with the same tests and examinations, Professor Masters says the marks and grades individuals receive at the end of a school year are assumed to reflect how well they have learnt during that year.

'This curriculum-assessment system is considered 'meritocratic' in that it allows every student to compete on an equal footing and to be judged on their own merit,' Professor Masters writes. 'Importantly, a meritocratic system is not expected to deliver equal outcomes.'

Professor Masters highlights this with a quote from The Tyranny of Merit by Michael Sandel: 'Even a fair competition has winners and losers. What matters is that everyone starts the race at the same starting point.'

But Masters points out that, in education, 'Instead of beginning on the same starting line, students begin each school year widely spread along the running track. Despite this, they are all judged against the same finish line: the year-level curriculum expectations.'

Compounding this inequity, Professor Masters writes, is that students disadvantaged by being assigned a curriculum for which they are not yet ready are often also the students least likely to have access to resources to counter this disadvantage. The common experience of these students is to begin each school year toward the back of the pack and on track to receive low grades.

'It is fundamentally inequitable to insist on equal treatment when students are not equally ready,' Professor Masters writes. 'Equity demands a curriculum responsive to individual needs, not blind equality.'

Professor Masters proposes that, instead of being anchored to years of school, an equitable curriculum would define a common sequence and course of learning for all students while allowing for differences in individuals' starting points and rates of progress. An equitable assessment system would be designed to establish the points individuals had reached in their learning, as a guide to appropriate next steps in teaching and learning, and would recognise and reward the progress individuals make over the course of a year, regardless of their starting points.

'Given community faith in the fairness of current curriculum and assessment processes, the common belief that educational outcomes are meritocratic and deserved, the far-reaching life consequences of those outcomes, and the fact that existing inequities are most likely to disadvantage those least likely to question or object, we have a responsibility as educators to responsibility as educators redouble our efforts to make equity more than a myth,' Professor Masters writes. **T**

This article has been previously published in ACER's Discover www. https://www.acer.org/au/discover/article/debunking-the-equity-myth-in-education.

AUTHOR
Professor Geoff Masters AO has served as Chief Executive Officer and board member of the Australian Council for Educational Research (ACER) since 1998. He has a PhD in educational measurement, and has published widely in the fields of educational assessment and research. His contributions to education have been recognised through the award of the Australian College of Educators' Medal in 2009 and his appointment as an Officer of the Order of Australia in 2014.

