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Working with Worksheets

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All opinions expressed in this publication are those of the authors and do not necessarily reflect the official policy or position of the Azim Premji University.

FROM THE EDITOR



The COVID-19 pandemic has taught us all a number of lessons, and online schooling was one of these. In the list of new teaching methods that teachers quickly thought of, the worksheet emerged as a leader, a learning aid that is creative, participative and which makes children want to use their minds more independently than when answering run-of-the-mill exercises from textbooks. Teachers physically distributed and collected worksheets and were able to keep up some semblance of learning during the school closures. After the reopening, the value of worksheets having been established, teachers are continuing to use them. There are a number of reasons for this. Worksheets let children learn without feeling burdened because the mode of learning is so participative and collaborative. Worksheets work well, particularly in primary school: when answering orally or in writing seems like an avoidable chore, worksheets can seem like fun. This is especially relevant when the world is moving away from individualistic modes of learning, relying on outdated methodologies, such as rote-learning and moving forward to play-related and collaborative ways and strategies of imparting education. Additionally, worksheets are also indicators of learning progress and allow both the teacher and the student to assess the student's learning as well as the efficacy of the worksheet itself. For the parents, too, it is an enjoyable way of helping their children complete the worksheet and being abreast of their progress. When created by teachers, worksheets are most versatile because they themselves have thought of the purpose and the context of its contents.

The learning that results from worksheets, which sharpen children's skills by teaching them to rely on their own logic to arrive at answers and deduce solutions for themselves, is subtly transmitted and, hence, more likely to be permanent. This sets the stage for later independent action and decision-

making skills. An effectively-created worksheet aids children in actually examining concepts taught during the course of the lesson, while in pre-primary classes, filling in worksheets, drawing and colouring pictures sharpen fine motor skills.

All the articles in this issue demonstrate the uses of worksheets. One article speaks of reinforcing learning, motivating students and encouraging independent learning by creating individualised worksheets. Another article gives us insights into the types of worksheets that are the most efficacious by keeping in mind the level at which they are going to be used. Yet another article contradicts the notion that worksheets merely encourage drill and practice, particularly in maths. Another has highlighted the *Learning Reading Programme* and the necessity, again, of relating worksheets to the level of the class. We also have an article on learning maths through IT and games with dice and one in which teachers give their stamp of approval to worksheets.

One theme common to all the articles in this issue is the joy and involvement that worksheets generate: they are no longer the dull, repetitive drills that they were, capable of eliciting only one answer. They are now an active learning tool and the uses they can be put to are limited only by the imagination of their creator.

We hope that our readers will get new ideas from this issue to enhance the children's learning experience. We have added a pullout feature as exemplars of how worksheets can be created - teachers can add to them or make the changes most relevant to their classes. Your feedback is welcome.

Prema Raghunath

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Designing Worksheets for Meaningful Learning

Aanchal Chomal

Introduction

In the last two years of the pandemic, student learning has been severely impacted due to frequent school closures and ineffective online learning alternatives. During this time, we have observed several schools and governments implementing worksheets as one of the teaching-learning materials (TLM) to maintain continuity of student learning and address the widespread and serious nature of learning loss. However, the effectiveness of these worksheets in furthering student learning will depend on how they have been designed. To what extent do these worksheets address the learning loss that has occurred in the last two years? During school reopening and for some time after that, investing time and effort in the designing of effective TLMs that can supplement students' learning will be paramount and teachers will need to take a lead in developing these.

Worksheets are the most commonly used TLMs and teachers are often not provided with any guidelines or instructions on designing worksheets. As a result, often worksheets end up being practice sheets merely aimed at reproducing facts learnt from the textbooks; or for drill and practice of certain skills; or for copy writing, colouring etc. Very often, these types of worksheets keep students occupied but may or may not lead to any meaningful learning.

This article is primarily aimed at helping teachers in designing effective worksheets that can support continuity in students' learning. A few design principles that are guided by sound pedagogical considerations are discussed.

What is a (good) worksheet?

In a blog post,¹ Jennifer Gonzalez suggests that most worksheets fall within a continuum of 'busysheets' and 'powersheets'. Busysheets are the kind of worksheets that keep students occupied in some way, 'where students are either doing work that's

fairly low-level recall stuff – filling in blanks with words, choosing from multiple-choice questions, labelling things – or work that has no educational value at all, like word searches, word scrambles, or colouring, even when colouring adds no extra layer of understanding.'

In contrast to busysheets, powersheets are learning tools which engage the student in meaningful learning, such as the learning of a skill, its application or a self-learning tool. It is, therefore, significant to develop an understanding of the principles and processes of designing worksheets that function as powersheets.

Principles for designing good worksheets

The principles of designing good worksheets could be broadly split into two categories, one, related to content and pedagogical considerations and two, related to the designing of the worksheets – the layout and presentation.

a. Content and pedagogical considerations

- i. Worksheets should address key learning outcomes and foundational competencies:

Due to the massive learning loss that has occurred in the last two years, worksheets should be grade-agnostic, that is, they should not be based on any grade-specific textbook. They should be designed keeping in mind the learning outcomes and competencies relevant to the subject. In addition to being grade-agnostic, it is equally important for the worksheets to address pre-requisite outcomes of at least two grades below the grade that the child is currently studying in. This means that while designing a language worksheet for a class III child, there should be a few questions/tasks that are of classes II and I.

Illustratively, for a class III worksheet on writing, the outcomes that can be addressed in the worksheet can be organised as shown in the Table 1.

Class I-level outcomes	Class II-level outcomes	Class III-level outcomes
1. Draws/scribbles in response to poems and stories	2.1 Draws or writes a few words or short sentences in response to poems and stories	2.1 Writes 5-6 sentences in English on personal experiences/events using verbal or visual clues

Table 1. Source: NCERT Learning Outcomes, Elementary Stage, 2017

ii. Worksheets should include tasks that scaffold and deepen conceptual understanding:

In order to make worksheets an effective learning resource, it is important to design the tasks carefully. One of the foremost principles would be to provide tasks that are not limited to lower-order thinking, such as recalling, copying, and repeating procedures. The tasks should entail the use of conceptual understanding by the learner. That may not be an easy task, particularly due to the interrupted learning in

the last two years. In such cases, some sort of scaffolding tasks should be provided to the child. A scaffolding task, as the name suggests, would support the learner in understanding how to go about solving a given problem. Illustratively, in the next example (Figures 1 and 2), the learner is made to understand how the concept of multiplication is actually repeated addition through grouping. Once learners have gone through the solved example, they are supposed to try out the worksheet on their own.

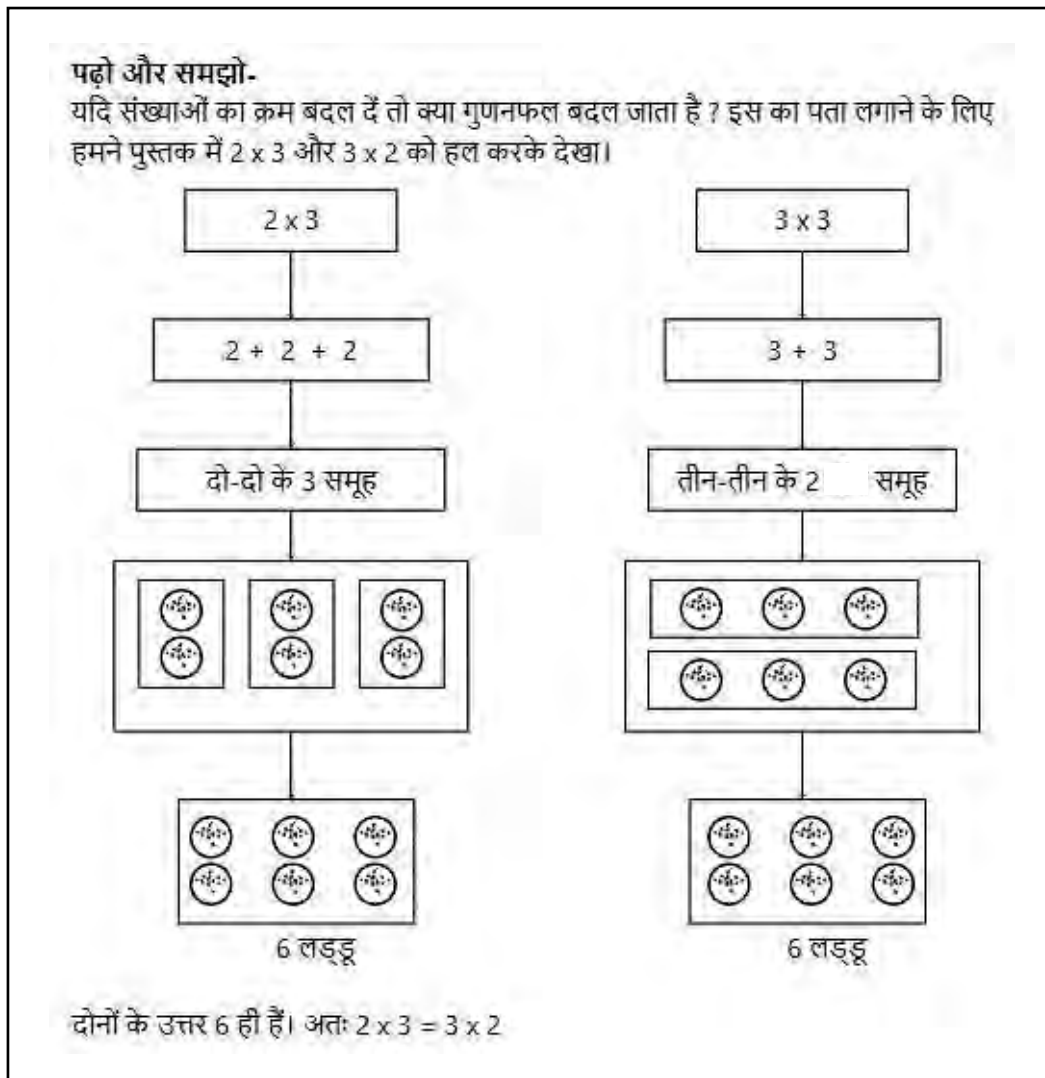


Figure 1. Source: Azim Premji Foundation worksheets, Chhattisgarh, 2021.

एक बार पुनः उसे आप इस अध्याय की शुरुआत में पाठ्य पुस्तक में देख सकते हैं।
 उसके आधार पर निम्न प्रश्नों को हल करें -
 अब आप इसी तरह 4×2 तथा 2×4 को पूरा करो।

क्या दोनों बराबर हैं? _____ अतः $4 \times 2 = 2 \times 4$

Figure 2. Source: Azim Premji Foundation worksheets, Chhattisgarh, 2021.

- iii. Worksheets should include a variety of tasks, including those on higher-order thinking: Since the worksheets must include prior learning, they can have a diverse set of tasks – starting from simpler ones to those that adequately challenge the learner. The worksheets should gradually help the learner in demonstrating the skills of application, analysis and problem-solving. Illustratively, the task given in Figure 3 requires the student to apply both addition and subtraction procedures in an unfamiliar context than those presented in the textbook.
- iv. Worksheets should include authentic materials and tasks for experiential learning: A host of authentic materials that is available in the learner's environment, such as maps,

posters, newspaper articles, food item wrappers, etc. should be used as context and stimulus to create such tasks. The tasks in a worksheet could also be connected to conducting some real-life experiments and recording the data back into the worksheet. Such tasks can be done in groups or pairs where learners get an opportunity to collaborate with their peers to perform the tasks. Illustratively, in the science task shown in Table 2, the learners have to observe key characteristics of soil with some leading questions and note down their observations in the worksheet. Such tasks can provide an excellent start for triggering a discussion in class and connecting these to further concepts in the subject.

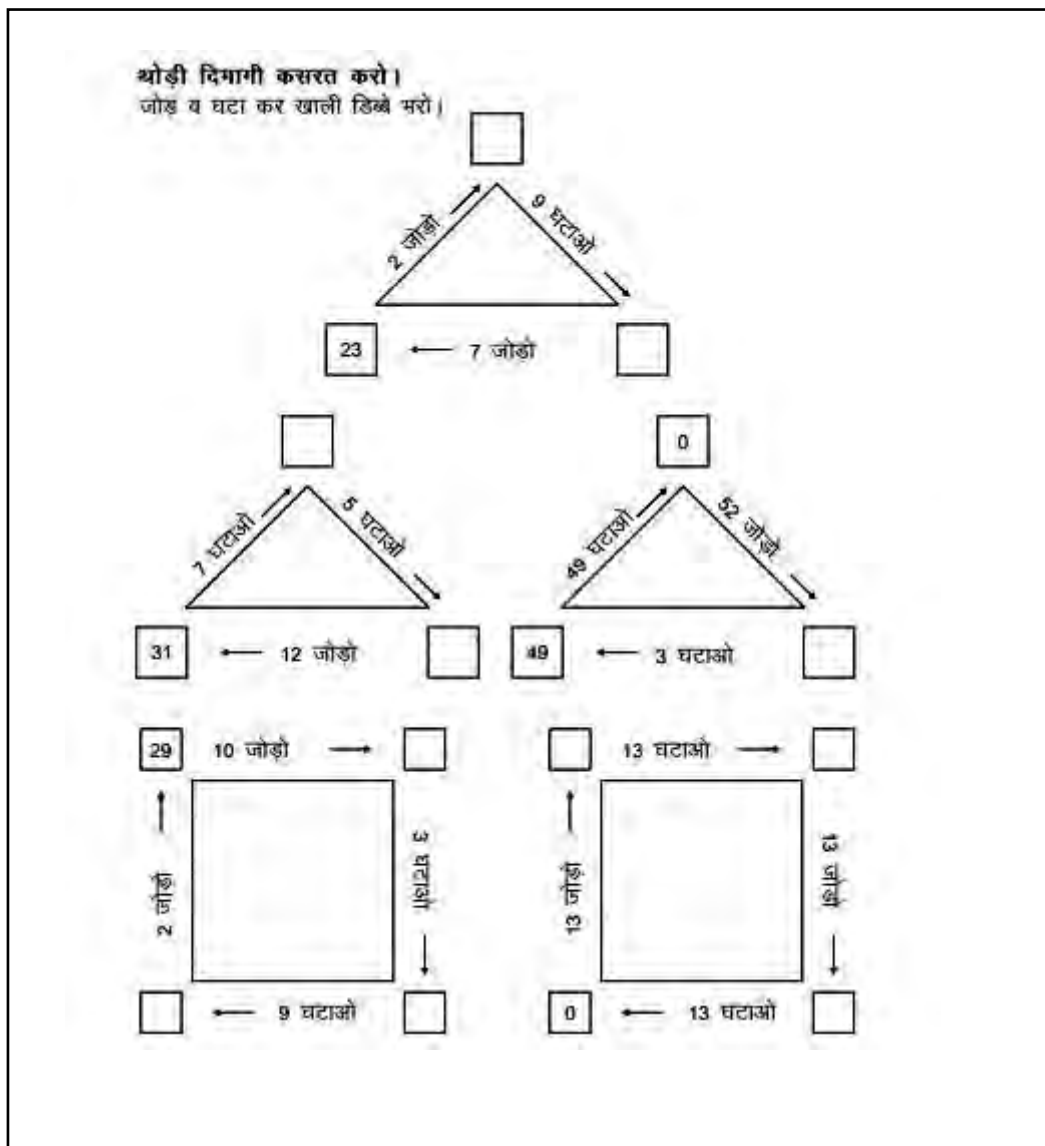


Figure 3. Source: Rajasthan Workbooks, 2007.

EXPERIMENT: EXAMINING SOIL		
Have you ever wondered which properties of soil you could study? Let us make a list and study them:		
Points for observation	Properties	Observations
<ul style="list-style-type: none"> How does the soil look? Is it lumpy, a fine powder or granular? What is its colour - black, brown, red, any others? How does it feel when you touch or press it? Hard, soft, elastic, dry, sticky? How does it smell? Aromatic, foul, no smell? Can you see any living creatures or remains of dead creatures or plants in the soil? 	<ol style="list-style-type: none"> Shape of particles Colour How it feels Smell Living organisms present Remains of organisms Type of soil Moisture Water retention 	

Table 2. Adapted from Bal Vaigyanik Textbooks

v. Worksheets must include self-reflection prompts for learner- and teacher-feedback:

The worksheets should also have a corner for the learner to reflect on and share his/her views on the tasks. In addition to that, the teacher

should also provide feedback to the learners on specific tasks. This would help the learners in understanding what is expected of them in subsequent tasks undertaken.

Self-reflection prompts	Student's responses	Teacher's feedback about student
1. Was I able to attempt all the questions in this worksheet? 2. What tasks/questions did I like the most and why? 3. Which question was I unable to answer and would need more help to answer?		

Table 3. Learner and teacher feedback

Look at the picture below. Observe the different uses of the coconut tree.

ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ನೋಡಿ. ತೆಂಗಿನ ಮರದ ವಿವಿಧ ಉಪಯೋಗಗಳನ್ನು ಗಮನಿಸಿ.



Note to teacher : Ask questions on how each part of a coconut tree can be used. Discuss how different parts of trees are used at homes.

Figure 4. A worksheet with bilingual instructions

b. Design, layout and presentation

Once the content of the worksheet is finalised using sound pedagogical principles, the next important thing to keep in mind is the design of the worksheet. A few simple things should be kept in mind.

- i. Font size should be large enough for young learners to read the text clearly.
- ii. There must be an adequate number of line spaces to allow learners to express their answers fully.
- iii. The quality of paper used for the worksheets should be good. It should not tear when learners write on it.
- iv. The overall layout and presentation, especially for younger children, should be attractive and inviting.
- v. There should be clarity in the prompts and instructions: It has also been found that the quality of prompts and instructions provided in the worksheets greatly influences students' ability to solve the worksheets. Tasks, in which instructions are specific and simple, are easily solved by the learner. In schools following bilingual medium of instructions, the worksheets could also carry instructions for both teacher and learners in both languages. In the example shown in Figure 4, the EVS textbook of Karnataka that was used in the English medium sections used bilingual instructions to scaffold both the learner and teacher in acquiring proficiency in English.

What could be the uses of such worksheets?

Worksheets when developed meaningfully can

serve multiple purposes.

i. Provide evidence of students' learning and reporting learner progress:

These worksheets demonstrate how well a child has learnt throughout the academic year and can, therefore, serve the function of reliable evidence of learner progress in an academic year. A teacher can extract relevant pages from students' worksheets and maintain records in their portfolios. Such portfolios or box files as they are called in many states provide a comprehensive and consolidated overview of each child's capabilities and areas of strength. This can, in turn, be used for periodic communication with the parents about the child's learning levels.

ii. Collating students' learning levels and planning classroom pedagogy:

If the worksheets are designed keeping the above principles in mind, they can be used as a tool to diagnose students' current learning levels. For instance, after administering a worksheet with a group of 20 students, a teacher may be able to accurately identify how many children in her class are at grade 1/2/3 levels in a particular competency. She can also get a sense of the competency in which her class is the weakest – the one in which most of the children have made mistakes. Such an analysis will enable the teacher to pitch her classroom transaction at a level that matches the level of the students. It will also give her an adequate insight into why students are struggling in learning certain class-level content.

Sl. No.	Name of student	Performs all four mathematical operations	Solves word problems with at least two or more mathematical operations	Creates simple word problems	Supports peers in solving problems
1	Student 1	Y	N	Y	N
2	Student 2	N	N	Y	N
3	Student 3	N	N	N	N
4	Student 4	Y	Y	Y	Y
5	Student 5	N	N	Y	Y
6	Student 6	N	N	N	N
7	Student 7	Y	Y	Y	Y
8	Student 8	Y	Y	Y	N
No. of students needing support		4	5	2	5

Table 4. The teacher could maintain a consolidated assessment record.

iii. *Promote the culture of assessment as learning:* Worksheets designed for learners with space and opportunities for self-reflection through prompts will help students make the transition to assessment as learning. Students will be able to practise self-assessment and reflect upon their strengths and weaknesses. In the lower classes, the teacher may need to scaffold this process closely or use simpler examplesⁱⁱⁱ; however, with repeated practice of using such worksheets, students will be able to self-assess their progress independently.

Conclusion

Worksheets will continue to be a very important TLM in the recovery of learning loss and in supporting students in furthering their learning. The layout and presentation of the worksheets should be simple and attractive, and they should have the right amount of textual material as per the age of the learner and complexity of the concept addressed in the worksheet. The font size,

illustrations, images and instructions used must be clear, simple and unambiguous. In addition to the design, it is also important to develop the content judiciously – worksheets should be seen as a learning resource providing cognitive scaffolding to the student to engage deeply with the learnt concepts. The content in the worksheets should be well-aligned to learning outcomes. A wide variety of tasks ranging from questions and activities to real-world tasks should be included in the worksheets. It is also advisable to sequentially organise the questions or tasks from simple to complex ones.

Apart from the designing of worksheets, it is also necessary to discuss how to use them – as a TLM, these could be used for both self-learning as well as peer/group learning. Well-developed worksheets may also be used as an assessment resource to collect and collate evidences about student learning and help the teacher in planning her lessons more effectively.

Endnotes

- i <https://www.cultofpedagogy.com/busysheets/>
- ii Based on studies conducted by Stanford University
- iii Aanchal C. 2020. Coping with Lost Time, Learning Outcomes and Assessment. Learning Curve Issue XI, Dec 2020. http://publications.azimpremjifoundation.org/2503/1/4_Learning%20Outcomes%20and%20Assessment_Aanchal_Chomal.pdf

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Different state and other materials and textbooks: Karnataka DSERT, *Bal Vaigyanik*, Rajasthan Workbooks.



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The Place of Worksheets in Learning

Aruna Jyothi

Definition and rationale

Worksheets are designed to provide supplementary work to students. In a classroom, a worksheet is, by and large, used to provide some information or give more work (practice) in addition to what is taught or learnt from the textbooks and, at times, even to assess students' work. Worksheets are used in all subjects, all age groups of students, and for all levels of learners.

Depending on the way it is designed, a worksheet could serve either as a teaching tool or a learning tool. Many a time, the kind of exposure one wishes to provide students with – be it as a piece of information or as a creative activity – is not available in a textbook. A teacher then turns to other sources or resources available outside of these textbooks and converts them into worksheet(s). At times, teachers simply duplicate or reproduce content given in other textbooks to create a worksheet. Therefore, a teacher's imagination and creativity play a significant role in making the worksheets interesting and motivating or, conversely, mechanical.

Context, abilities, children's levels of learning and the class level dictate the way a worksheet is to be designed. I feel even within a standard classroom, where children are of the same age group, one cannot have the same set of worksheets for all: by now it is a well-established fact that children's learning levels vary even within a standard class setting. Worksheets can be given either as classwork or homework and are generally for individual work/activity.

Purpose

As a teacher, it is important to ask oneself the purpose behind giving any additional work to one's students in the form of worksheets. Is it about giving 'more work' of the same kind, to provide rigour, keep students occupied or assess them? Is it about helping them stretch their imagination? Worksheets can become boring if children are

bombarded with more of the same; although rigour is required from time to time, the decision regarding the purpose calls for the teacher's discretion.

As a teacher, especially of young children, I created worksheets based on some basic principles, keeping the age group and abilities of students in mind, to do the following:

- Reinforce the concept learnt
- Explore concepts/topics in different ways
- Motivate students to learn
- Make students independent learners

Refer to Figure 1 for the framework that I used for creating worksheets.

Assumption

Students have already been introduced to the topic/concept through the use of concrete aids. They have been provided with sufficient time and space before transferring their understanding onto paper (in this case, worksheets).

For instance, consider a child who is not yet able to read. How can he/she work independently? Therefore, given the mixed ability of children in any grade, it is necessary for a teacher to be prepared with the appropriate material – textbooks, resource books, workbooks, worksheets, concrete aids, and other manipulatives. This will, to a large extent, reduce the burden on the teacher and make the learning less teacher-centric. The teacher may want to introduce a topic to the whole class, to bring all the students on to the same level, or to do the groundwork. It could be teacher-driven at this point. The students could then move on to working on the problems given in the textbook, workbook, or exercise books, as mandated. This could vary, depending on a teacher's style and comfort.

When do worksheets come in?

Worksheets come in handy for those students who finish working faster than the others on all of the above. Rather than have these students work on 'more-of-the-same' kind, the teacher can have a set of four or five worksheets on the concept that are created or designed differently for these students.