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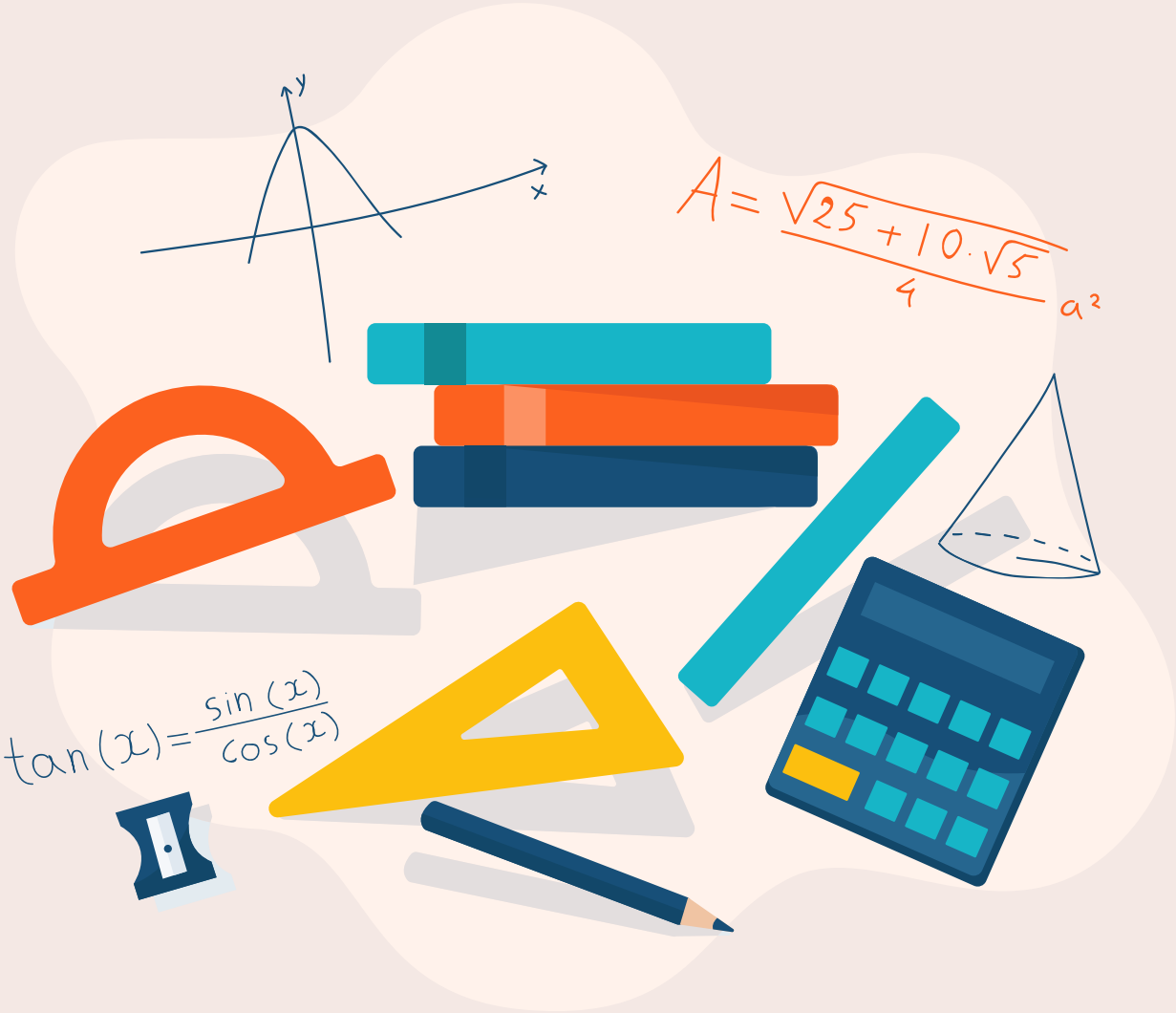


Teacher resources on numeracy

TEACHERS HAVE TO PERSISTENTLY ORIENT MATHEMATICS TEACHING TOWARDS BUILDING A STRONG FOUNDATION AND IMPROVING ACHIEVEMENTS OF STUDENTS. THIS ARTICLE PROVIDES A LIST OF SHORT TOPICAL ONLINE READINGS ON TEACHING AND LEARNING MATHEMATICS PUBLISHED BY ACER.

Learning and fearing mathematics

In this article, Sarah Buckley and Kate Reid explain how psychology and neuroscience research findings can help teachers debunk the processes behind children's mathematics learning and what they feel about mathematics.

Discover: https://www.acer.org/au/discover/article/learning-and-fearing-mathematics

Preparing mathematics teachers

This article shares the findings of a study that compares how mathematics teachers are prepared in seventeen different countries and their knowledge of mathematics and teaching methods. The survey study covered 22 000 future teachers, 750 programmes, and 500 institutions across different countries.

Discover: https://www.acer.org/id/discover/article/preparing-mathematics-teachers

Parents urged to develop maths in kids from birth

In this article, Robert Hunting, Judy Mousley, and Bob Perry, the authors of Young Children Learning Mathematics: A guide for educators and families provide insights from their book and recommend that parents, grandparents, and early childhood educators use playtime for developing mathematical concepts among young children.

Discover: https://www.acer.org/in/discover/article/parents-urged-to-develop-maths-in-kids-from-birth-1

How to foster early numeracy skill development

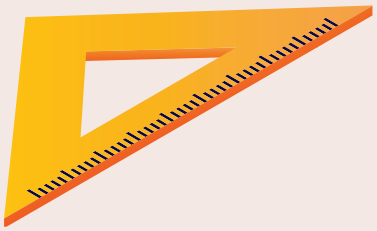
This article summarises the findings from the ACER report, Counting on it: Early numeracy development and the preschool child, covering two key areas – how early numeracy learning affects later learning, and how to support early numeracy development. The article suggests that early numeracy skills can be fostered through exchanges with caregivers before a child joins formal schooling and can help build a solid foundation for mathematics in later years.

Discover: https://www.acer.org/au/discover/article/how-to-foster-early-numeracy-skill-development

Using picture books to reduce maths anxiety

This resource highlights how picture books can help students overcome mathematics anxiety. It also provides a list of picture books that are available online and can support mathematics teaching.

Discover: https://www.acer.org/au/discover/article/using-picture-books-to-reduce-maths-anxiety T



AUTHOR
Anannya Chakraborty is a Senior Communication Officer at ACER India.

Letters to the editor

ART INTEGRATION IN MATHS THROUGH WARLI ART

Dear Editor,

I am writing to you to share my thoughts on using Warli art to teach mathematics. Art and maths are closely related in terms of reasoning and pattern recognition. Artists and mathematicians both use geometry in their work including shapes, symmetry, proportions, and measurements.

I was recently asked to deliver an art-integrated mathematics class for angles. The objectives were to teach children how to identify different types of angles and classify an angle as acute, obtuse, vertically opposite, or right.

Warli painting is a style of tribal art mostly created by the tribal people from the North Sahyadri range in India. This tribal art originated in Maharashtra and is practiced even today.

An angle is a measurement of turn. It tells us the amount of turn from one position to another. So how did I teach children the concept of angles through Warli? In Warli art, people and animals are represented by two inverse triangles joined at their tips. The upper triangle depicts the torso and the lower triangle the pelvis. I asked students to draw a big X in their copies with the help of a scale and name all the endpoints. Then we discussed vertically opposite angles formed at the intersection points. Then I asked them to join the top two ends to form a triangle. They then measured the angles inside the triangle and learnt that the addition of all angles in a triangle sums up to 180 degrees. In the same way, they joined the lower two ends and repeated the procedure.

Then students made a circle at the top creating a head and connected the two inverted triangles with the head by drawing two small parallel lines (neck). They also made hands and legs in different directions using two straight lines and then defined whether the angles formed at hands were acute or obtuse.