Maths Worksheets

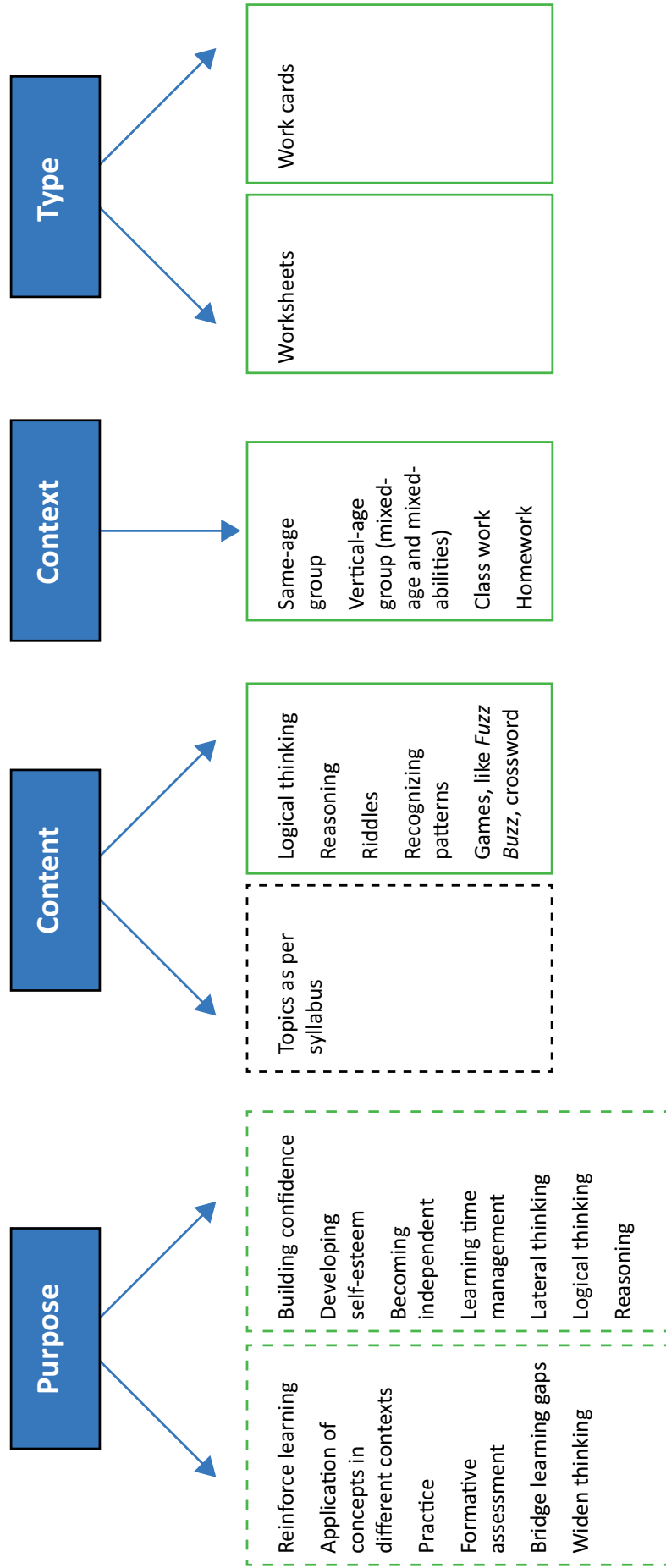


Figure 1. My framework for creating worksheets.

The more proficient and confident students may complete the mandated class-level work and also the set of related worksheets, students who are at the class level may only be able to complete one or two worksheets, and the ones who are grappling with their work, may or may not be able to attempt the worksheets at all. However, the teacher can, at least, ensure that the work given in the books is complete, as that may be the mandate for many teachers/schools.

Introducing worksheets could be done after the class-level work that is required or expected of all the students is completed. This is to ensure that moving on to worksheets is not because some are better than the others, but as something that has been earned as a reward for completing the work. It is, therefore, critical to design the worksheets differently, make them interesting and motivating for students. A worksheet does not need to serve as a benchmark for others, as it is not compulsory. It is only an invitation to explore, enjoy, and feel motivated to earn the worksheets and progress towards them. This approach may work for many schools/teachers as the majority, are bound by the syllabus and textbooks.

Worksheets for different levels of learners in a class

1. For advanced students
 - Solving of regular sums in a different context
 - Reinforcement of previous concepts along with the new ones learnt
 - Verbal reasoning
 - Logical thinking and reasoning
 - Games – *Fuzz Buzz, Bingo*, matching, dartboard, crossword

Some examples are shown in Figures 2 and 3.
2. For class-level learners
 - Solving of regular sums, but in different contexts
 - Reinforcement of previous concepts along with new ones learnt
 - Lateral thinking (like addends: $__ + 8 = 10$ (OR) $7 + __ = 10$ instead of $8 + 2 = ?$ (OR) $__ + __ = 561$. Such small flips can be engaging and also help recognise the patterns)
 - Moving on to working on work cards in addition to all of the above.
3. Some students may take more time than

required or may grapple with class-level work for various reasons. (Teachers would know their students better and they are the best judge of students' abilities). Some of the reasons could be:

- Inability to work within a time frame: Students can be asked to keep track of the time that they take to finish their work. The teacher should ideally have a conversation with a student who takes longer to complete work to ascertain the reasons for needing more time.
- Diffidence: A student is perhaps able to do simple two-digit addition and is not yet able to do the carry-over sums. The teacher can create worksheets that have more of the sums which the student can solve and slip in a couple of sums that involve carry-over. The likelihood of the student getting a majority of the sums correct would be high and only those that he or she was not sure of may go wrong or the student may get them right by chance too! The point is, seeing most of the work correct and only a few wrong, will boost the student's esteem and build his/her confidence to move on.
- Dependency: Ensure that the instructions are short and simple and that the student can read these on his/her own. Use visuals wherever required to support the words/instructions (no harm done). Remember, the priority is to leave the student with a sense of achievement.

Role of teacher

The teacher can have a set of four or five worksheets for every topic/concept. It is up to her/him to take a call on putting a halt or winding up the topic and moving on to the next. As John Hull says, 'Does work end when the brightest have completed the whole worksheet, or when the slowest have completed the initial stages?' It is a difficult call to take, and once again the teacher is the best judge.

One of the techniques that I have used is, having a work card over and above the worksheet. Work cards are not mandatory, even for fast learners and those who are better-equipped, as they come with some conditions – they must be explored on their own, learners can work in consultation with a peer if required. Teacher support is remote and is available only after a student has tried all other avenues, for example, the 3- before- me strategy. Work cards would have a set of games and other such activities that could be taken up after the worksheets, or at any point in time, even during

Sindhu	6	5	1	8	9	10	4	11	3
Tanvi	38	27	3	66					

Find Tanvi's Secret Rule

other subject lessons once students complete the classwork. Called *Any Time is Math Time*, these can be used as fillers too, for example, the two-person game, 'Find Tanvi's Secret Rule'.

Having such games (of pattern recognition), either on the bulletin board or as work cards, will help children think and look for patterns and stretch their imagination. Here if Sindhu says 6, Tanvi is saying 38; if it is 5 Tanvi says 27, and so on. Children must find the basis for Tanvi's responses. How is she arriving at those numbers? What is the pattern involved?

Do note that such topics or concepts should have been introduced to children at some point in class without which children may feel clueless. For example, children must have had opportunities to play around with numbers and recognise patterns.

Having all the materials ready and being organised helps a teacher to handle different abilities of children, address learner levels and help students move at their own pace. It fits into Bloom's Taxonomy, when some may remain at the knowledge and understanding level, while some may progress to evaluating and creating. Producing worksheets that suit students' requirements not only helps them proceed at their own pace, it also does not hold anyone back. It teaches students to accept, tolerate and cooperate with each other.

Challenges faced by teachers

Teachers may face issues such as:

- Will students feel that they are at a different level as compared to their peers?
- Students may ask why some of their peers are allowed to do other worksheets and not them.
- Parents may want to know why their child's homework is different from another child's.
- A child may not want to proceed with work cards or do work beyond the textbooks.

Such issues call for well-planned, well-thought-out responses, based on the rationale the teacher has in mind. It is crucial to remain balanced and impartial towards students. It rests solely on the teacher's ability and sensibility to not compare children and

to ensure that no child ends up feeling superior or inferior to others.

Students in any class will be at different stages and levels for the time the lesson/topic is running. My estimate is that each topic would require a minimum of seven to ten days depending on the age group. The lower the age group, the more the time required for every topic/theme. As teachers, we often move on to teaching the next topic or concept, rather than allowing students to explore the one being taught from various angles to widen the horizons of their thinking. Using worksheets can provide plenty of such opportunities.

How does one go about gathering or collecting such worksheets? Since teachers would know the textbook/topics/syllabus to be covered, they could be on the lookout for books and other resources, start collecting them, and put them to use as and when required, rather than searching for them just before teaching the topic or while teaching it. Worksheets or materials thus collected can become a repository of one's own over a period of time – provided they are saved/filed.

A few tips to ensure that students become independent learners

- Instructions should be short and crisp, for example, instead of saying, 'Find the sum of the following,' just say, 'Add'.
- Graphic organisersⁱ help students organise their thoughts, for example, KWL,ⁱⁱ flow charts, mind maps, web charts, content maps.
- Use visuals, if required, to help students decipher the instructions on their own. Children who struggle with reading and writing can be encouraged by substituting visuals/pictures to represent difficult words.
- Provide support by showing what is to be done, for example, 'circle the same word as in the margin'.
- Break down the content into manageable parts. The article *Creating a Supportive Learning Environment*, (Learning Curve, April 2020) has strategies that will help all the children, including the ones who are lagging

- Homework could go with a small note to the parents requesting them to help their child to revise and practise concepts taught in class within a specified period every day. (Such short notes from the teacher add a personal touch and can benefit both the student and the parents.)
- Students need not know the formulas always. They can try to solve the sums through the trial-and-error method. Remember, these are not for grading as much as for investigating, exploring and motivating.
- Above all, constructive and specific feedback from the teacher will inspire the students to learn and grow.

None of the strategies suggested is easy to implement. Each one of them calls for a lot of teacher preparation, planning and, above all,

command over the subject (content knowledge), to think on different levels of a concept. The teacher should be able to cope with all the questions and should constantly move between groups of children working at different levels. All of this calls for an alert and active mind. I am sure that the outcome will definitely be rewarding to the teacher. When parents see their wards motivated and interested in learning at school, they will start cooperating. I was lucky to have such parents and one of them even gifted me with the book, *Games for Math, Playful Ways to Help Your Child Learn Math from Kindergarten to Third Grade*, by Peggy Kaye. The schools that I worked in had rich libraries. I used to note the ideas and tweak them to suit the needs of the learners in my class. In the end, I would like you to remember that if it was possible for me, it is possible for you too.

Phone Number Fun!

Can you help Chintu find the correct phone numbers?

Sneha: 976031022	1. Whose phone number contains only odd numbers? ____
Ramesh Uncle: 873639303	2. Whose phone number adds up to 30? ____
Mummy: 9845116543	3. Whose phone number adds up to less than 20? ____
Raju Groceries: 9139959377	4. Whose phone number contains the same number four times? ____
Nanima: 220317609	5. Which three phone numbers contain all the same numbers? ____
School: 5111211152	
Neighbour Aunty: 690713202	
Cycle repair: 8342689103	

Figure 2. Phone number game

Fun with Codes!

Here are five words: BEND, DEBT, BENT, TEND, DENT

The same words are hidden in the codes below but in a different order. Find the right word for each code word.

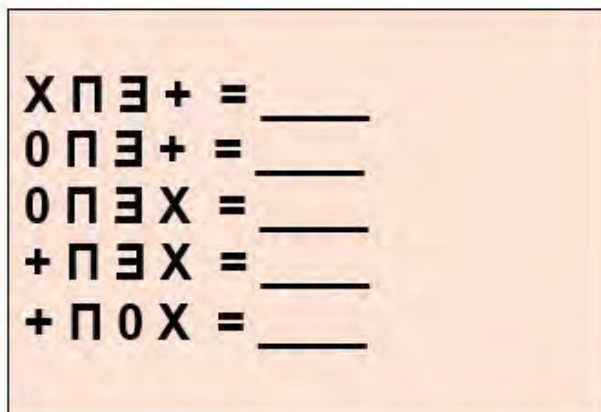


Figure 3. Cracking the code game

Endnotes

- i Graphic organisers are visual representations to help organize thoughts, ideas, show relationships etc. They can be a learning tool as well as a pedagogical tool.
- ii KWL: Know/Want to Know/Learned. KWL strategy encourages students to think about what they already know about something, what they want to know and what they finally learn. It helps students organise their learning throughout the process of learning.