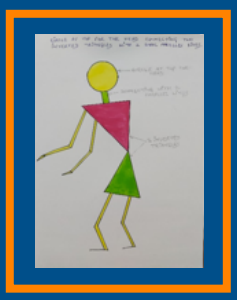


Figure 1: Learning geometry with Warli

Best wishes,
Dr Ragini
Sumbeam Lahartara

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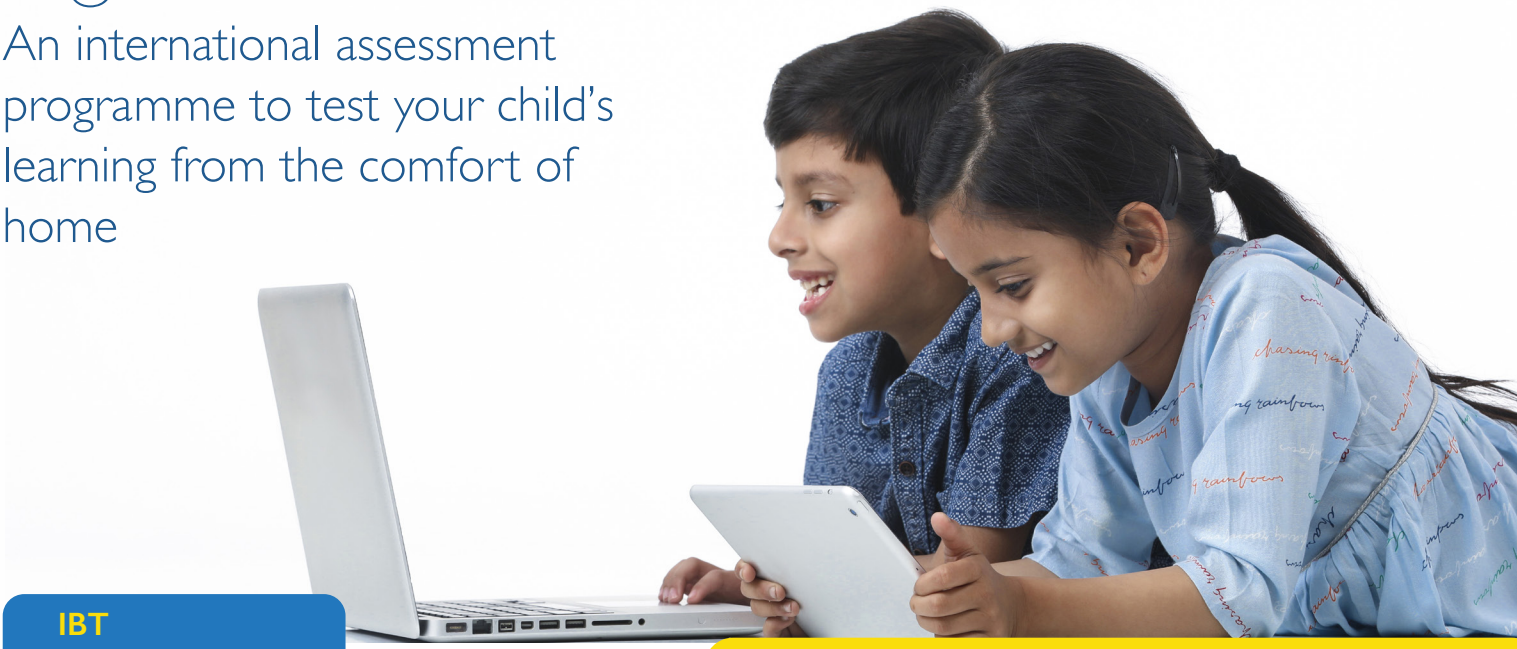

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World Wildlife Day quiz

WORLD WILDLIFE DAY IS CELEBRATED ON 3 MARCH EVERY YEAR; THE THEME FOR 2021 WAS FORESTS AND LIVELIHOODS: SUSTAINING PEOPLE AND PLANET. THE UN ESTIMATES THAT AROUND 200–350 MILLION PEOPLE GLOBALLY LIVE WITHIN OR NEAR FORESTED AREAS. FOREST ECOSYSTEMS ARE A SOURCE OF LIVELIHOOD AND COVER THE BASIC NEEDS OF MANY PEOPLE, PARTICULARLY INDIGENOUS AND LOCAL COMMUNITIES.

IN KEEPING WITH THIS YEAR'S THEME, HERE ARE SOME QUESTIONS TO TEST YOUR KNOWLEDGE OF FORESTS AND THE LIVELIHOODS THEY PROVIDE:

1. The Sundarbans is famous for what forest-based product?

A) Timber
B) Bamboo
C) Honey
D) Medicinal plants

2. How many people in India are dependent on forests for sustenance and livelihood?

A) 1 million people
B) 5 million people
C) 15 million people
D) 300 million people

3. Which state has the largest forest cover in India area-wise?

A) Arunachal Pradesh
B) Madhya Pradesh
C) Karnataka
D) Maharashtra

4. Which of these is a dye-yielding plant?

A) Ritha/Acacia sinuate (Lour) Merril
B) Rose
C) Palm
D) Tulip

5. Which of these Indian states has the highest mangrove cover?

A) Andaman and Nicobar Islands
B) Andhra Pradesh
C) Gujarat
D) West Bengal

6. Which is the world's largest tropical rainforest?

A) Southwest National Park, Australia
B) Amazon, South America
C) Cardamom Mountains, Southeast Asia
D) Sundarbans, South Asia

7. In which year was the The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act enacted in India?

A) 2015
B) 2010
C) 2006
D) 2000

Further reading
https://www.wildlifeday.org/
https://tribal.nic.in/

Enjoyed this quiz? Send your opinion to **commsindia@acer.org** giving reference to this quiz.

Answers

1. Honey
2. 300 million
3. Madhya Pradesh
4. Ritha/Acacia sinuate (Lour) Merril
5. West Bengal
6. Amazon, South America
7. 2006

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IBT

International Benchmark Test

BENCHMARK YOUR ACHIEVEMENT AGAINST THE WORLD

The International Benchmark Tests (IBT) are an internationally administered programme of assessment in English, Mathematics, Science, and Reasoning developed by the Australian Council for Educational Research, a world leader in educational assessment and reporting. Very recently IBT Arabic language assessments have been introduced. IBT benchmarks student performance against a broad international cohort of students. Schools use IBT to benchmark student and school performance nationally and internationally and to monitor student progress from one year to the next.

IBT is a comprehensive assessment of student performance and ability for Classes 3 to 10. The IBT reports identify student strengths and weaknesses, providing teachers with reliable data to inform their teaching.

IBT currently operates in countries in the following regions: South Asia, East Asia, the Middle East, and Southern Africa.

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Supporting teachers to use data to improve learning

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IBT Plus offers a rigorous and reliable suite of IBT assessments integrated with professional learning workshops. It is the only international assessment programme in India providing high quality professional learning workshops that support schools to effectively use assessment data and target teaching strategies to improve learning outcomes.

IBT Plus supports school leaders and teachers to:

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- Test 21st century skills
- Use evidence in teaching and learning
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NEWS SNAPSHOT BY ANANNYA CHAKRABORTY.

India

School closures affect millions of Indian children

The United Nations Children's Fund (UNICEF) estimates that 247 million children in elementary and secondary schools of India were impacted by the COVID-19 school closures that began in 2020.

Training on CBSE's restructured affiliation process

The Central Board of Secondary Education (CBSE) will be training schools on the recently restructured affiliation process through a series of webinars and training sessions. The new process is digital, based on data analytics, and as per the recommendations of the National Education Policy.

Delhi Government's e-learning content gets international users

Users from 20 countries have accessed the e-learning content developed by the Government of the National Capital Territory of Delhi for its schools during the COVID-19 pandemic. Canada, Germany, Malaysia, Nepal, New Zealand, Philippines, Singapore, UK, and USA are some of the countries mentioned in the report.

South Asia

MoU for the reconstruction of Nepalese schools

A memorandum of understanding (MoU) between India and Nepal was signed for the reconstruction of six secondary schools in Nepal. A total of Nepali Rupees 518 million will be spent on the reconstruction.

Bangladeshi schools reopen

Bangladesh has decided to reopen primary, secondary, and higher secondary level educational institutions on March 30. Schools in Bangladesh have remained closed since 17 March 2020 due to the COVID-19 outbreak and now classes will be held once or twice a week for different grades.

South East Asia

Thai private schools offer fee refunds

Private schools in Thailand had to repay parents for services that were not delivered – lunches, milk, computers, extra language classes, swimming, and sports activities – during the COVID-19 outbreak. Approximately 524 private schools across the country have returned a total of 561 million baht to parents.

Vaccinations for teachers in Indonesia

Indonesia started to vaccinate school teachers in February 2021 and aims to complete the inoculation of 5 million teachers by June. A limited number of children had started going to schools in areas of low transmission from January onwards.

International

Budget cuts due to COVID-19

Education Finance Watch (EFW) – a partnership between the World Bank and UNESCO's Global Education Monitoring (GEM) Report – found that public education budgets have plummeted in two-thirds of low- and lower-middle-income countries. Although there have not been any significant budget cuts, these may be increased as finances dwindle over time. This will consequently increase the gap between education funding of low- and high-income countries.

LINKS
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