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The Concept of Worksheets

Hridaykant Dewan and Shekhar Dewan

Worksheets present tasks to help children learn. Various kinds of worksheets, attuned to specific learning goals and needs, exist. Though worksheets have been a topic of discussion for years in India, the use of worksheets has become common only recently. Conversations around improving the learning of children are generally linked to, and often reduced to, providing worksheets to children. In many ways, worksheets are viewed as a panacea for everything; from difficulties in learning to acceleration in learning, all aspects are thought to be addressed by worksheets. Given the prominence worksheets have acquired, it is timely to consider how different people are conceptualising and creating these and what teachers using these should look for.

It is also useful to consider the ways in which worksheets can be thought of; how different kinds of worksheets can be conceptualised and understood and the purposes for which they can be used. Several aspects help determine the appropriateness of a worksheet, for example, is the worksheet to be completed individually, or is it intended to foster learning in a group? Should it be multiple choice or allow for qualitative responses that require description? How much breadth should it cover?

These questions are linked to our outlook on children's learning – how we choose learning tasks and how children interact with and relate to one another as they accomplish these tasks. Not only whether they interact, but also how they could be encouraged to study independently and learn individually in a competitive atmosphere or be seen as cooperative seekers helping each other in learning and gaining from interactions with each other. Should worksheets aim for one level of difficulty, or allow children to engage with these at multiple levels in an evolving fashion as their learning grows? Given the varied class sizes, should a class only be dictated by the teacher? Or is it possible to give choices to the children? What role can worksheets play here? These notions, conscious or otherwise, influence the classroom – the extent

and nature of participation of the students, and the role of the teacher.

Models of learning and worksheets

If we think in terms of a broad classification, we can describe the expectations from a learning engagement in the following ways:

a. Information-focussed

Learning is about knowing facts and, therefore, the best way to ensure this is to repeat the facts. While this may sound extremely silly, it is the reality of many teaching-learning processes. Associated worksheets test memorisation of facts or reinforce their memorisation through repetition. For example, there are worksheets that ask children to write numbers from 1 to 100, multiplication tables, or list properties of addition, that is, remember the numbers to be added. Others might expect children to write the names of continents, Indian states, or the planets. They might test factual knowledge, such as which planet has a ring, or the properties of specific chemicals. Some might test textbook concepts, such as how greenhouse gases trap emissions. Information-focussed worksheets emphasise the verbatim answer that has been taught, rather than exploration, or formulation of the child's own understanding of or opinion on a topic.

b. Procedure-focussed

The second category of worksheets focuses on helping the child practice certain kinds of problem-solving exercises using given procedures or following instructions to complete tasks with known outcomes. This is often the case with maths worksheets and textbook exercises. The worksheets start with the basic procedure and add complexity to allow the learner to complete more complicated procedures. For example, a worksheet on addition may proceed from the addition of single-digit numbers to two-digit numbers, training the students to add columns from left to right. As the worksheet transitions to two-digit numbers, 'carry-over' needs to be

introduced. Similar worksheets are used for subtraction, fractional and decimal numbers and their operations, and later for logarithms, and even calculus.

Even worksheets that have mixed questions and require different approaches, such as practice tests, usually expect this procedure to be followed. Thinking is usually discouraged, and whatever little is permissible pertains to the appropriate selection and application of the intended procedure. Activities and experimental worksheets do not leave any scope for variation or careful observation and interpretation. The instructions are detailed, and the outcomes and interpretations are already provided in the text.

c. *Thinking and doing focussed*

The third broad category is worksheets that require an application of understanding. They require the tasks to be understood, the steps required to do a task thought of and then, the task performed. Some worksheets may also allow for multiple approaches to the tasks. These kinds of worksheets expect the learner to make an effort to understand the text, analyse the information given, and then work on the task using prior knowledge, particularly conceptual knowledge, understanding and ability. For example, tasks on arithmetic operations could include, first, determining the appropriate numbers to then performing the appropriate operation to get correct answers. Simple word problems are rudimentary forms of this, as they involve interpretation in selecting the right numbers and correct operations in the right order. As they get more complex, these word problems may involve more steps or evolving a strategy and a method to solve the problem. At upper primary, and then at the secondary level, learners may involve assumed letter-numbers (such as x and y) for some entities and work with them to reach the answer.

Examples of such worksheets include word problems of appropriate levels, including those that require setting up of equations, or maths worksheets that ask the learner to find as many relationships between numbers as they can, with freely chosen or preselected operations. In other subjects, the worksheets may ask learners to respond to specific points in the text, analyse comments on it, or write about something that is central to the text. These texts could focus on aspects of literature, science, or social studies.

It could be a story or an incomplete narration of an event to be completed by imagining what would happen next. It may ask learners to use a specific set of words from the text to make new sentences or paragraphs.

d. *Exploratory Worksheets*

There are several other kinds of potentially useful worksheets, such as descriptions of objects, events or personal experiences, freely chosen topics, and ways for the individual to reflect on, write about, and grow in their self-expressed voice. These allow for instruction at a broader level – not just a technical adjustment, but an instilling of ability, habit, and joy in thinking about and making choices from those thoughts.

Primarily, the ability to discern skilfully which aspects are important to think about and reflect upon enables self-leadership that can navigate ambiguity, uncertainty, and new territory. This translates well to most positions of leadership, an invaluable asset.

This differs from the kind of equivalent tasks for language that are given in information- and procedure-focussed worksheets in which the notions to be considered important from the perspective of feedback are also different.

In the first two types of worksheets, content would be judged on how close the responses are to what has been given to the learners as a model and feedback is given on the points they have missed, spelling and grammar etc. In the second category, the conversation would be about how they can elaborate on ideas and the assessment would consider the extent of their description, creativity, depth, and relevance. While the criteria for evaluation would need to be broader, true education cannot avoid taking the individuality of each person into consideration. Any education that fails to do so is failing to treat learners as thinking humans because such worksheets treat children as objects who just learn, rather than as subjects who have their own perceptions, motivations, and civic merit.

In maths, other tasks could be asking children to think of as many ways of getting a number using any two or three numbers. For example, 18 can be got from addition ($15 + 3$ or $9 + 9$), subtraction ($24 - 6$ etc.), multiplication (6×3 , 9×2) or division ($36/2$). Students may select from just the first two or be asked to derive 18 using each of the four basic operations. Very creative students may

even be allowed to invent their own operations, which are simply functions, of which there is an indefinite number. Such things should be permitted and encouraged; advanced maths requires the invention of various strategies for proofs, theorems, explorations and even calculations. Over time, only some of the often-used functions survive, while most others are abandoned for more useful approaches. Similar things occur in writing, and in the workplace, ideas are proposed, considered, and revised, leaving a few polished gems.

Students should not be trained out of such processes, which are expected later in life. Instead, they should clearly understand what the standard fare is, how canonical it is and to what extent their 'inventions', that is, the strategies and methods they have thought of can sometimes fit into a picture or even, on the rare occasion, be an independent rediscovery of something important. These tasks should also be done collectively to foster such work in groups. While certain disciplines like drama are often taught like this, the 'hard' subjects are not seen in this light, often to the detriment of learning and student interest, a failure of our system.

Worksheets in science could be about observing phenomena, recording suggested observations and analysing observations. They could be presented with an introduction that gives a general picture along with a sense of exploration to lead students into a deeper knowledge of the underlying phenomena. Science, at its best, is engaged with and often involves the understanding of how to navigate the tension, (the special relationship) between a proposed theory and an experimental result. To make students experience a sense of an established theory, experiments presented only need tuning, but to get them to explore newer dimensions, thinking about the experiments is a vital skill. Similarly, one cannot understand how to handle data and statistics without first understanding how readings can be miscalibrated, or how they can measure something other than what they are being interpreted to measure. For example, the thermometer measures the degree of hotness rather than the quantity of heat. So, an object that is at a higher temperature may have a smaller amount of heat content and may need less amount of heat to reach a higher temperature. On another plane, one cannot measure 'weight'. Instead, one measures how scales tip on an axis, or how much a spring is compressed, and use these to gauge the force applied, which is interpreted as

'weight'. Learners need to have the opportunity to engage with questions that specify the manner of data collection, the nature of the data and its significance from the beginning.

This implies that tasks that encourage exploration and charting one's own way forward are not post-teaching; that they should be given only after the concepts included have been taught because they are an integral part of the teaching-learning process and children should have opportunities to engage with them several times. In fact, the learning process should involve engaging students to practise independent thinking in their way forward in the context of their own lives, so that in addition to using their education in their work, they can make better decisions in all aspects of their lives. For this, worksheets need to pick up situations that are linked to the lives of young learners and give them an opportunity to explore concepts in their lives, have problems and tasks that are familiar and, therefore, more comprehensible. It also makes them feel that the school and their lives are not disjunct.

Learner engagement is key

In our view, worksheets largely devised with the third perspective, that is, thinking and doing focussed, are the most useful. They make children think and extend their abilities to attempt tasks that they are capable of but have not done before. It is not enough, however, to just make these worksheets available, what is also needed is an understanding as to why and how such worksheets are to be used. This includes how to review the work of children on these worksheets and giving them feedback and help in their work.

We should remember that measuring learning is not the primary purpose of worksheets. The most important purpose is to help learners engage with the concepts, techniques, and difficult points to develop their understanding, ability, and autonomy as learners. Ideally, worksheets should challenge learners while developing their confidence. Doing a worksheet is not about filling and completing it without mistakes. It is about doing as much as a child can to his or her capability, with the responses that seem correct to him or her at that point in time, after careful thought. Worksheets should be used by the teacher to give children feedback and choose appropriate work for them to follow up and move forward.

While worksheets are for practice, they are not for

mechanical task-repetition. They are also not to be used as ‘fillers’ for students when the teacher is occupied with other tasks. The teacher needs to periodically observe and interact with children on worksheets being done in the classroom and if needed, nudge the students to participate, think and express. The teacher may suggest supplementary tasks if a group of children or a particular child seem to be making good progress and seem capable of being further challenged.

Worksheets should be reusable, extendable, and generative – both for teachers and students. Worksheets give teachers the opportunity to carry on with similar material while developing it in new ways. They can select different kinds of worksheets, depending on how the curriculum is structured. Of course, new worksheets often need to be developed: both for new subjects, and for enlivening dated material. For children, worksheets need to reinforce what has been taught, help them build on concepts and extend them in new directions, and create their own problems and ideas that allow them to participate in the process of knowledge generation, which is the foundation of academic contribution.

Worksheets can also be more open-ended. They can be observational tasks, where children write about what they have seen, and these observations can even be written succinctly on the blackboard. Children can be asked to consider certain concepts, write essays about creative subjects, or even solve hypothetical complex situations, such as how to organise a society and relationships fairly among its members. Another kind of worksheet task could require groups of children to make claims on their observations and have other children hunt for possible counterexamples or logical contradictions.

These examples of open-ended worksheets stimulate children to learn these subjects, excite their curiosity, provide practice to their observational, analytical, logical abilities as well as their ability to comprehend and express. Depending upon the context of the children and the topics that the teacher wants to engage them in, many different worksheets can be created. The important point is to keep the key principles and your purpose in mind. Worksheets that require minimal engagement and very little work from the child and have fixed answers have a very limited ability to educate children.

Summary

So, what are the implications of these considerations in our present context? How do they link with prevalent suggestions about the curriculum, including the content, as well as the teaching-learning process? Increasingly, there is more talk about worksheets and their effectiveness in helping children learn. Often, they are seen as replacements for the textbook or a means of independent learning by the learner, a set of materials for revision or practice etc.

In some programmes for the primary and upper-primary classes, worksheets comprise the entire set of materials. However, most such exercises look at education and syllabi very narrowly. While narrow, prescriptive worksheets can teach basic concrete skills, advanced understanding requires elements that require creativity, imagination and logic. As we have seen, worksheets can be used to introduce new ideas, to enable the extension and consolidation of some abilities, as well to strengthen the understanding and appreciation of concepts and associated frameworks.

During the pandemic, the need for parents to take more responsibility for and interest in the learning of their children grew even more. With reduced teacher interaction, the sources of interchange available to the child became parents and the friends around him/her. It was also a time when more worksheets started being created, printed, and distributed than ever before. Now, the design of worksheets, therefore, needs to be evaluated in terms of the present circumstances, and the increased role these must play in the learning of children. To these ends, we state the following principles for worksheet development.

Six principles for developing worksheets

1. Worksheets reinforce and put into use what a learner has learned and extend the learning. They can also precede instruction by facilitating the learner to collect materials or problems useful in learning something.
2. Worksheets *cannot* replace teacher instruction which takes into account what the learner knows and needs to know.
3. The best worksheets can be used without a teacher’s mediation, but with the possibility of peer interaction and group work.

4. A worksheet which precedes the learning of a particular concept can be designed to:
 - a) Collect fresh information to be used in learning (like an observation of life patterns, experimental observations, measurements, etc),
 - b) Use/revisit an idea, concept, or skill previously learnt but whose mastery is now required for further learning. For example, mastering addition mentally or physically before being taught column addition and carry-over. In the context of language-learning or writing, what happened yesterday as a prelude for teaching the use of past tense. Making a learner do long calculations to indicate that there is a need for some short methods, that is, how formulas help in quick calculations; repeated additions to show the need for multiplication tables etc.
5. A worksheet can be used to reinforce an idea, evaluate the idea for oneself, and explore new dimensions of that idea (seen as a collection of diverse tasks rather than a hierarchy). The overriding principle is to show that what has been learnt has interesting and challenging applications,

rather than drilling procedures to perfection.

6. Worksheet performances are best reviewed jointly by the teacher and student and evaluation is best avoided. Students should enjoy learning without an environment of judgement and fear. Rather, they should develop the habit of reflecting on what they have learnt and exploring it further.

In addition, we have spoken about the usefulness of worksheets that have the embedded scope of repeated use in different ways, as well as of their extension. They require the careful participation of the teacher in planning, choosing, reconstructing, and overseeing. This requires the sensibility to recognise that the purpose is educational rather than training: the effort towards engaging with learning counts much more than following protocols, which themselves are limited. The teacher should consider the responses of children as an outcome of the teaching process and reflect on appropriate adjustments and changes. Worksheets that can lead learners to the doorstep of a new idea, which needs to be taught by a teacher are essential for giving them freedom, flexibility and a challenge to extend their capabilities.

Acknowledgement

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Fun Worksheets for Preschool Learning

Pranalee Sharma and Rima Kaur

Preschool education is imparted to children who are 3-6 years old. The age group of 3-6 years, that is, three years of preschool, in addition to classes I and II, will now fall under the Foundational Stage as part of the 5+3+3+4 pedagogical and curricular restructuring stated in the National Education Policy of 2020 (NEP 2020). The age range of 3-8 years is widely accepted as the stage of early childhood care and education (ECCE). As per NEP 2020, early childhood education must consist of 'flexible, multi-faceted, multi-level, play-based, activity-based and inquiry-based learning... to attain optimal outcomes in the domains of physical and motor development, cognitive development, socio-emotional-ethical development, cultural/artistic development and the development of communication and early language, literacy and numeracy.' (NEP 2020, Para 1.2, p. 7)

A very widely-used instructional material in preschools is the worksheet. A worksheet is printed instructional material in the form of a loose sheet of paper containing tasks or problems that help children explore and learn a topic. For teachers, the worksheet is an important assessment tool, as well.

Unfortunately, worksheets have slowly turned into a drill of questions that are repeated in the same format with usually only one right answer. Some might argue that worksheets also have scaffolding questions that foster inquiry-based learning, but the appropriateness of using these in early childhood can be questioned. Research has, time and again, established the significance of play and play-based learning in early childhood education, and the dichotomy between learning through play and learning through more academic approaches continues to exist. The demands of time have pressured children as young as 3-years to know the alphabet, numbers, counting; recognise shapes, and; so on, much before they are ready to do so. The recent focus on formative assessment to collect authentic evidence of children's progress has exacerbated classwork and homework in notebooks and worksheets. This disregards developmentally-appropriate practices and gives

rise to scenarios where young children are force-fitted into learning and assessment tasks that are not congruent with their learning needs.

However, the effectiveness of worksheets cannot be discounted even as they are categorised as a more cognitive (academic) approach to learning and assessment. Let us see how worksheets can effectively be designed and used in early childhood, specifically in the preschool years, in conjunction with other play-based pedagogical processes in a stimulating and rich learning environment. We can do this by first looking at a few worksheets that are commonly used in the preschool classroom.

Worksheets commonly used in preschool

Many critical concerns emerge when we examine these worksheets. Generally, such worksheets:

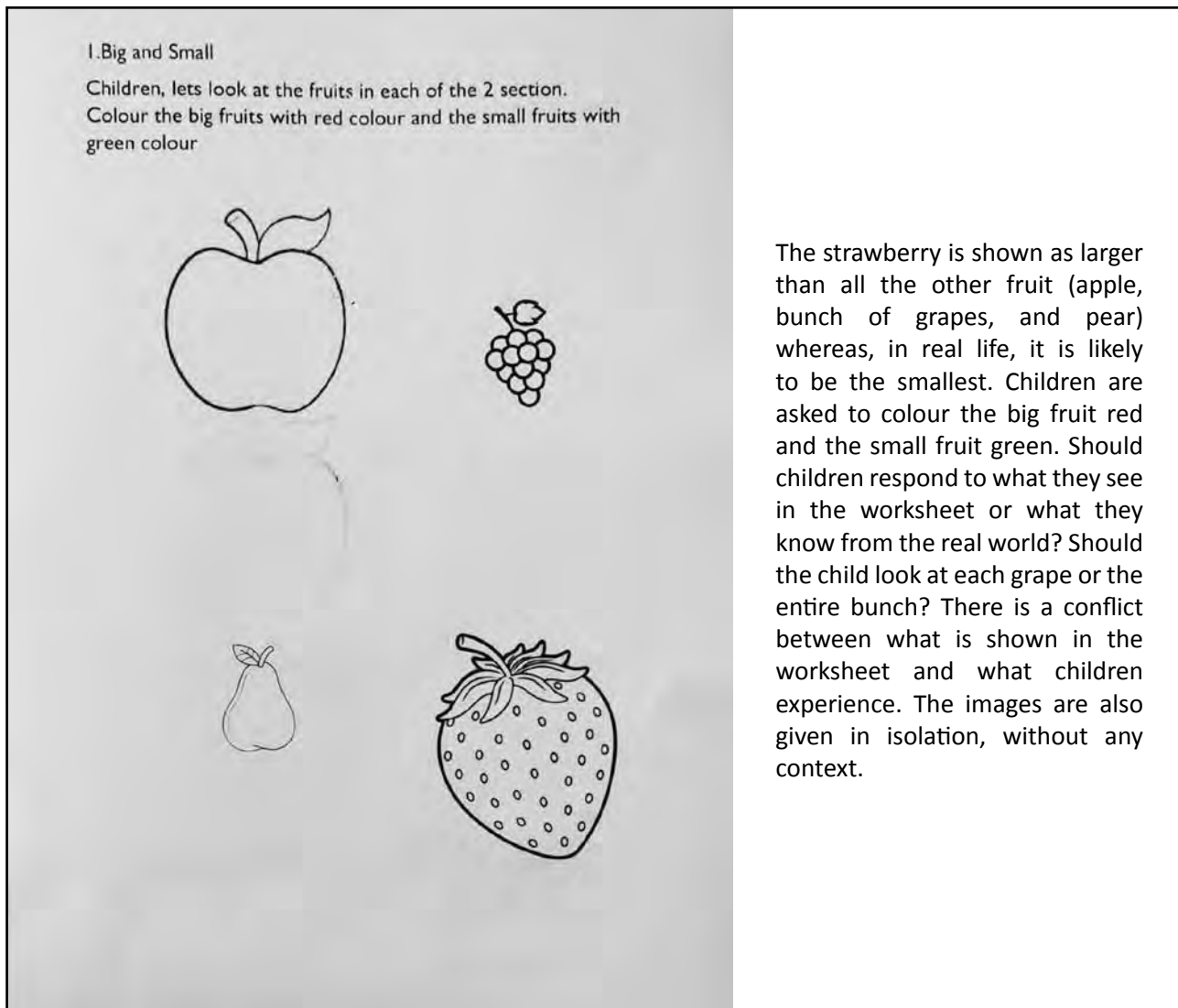
- Follow only traditional worksheet formats, such as copying, tracing, matching etc.
- Aim to develop fine motor skills and eye-hand coordination of children
- Are given to very young children who may not have developed a meaningful relationship with print
- Presuppose that the teacher has introduced the concept through play-based activities
- Focus on certain concepts only or these are too concept heavy/loaded
- Neglect or underrepresent aspects of a healthy attitude, skills of critical thinking, values, collaboration, communication, creativity, and socio-emotional development
- Are decontextualized, isolated, and divorced from children's experiences and interests
- Provide little to no intellectual, creative, or emotional stimulation to children
- May not even be designed by the teacher/school for the specific class/children in question
- Give the impression that they are child-friendly by incorporating pictures, colours, etc.
- May be riddled with factual and conceptual errors and inaccuracies

- Do not have clearly defined instructions for the teacher or may have instructions that are confusing
- Are in one language, that is, the medium of instruction, which is often not the children's home language
- Disregard children with disabilities who may benefit from a tweaked design or format
- Become the go-to assessment tool in the preschool classroom and push out anecdotal records, checklists etc.
- Are designed for collecting evidence, leaving no room for providing feedback for learning
- Align to only a few Learning Outcomes, if at all

These critical concerns give us food for thought regarding the features of good worksheets. A good

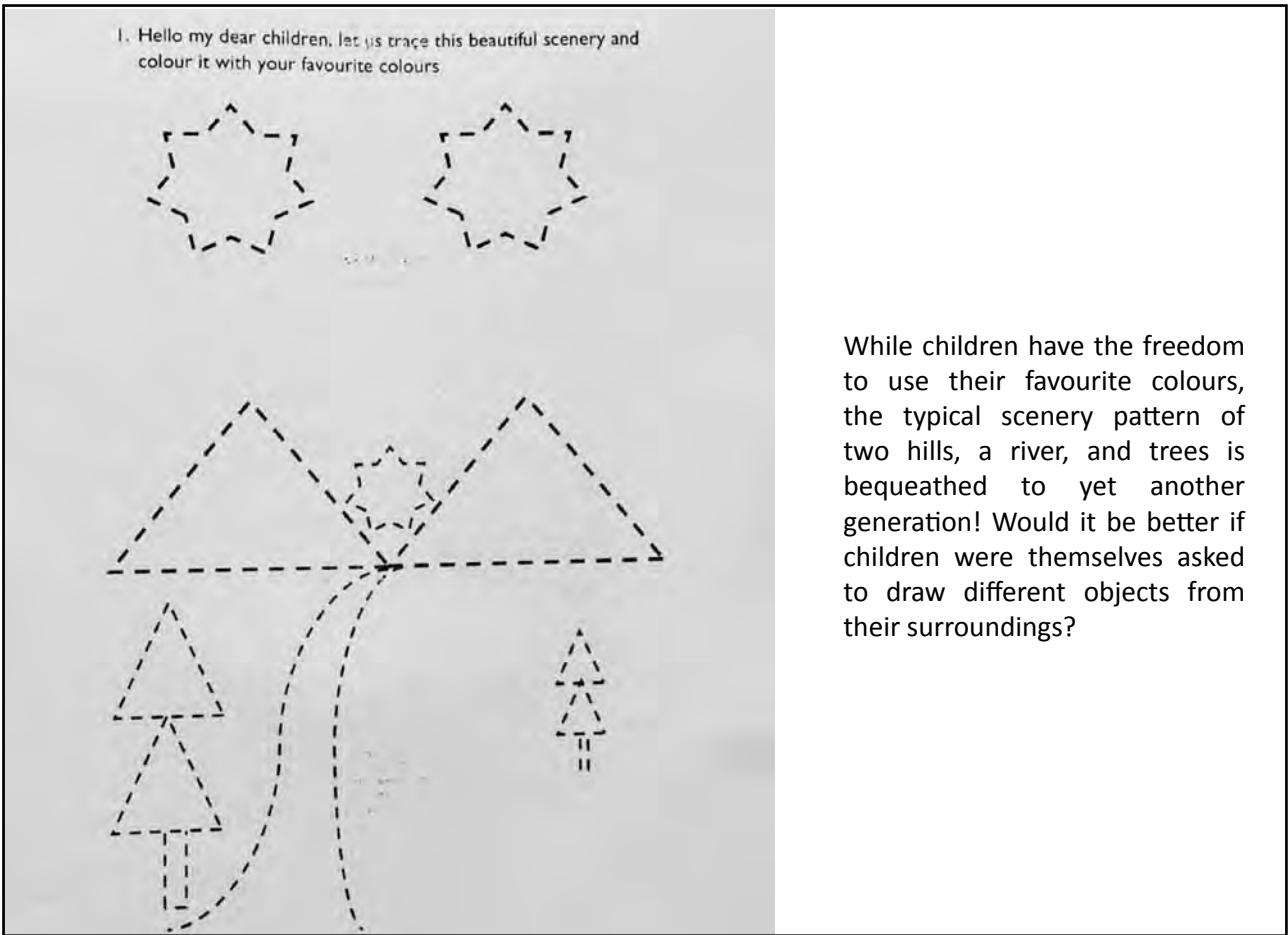
worksheet should:

- Use mixed formats, depending on the nature of the task
- Be developmentally and contextually appropriate
- Have simple, clear, and contextually relevant language
- Be factually and conceptually accurate
- Trigger curiosity and thinking
- Help identify the stage of learning and misconceptions, if any
- Be aligned to Learning Outcomes
- Encompass all domains of development
- Have an inclusive design and flexibility for adaptation
- Be used as one of the curricular materials in preschool



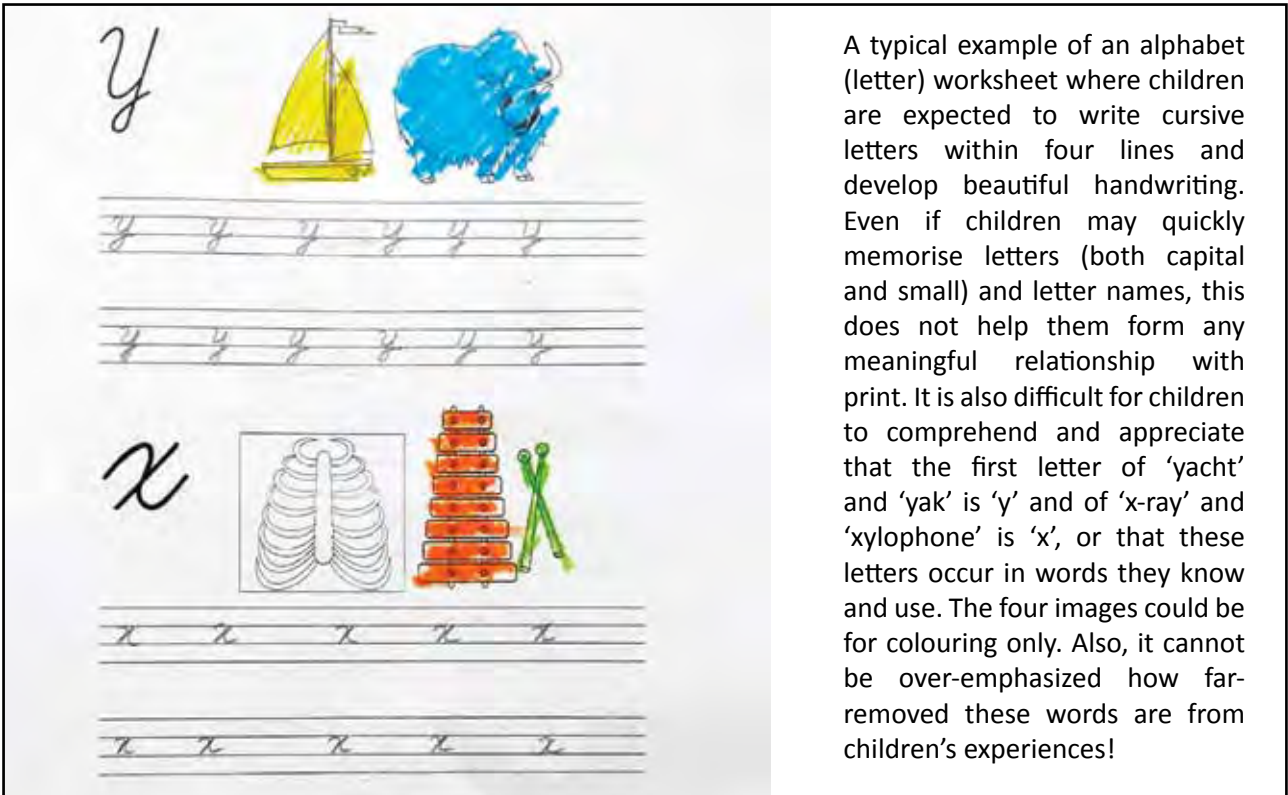
The strawberry is shown as larger than all the other fruit (apple, bunch of grapes, and pear) whereas, in real life, it is likely to be the smallest. Children are asked to colour the big fruit red and the small fruit green. Should children respond to what they see in the worksheet or what they know from the real world? Should the child look at each grape or the entire bunch? There is a conflict between what is shown in the worksheet and what children experience. The images are also given in isolation, without any context.

Figure 1. An example of a commonly used worksheet in preschool.



While children have the freedom to use their favourite colours, the typical scenery pattern of two hills, a river, and trees is bequeathed to yet another generation! Would it be better if children were themselves asked to draw different objects from their surroundings?

Figures 2 and 3. More examples of commonly used worksheets in preschool.



A typical example of an alphabet (letter) worksheet where children are expected to write cursive letters within four lines and develop beautiful handwriting. Even if children may quickly memorise letters (both capital and small) and letter names, this does not help them form any meaningful relationship with print. It is also difficult for children to comprehend and appreciate that the first letter of 'yacht' and 'yak' is 'y' and of 'x-ray' and 'xylophone' is 'x', or that these letters occur in words they know and use. The four images could be for colouring only. Also, it cannot be over-emphasized how far-removed these words are from children's experiences!

A teacher's view

An interview with a private preschool teacher from Nagaland gives insights into how worksheets are commonly used in the preschool years. She stated that most recently, worksheets were sent home during the pandemic so that parents had some support material and children had 'something to do'. When in school, children are usually handed worksheets from the very beginning. In the first two to three months of the ECCE programme, they engage in a lot of drawing, colouring, and tracing activities. This helps the teacher assess concepts like shapes, letters and numbers; and produces evidence of the child's progress. Once children go through this initial phase, worksheets related to other concepts are similarly introduced and used. The teacher also adds that worksheets are a regular feature every week, in addition to indoor and outdoor play, music and movement, etc. A standard set of worksheets is used year after year, though teachers who are creative may develop worksheets of their own.

This teacher admits that though most preschool teachers have got some form of training on how to design interesting and fun worksheets post the introduction of NEP, they have not yet been able to implement their learnings and are aware that worksheets in their current form are not very helpful. Another government preschool teacher from Nagaland shared that there are large differences between the use of worksheets in public and private preschools, with public preschools (both government schools and *anganwadis*) often facing a resource crunch when it comes to printing worksheets for all children.

'Fun worksheets' for early childhood

The Preschool Curriculum developed by NCERT

(2019) suggests using 'fun worksheets' along with a diverse list of activities. Now, what is 'fun'? When teachers say they want children to 'have fun', what do they mean? For children, fun can be activities that provide pleasure without any purpose. An activity that is accompanied by smiles and laughter can be termed as fun from an adult's perspective. Fun, in early childhood, is often equated with play. The NEP 2020 and the Preschool Curriculum clearly emphasise play and play-based learning as well as the significance of making a preschool classroom enjoyable using 'fun' worksheets. The children's choice and control over the activity or task in a worksheet have a role in defining a worksheet as fun or not. A worksheet that might seem like work can be fun depending on the choice, freedom, and control provided to children.

The question that arises then is, what kind of worksheets are appropriate for children in preschools? Can we look at worksheets which are not only educational but also pleasurable for children? Let us look at the process that is usually followed while developing a worksheet for early childhood.

Step 1: Planning

A preschool teacher first needs to decide the reason behind developing a worksheet. Every worksheet must serve a concrete purpose in the five domains of development, namely, physical, cognitive, social, emotional, and language. Several worksheets focus solely on cognitive and physical development but miss out on social and emotional development.

The questions a teacher should be able to answer at this stage are:

1. What is the purpose behind preparing this worksheet?

Planning

Preparing

Assessing

For example, the purpose could be to look at the child's progress in one of the domains of development.

2. For which age group am I preparing this worksheet?

For example, a teacher may prepare it for 3-year-olds, and needs to know what can be expected from a 3-year-old who can sort items by one characteristic as opposed to a 6-year-old who can sort items by more than one characteristic.

3. From where can I get ideas to prepare this worksheet?

For example, a teacher may discuss with fellow teachers, join a group of teachers on *WhatsApp*, or even refer to articles and blogs on early childhood.

Step 2: Preparing

Each worksheet must align with Early Learning Outcome(s) (outlined in the *Preschool Curriculum, 2019*). This also ensures the validity of the worksheet. A worksheet can be tagged as 'valid' if it is able to measure what it is supposed to measure.

The questions a teacher should be able to answer at this stage are:

1. To which Early Learning Outcome(s) is this worksheet aligned?

For example, the teacher may cluster two-three outcomes from different preschool goals.

2. Will the worksheet give me insights into a child's learning?

For example, the teacher may anticipate certain responses from children in specific areas.

3. Which pedagogy do I need to prepare for?

For example, the teacher may have to prepare the learning environment or design/obtain materials.

Step 3: Assessing

The third step is using the worksheets for the assessment of children's learning. Once children fill up the worksheets, teachers can use these to identify areas where improvement is required. The information gathered through worksheets helps both teachers and parents.

The questions a teacher should be able to answer at this stage are:

1. What does the child understand and not understand?

For example, the teacher may identify

misconceptions or gaps in learning based on the child's responses.

2. What should the child be learning?

For example, the teacher may identify what the child should focus on, based on the misconceptions they may have.

3. Which pedagogy would be appropriate to address gaps in learning?

For example, the teacher may change the instructional strategy, other material used, or the worksheet itself.

Ideas for 'fun worksheets'

Here are some suggestions for designing fun worksheets for children who are in preschool.

1. Standard worksheets

A few worksheets can certainly be in the usual format where a sheet of paper has a task that needs to be completed with a pencil or crayons. These can be made more engaging by keeping the principles of designing good worksheets in mind.

- a. Mazes: A variety of mazes can be designed for interesting problem situations, for example, going from home to the market to buy paper and crayons, taking a mother duck to her ducklings, helping a boy find his missing shoe, and a bee to a hive. Mazes should provide the right degree of challenge to children, that is, these should neither be too easy nor too difficult to complete.
- b. Matching: Instead of matching two columns, children can match using squiggly lines where the pictures, words, shapes, etc., are scattered across the page. This leaves children with more scope for navigating and playing with the page space while still solving the task. More creative and unconventional ways of matching can be explored. Matching emoticons to different picture-based situations (getting hurt, playing with friends, being surprised) and matching letters with initial sounds of words represented by pictures ('p' for pig, 'c' for cake, 'b' for bus) for developing sound-letter correspondence are a few examples.
- c. Joining dots: Children can join dots in serial order to form a picture that they can colour. The dots can be accompanied by numbers (depending on how far children can count) and even letters (a-z). The pictures should interest and excite children, for example, a many-legged insect, a funky vehicle, a flying dinosaur, or even a wizard

wearing a hat. An isolated picture, such as an apple or a strawberry in the middle of a white page that does not interest or excite children, should be avoided. It is better to have a larger and more detailed picture where one part is in dots rather than a small and boring picture that is fully made up of dots.

- d. **Odd-one-out:** Meaningful scenarios where an object, person, or animal is 'odd' and does not fit into the given category, for example, an elephant sitting on a tree with a parrot and a crow, a tortoise flying in the sky, or a fridge full of food and one shoe. Worksheets can slowly include more categories and abstract concepts in a decontextualised format, such as living and non-living things, solids and liquids, shapes, and edible and non-edible things.
- e. **Spot the difference:** Two near-identical pictures with a lot of details where children circle or point out which details are missing or different. The more detailed the picture and finer the differences, the greater the challenge.
- f. **Drawing and colouring:** Drawing and colouring pages can certainly be considered worksheets. Instead of arbitrary drawing assignments, children can be asked to engage with their culture and surroundings, for example, they can be asked to go home and draw an interesting/heavy object they cannot get to school, they can draw a scene of their family having a meal, and they can even draw themselves playing in their favourite corner of the house. Children can also draw from their imagination. For example, how they will look when they grow up, what they would like to wear for a celebration in school, or what their dream world would look like. These worksheets should not aim to assess or judge children's choice of colour, ability to colour within the lines, or overall finesse in art. Different materials like colour pencils, paints, vegetable prints, thumbprints, etc., can be introduced, depending on the nature of the task.
- g. **Alphabet-recognition worksheets:** Learning to form letters can begin with colouring and decorating large outlines of their names, slowly graduating to recognising, circling/underlining, and copying individual letters from their names, names of friends and family members, and other familiar words, preferably accompanied by detailed pictures for context, such as truck, bus,

and cycle on a busy road scene. This is preferred over tracing and copying small and capital letters in isolation, as commonly seen in 'fading worksheets' in which capital and small letters are repeatedly traced in a four-line format with decreasing visual clues in each line.

- h. **Number-recognition worksheets:** Similar to the alphabet worksheets, worksheets for counting can be more than 'fading worksheets' or counting several random items in rows. These may contain vivid and detailed scenes – a farm or orchard scene where children count vegetables, fruit, trees, birds, butterflies, farmers, farm equipment like tractors etc.

2. *Cut-and-paste worksheets*

Worksheets that children can tear free-hand or cut with scissors and either assemble or paste together for a specific purpose, such as cutting and arranging jumbled pieces of a puzzle, cutting clothing items and dressing a human figure, making zigzag/spiral/mesh paper streamers by cutting along the dotted lines, cutting pictures of birds and animals and pasting them in the correct columns, cutting numbers and pasting them next to pictures that have the same number of items, etc.

3. *Letter-writing worksheets*

Worksheets that have the basic format of a short note or a letter that can be folded so that it can double up like an envelope. These can be either posted directly or handed over to classmates, teachers, parents, etc. Children can engage in imitative writing, scribbling, and drawing and build a meaningful relationship with print with the help of the teacher.

4. *Checklist worksheets*

Checklists can be used for ticking items found in a treasure hunt, marking attendance, voting for which games to play, marking items to purchase in a shopping role-playing game, selecting items to pack for a school picnic etc. They can be picture-based or have both pictures and words for scaffolded exposure to printed words. Depending on the nature of the activity used in conjunction, both individual and group worksheets can be designed.

5. *Pop-up worksheets*

Worksheets printed on thick card paper containing outlines of different elements of a big

picture, which children colour, cut out, fold, and paste on a piece of cardboard or box to make a pop-up scene. For example, to make a playground pop-up scene, the worksheet can have outlines of trees, swings, a few children, a puppy, and a ball. Each child can make his/her own pop-up scene or contribute any one element to a large pop-up that the class builds together. A 'hanging scene' can be similarly created where children hang their cut-outs in a shoebox using thread, for example, making an underwater scene with a shark, an octopus, bubbles, seaweeds, and a submarine or an outer-space scene with the sun, moon, rocket, an alien, and an astronaut.

6. *Game-based worksheets*

Similar to *Bingo* or *Tombola*, these worksheets contain grids of pictures, letters, numbers, shapes, or even familiar words that children

tick or colour based on what is called out by the teacher or a friend. It can be played individually or in pairs.

7. *Worksheets for recording*

Worksheets that are independently filled and discussed at regular intervals, for example, daily worksheets where children colour the emoticon that represents their day, weekly worksheets where children draw their favourite activity from the week, or fortnightly worksheets where children observe and record the growth of a sapling in the school garden.

8. *Pattern-making worksheets*

Children design and repeat patterns using self-made stamps using erasers; vegetables, like potatoes or ladyfinger; flowers; matchboxes; thumb- and hand-prints, etc.

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Digital Technologies for Developing Worksheets

Anusha Sharma

School closures for a major part of the last two years due to the pandemic has impacted different children in different ways; many have not received structured learning opportunities. A majority of them are likely to have not progressed in their formal education and have also lost out on skills and knowledge they had acquired, owing to lack of practice, mentorship and guidance from teachers, and other hardships they may have suffered. A teacher is, therefore, likely to find even greater variations in levels of learning and engagement in her class now. Alternate strategies and additional resources are required to respond to children's diverse needs.

A worksheet is one such resource that can be designed to engage students, regenerate their interest in learning, and build curiosity. The 'work' in the worksheet can transcend disciplinary boundaries and need not be limited to solving maths problems or answering memory-based questions. Worksheets can be used for exploring and developing psychomotor, analytical, spatial and communication skills by prompting learners to engage in elements of

constructivist pedagogy, like observing phenomena, collaborating with a classmate in a game, having whole-class discussions, or expressing one's thoughts. This article discusses some such examples.

Worksheets for collaboration and play

In the months after the second wave when primary and middle schools were shut, we ran a community learning centre for children of classes I-VI in a low-income-group community in Bengaluru where we found that worksheets could be used as a way to promote collaboration among peers. One such example was the number-grid race in which students are divided into pairs or small groups and given a pair of dice and some colours. Each child is handed a 100-grid worksheet with some empty space at the bottom. Children take turns to roll the dice and colour the corresponding number of squares in the number grid using a different colour each time. The child who reaches 100 first, wins.

There can be several variations in using this worksheet for children of different ages and learning levels. For

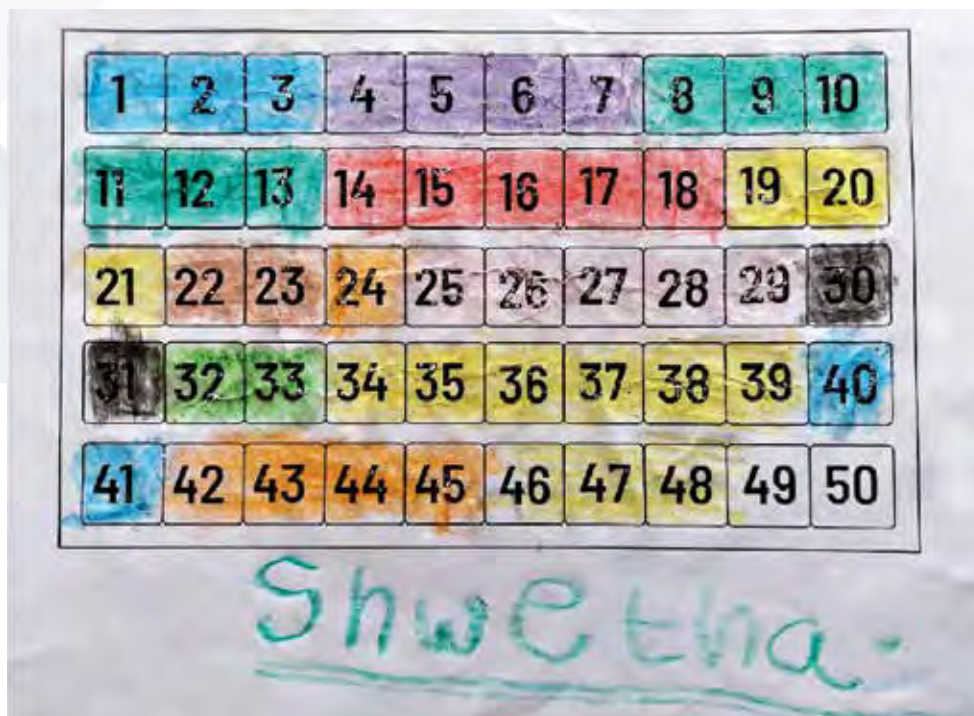


Figure 1. Roll and Race 50

younger children, the grid can be up to 50 and can be played with just one dice. Slightly older children can be asked to colour the boxes after performing addition in each turn with the previous sum and the number on the dice being the addends. For example, if the child gets 5, 4, and 6 in the first three turns, the addition equations would be: $0 + 5 = 5$, $5 + 4 = 9$, $9 + 6 = 15$, and so on. Children might start seeing a pattern and eventually realise that their sum corresponds to

the number in the last coloured square in their grid. This observation can be used to initiate a discussion on whether it holds good for every turn for everyone and to help them realise that the same count-on strategy they use for performing addition is what is being done when they colour the boxes as well. When they use their fingers, the last finger counted gives the sum and when colouring, the last box coloured represents the sum.

Roll and Race

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

<u>$0 + 2 = 2$</u>	<u>$28 + 5 = 33$</u>		
<u>$2 + 4 = 6$</u>	<u>$33 + 4 = 37$</u>	_____	_____
<u>$6 + 3 = 9$</u>	_____	_____	_____
<u>$9 + 5 = 14$</u>	_____	_____	_____
<u>$14 + 5 = 19$</u>	_____	_____	_____
<u>$19 + 1 = 20$</u>	_____	_____	_____
<u>$20 + 6 = 26$</u>	_____	_____	_____
<u>$26 + 2 = 28$</u>	_____	_____	_____

Figure 2. Roll and Race 100

The game can also be played starting from 100 and going in reverse to reach 0, calculating the difference in each turn. It can be played by having pairs of children as teams who share a worksheet. Each of them takes turns to roll the dice, colour the boxes, write the equation and find the sum/difference. The worksheet, in this case, promotes engagement with peers in the form of a game, while also creating opportunities for individual practice in working with numbers.

Interdisciplinary worksheets

As part of one of our school-level programmes where we engaged with students from a government-aided school, a worksheet was designed integrating aspects of language competency-building and knowledge in

geography. A crossword puzzle, which is a fun way to improve spelling and build vocabulary in English, was created using an online tool¹ based on the theme *Rivers of India*. This brought out students' knowledge of the names and facts about the rivers in the puzzle, along with the spellings of each. Designing an activity based on this worksheet could involve solving the worksheet and then following it up with a discussion about rivers and their significance, classification based on their origin, whether they are major rivers or tributaries, which sea or ocean they flow into, aquatic life in rivers, river pollution and its consequences, etc. Or it could help build language skills by having students share their experiences and stories of rivers which they have seen or are familiar with.

Rivers of India

ACROSS

- 3 Second longest river in South India
- 5 River known as 'Dakshina Ganga'
- 6 Longest river in India

DOWN

- 1 Sorrow of Bihar
- 2 River which houses the biggest dam in Karnataka
- 3 Main source of water in Karnataka and Tamil Nadu
- 4 Home of freshwater dolphins

Figure 3. Rivers crossword

Worksheets that cut across disciplines can be used to bring out relationships between different subjects, support a holistic understanding of concepts, and help children make better sense of the world around them. Taking the above example further, a follow-up worksheet with a map of the rivers of a region could be given to students, asking them to think of ways in which the length of a river could be measured. This can help students appreciate and apply the mathematical concepts they have learnt while making sense of the geographical aspects as well.

Promoting scientific inquiry

During the lockdown in 2020, our team conducted online classes for students of government and aided schools in Bengaluru South, Block III. As part of one of the science activities, a worksheet was used to pique students' curiosity and develop a spirit of scientific inquiry by asking them to record observations of the moon over a period of two weeks. The worksheet was

shared through a *WhatsApp* group and the students were asked to daily document in their notebooks the shape of the moon, its position (north/south/east/west), and the time of observation, according to the format given in the worksheet. Several students in the group participated enthusiastically, sharing photos of the moon and what they had been documenting. At the end of the activity, we had discussions about why the shape of the moon appears to change, why it is only visible when dark, and its position in the sky. In this case, the worksheet served as a tool to help children wonder, investigate, inquire and understand the theory behind the waxing and waning of the moon.

This type of activity can be contextualised to suit different learning objectives for children of different age groups. It can cover observation of other natural phenomena, such as sunrise/sunset timings, flow of rainwater, growth of plants, animal sounds etc.

Date (ದಿನಾಂಕ)	Did you see the moon in the morning? If yes what time? (am)	Where did you see the moon in the morning? (East, west, North or South)	Did you see the moon in the night? If yes what time? (pm)	Where did you see the moon in the night? (East, west, North or South)	What was the shape of the moon you saw? draw the shape of moon?
	(ನೀವು ಬೆಳಿಗ್ಗೆ ಚಂದ್ರನನ್ನು ನೋಡಿದ್ದೀರಾ? ಹೌದು ಎಂದರೆ ಯಾವ ಸಮಯ? (ಬೆಳಿಗ್ಗೆ))	(ನೀವು ಬೆಳಿಗ್ಗೆ ಚಂದ್ರನನ್ನು ಎಲ್ಲಿ ನೋಡಿದ್ದೀರಿ? (ಪೂರ್ವ, ಪಶ್ಚಿಮ, ಉತ್ತರ ಅಥವಾ ದಕ್ಷಿಣ))	(ನೀವು ರಾತ್ರಿಯಲ್ಲಿ ಚಂದ್ರನನ್ನು ನೋಡಿದ್ದೀರಾ? ಹೌದಾದರೆ ಯಾವ ಸಮಯ? (ಸಂಜೆ))	(ರಾತ್ರಿಯಲ್ಲಿ ನೀವು ಚಂದ್ರನನ್ನು ಎಲ್ಲಿ ನೋಡಿದ್ದೀರಿ? (ಪೂರ್ವ, ಪಶ್ಚಿಮ, ಉತ್ತರ ಅಥವಾ ದಕ್ಷಿಣ))	(ನೀವು ನೋಡಿದ ಚಂದ್ರನ ಆಕಾರ ಹೇಗಿತ್ತು? ನೀವು ನೋಡಿದ ಚಂದ್ರನ ಆಕಾರವನ್ನು ಬರೆಯಿರಿ?)

Table 1. Format for moon observation

Date (ದಿನಾಂಕ)	(ಮೂಲ ರೇಖೆ ನಿರೀಕ್ಷಿಸಿದ ಪೆದ್ದು ಎದ್ದು ವಿವರಿಸಿ (ರೇಖೆ)	(ಮೂಲ ರೇಖೆ ನಿರೀಕ್ಷಿಸಿದ ಪೆದ್ದು ಎದ್ದು ವಿವರಿಸಿ (ರೇಖೆ)	(ಮೂಲ ರೇಖೆ ನಿರೀಕ್ಷಿಸಿದ ಪೆದ್ದು ಎದ್ದು ವಿವರಿಸಿ (ರೇಖೆ)	(ಮೂಲ ರೇಖೆ ನಿರೀಕ್ಷಿಸಿದ ಪೆದ್ದು ಎದ್ದು ವಿವರಿಸಿ (ರೇಖೆ)	ನಿರೀಕ್ಷಿಸಿದ ಪೆದ್ದು ಎದ್ದು ವಿವರಿಸಿ ↓
12/1/2022	ಬಿಳಿ	ಬಿಳಿ	7:00 (ಪೆದ್ದು)	ಅರ್ಧ	
13/1/2022	ಬಿಳಿ	ಬಿಳಿ	7:49 (ಪೆದ್ದು)	ದಕ್ಷಿಣ	
14/1/2022	ಬಿಳಿ	ಬಿಳಿ	8:30 (ಪೆದ್ದು)	ಅರ್ಧ	
15/1/2022	ಬಿಳಿ	ಬಿಳಿ	8:00 (ಪೆದ್ದು)	ಅರ್ಧ	
16/1/2022	ಬಿಳಿ	ಬಿಳಿ	8:50 (ಪೆದ್ದು)	ಅರ್ಧ	

Figure 4. Moon observation - completed worksheet

Developing spatial sense and psychomotor skills

When schools reopened in Karnataka in September 2021, *IT for Change* organised 'Back to School' camps in government and aided schools with the aim to help children get re-acquainted and comfortable with the school environment and with one another while they engaged in fun educational activities. A Tangramⁱⁱ activity using worksheets was designed to allow students to create shapes for themselves. Students could potentially develop spatial understanding by playing around with the shapes, called tans, solving the Tangram puzzles. The worksheet had the outlines of shapes printed, which could be cut out and coloured to make the Tangram pieces. Different

puzzles of varying complexity were then given to the students to explore and solve.

Various mathematical concepts too were explored using these shapes which helped children understand properties of the shapes, visualise congruence (as the pieces could be placed one on top of the other), and recognise the relationships between the shapes.

Digital technologies for developing worksheets

The work of *IT for Change* in education focuses primarily on the integration of digital technologies in the areas of teacher professional development and school development, laying emphasis on 'creating and learning' and 'connecting and learning' approaches (these are themes from the National Information

and Communication Technology Curriculum). The worksheets described above were developed using FOSS (*Free and Open-Source Software*) tools, taking inspiration from online sources, like resource repositories, teacher blogs, and other educational websites.

Teachers can similarly draw upon a wealth of material available online to conceptualise their own worksheets and reimagine the different ways in which worksheets can be used in teaching-learning. While the internet holds a myriad of ideas and resources that can be accessed with ease, their educational value is determined mainly by the way in which the material is contextualised and customised in terms of language, age appropriateness, learner abilities, etc.,

to meet learners' needs. Teachers may not always find ready-made worksheets that are fully relevant to their learning objectives and available for all subjects/topics. The use of FOSS tools that are freely available, to adapt and contextualise Open Education Resources (OERs) that are available in the public domain can greatly facilitate teachers in creating, developing and sharing worksheets and other resources.

This is not to say that the use of digital tools is a necessary condition for worksheet creation, only that it opens up many more possibilities. In our work with teachers and schools, we have witnessed teachers using FOSS like *LibreOffice*, *GeoGebra*, *PhET* to create worksheets and other teaching-learning resources.

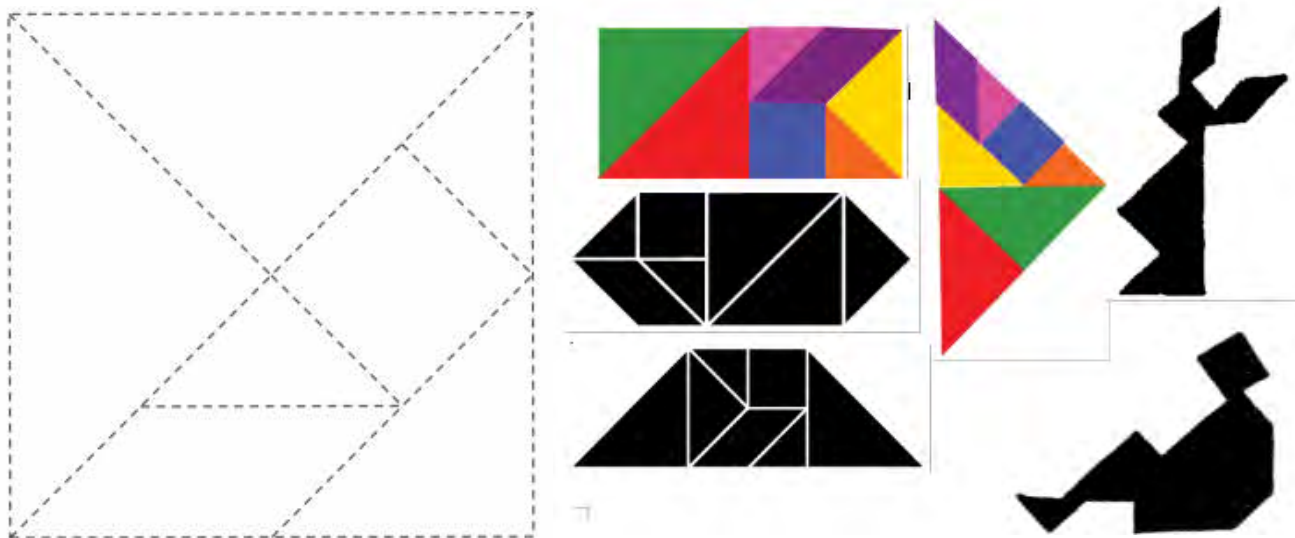


Figure 5. Tangrams

Acknowledgement

This article was made possible by valuable inputs from my team members Gurumurthy Kasinathan, Neeta Jose, Marzia Ibrahim and Girija MP.

Endnotes

- i <https://crosswordlabs.com/>
- ii A Tangram is a puzzle consisting of seven flat polygons, called tans, which are put together to form shapes.

References

FOSS tools that can be used for teaching-learning

Sample Repositories for OERs: OERcommons, Karnataka Open Educational Resources (KOER), Wikimedia Commons



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Language Worksheets Support Other Subjects

Chandra Viswanathan

Words are, in my not-so-humble opinion, our most inexhaustible source of magic.

- Albus Dumbledore (Harry Potter by JK Rowling)

When children are between the ages of one and five years, language is key to all his or her learning – cognitive thinking, social interaction and emotional development. However, as children enter school, language, unfortunately, becomes a 'subject', dealt with in isolation. We ignore the fact that children can assimilate concepts in maths, science and social studies only when they listen, talk, read and write about what they are learning. Without listening and reading skills, children cannot understand ideas, and only a strong foundation in speaking and writing skills can reflect their thinking process. As teachers and educators, we need to recognise that language skills are a prerequisite for understanding concepts in other subjects.

Science

Some years ago, I visited a school where children were demonstrating science experiments. One girl was trying out an experiment on the effect of air pressure. She placed a light ball in a plastic funnel, and blew hard into the funnel, trying to make the ball float in the air. But however hard she tried, the ball was stuck to the funnel and refused to budge.



When the teacher asked her to explain the experiment, she quickly put everything down, folded her arms, and recited the explanation verbatim from the book. She ended the narration with the words, '...and that is why the ball floats in the air'. She then quickly sat down, relieved.

After the class, when I went up to her and asked, 'But the ball never floated up, did it?' She smiled and showing me the book, said, 'Yes, but this is the paragraph given in the book, no Miss? That is what we are *supposed to say or write.*'

The purpose of science education is to learn how to observe, record, reason and infer based on what we do and see. Science tells us to question the why and understand the how. Neither of these can be done if language skills are not integrated along with science learning. If language is used only to test one's recall of what is written in the textbook, science becomes a dull and difficult subject.

Maths

Maths is fundamentally a language in which we translate between words and symbols. Maths statements are just a short way of representing a long string of words. It is ironic that we sometimes designate a separate place for language skills in maths, and call it, 'word problems'. The entire study of maths deals with translating words (verbal language) to short-form symbols that we can write, understand and manipulate easily. When we separate language skills and mathematical skills in the early years, children end up struggling when confronted with more complicated theorems, proofs, algebra and logical analysis in middle and high school.

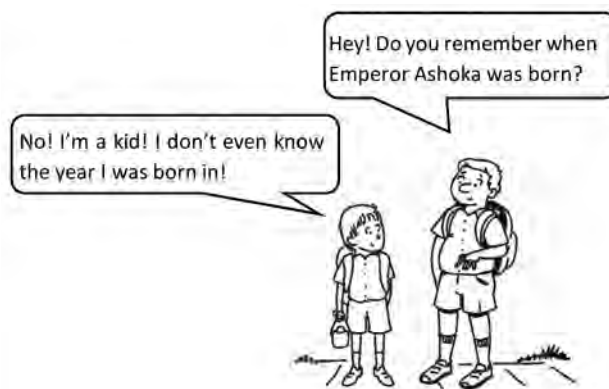
Social Studies

The study of social studies is to provide us with an identity - who we are, how we got here, and what valiant, sad or shocking events happened along the way. It provides us with a context to understand ourselves and empathise with others.

To truly learn social studies, we need to:

- Comprehend information
- Analyse (why, what if...)
- Separate facts from opinions
- Present arguments
- Make inferences
- Predict future trends

Each of these is closely related to language skills. If schools divorce language skills from social studies or view it as 'the job of the English teacher', the learning of history and geography becomes a series of unrelated facts – both boring and futile.



Integrating language skills with subject learning

To truly comprehend any concept, we need to be able to develop four key skills:

Say what we read or listen to in our own words	Give examples and counter-examples	Relate it to real-life experiences	Apply it to different situations
<i>vocabulary, comprehension, sequencing</i>	<i>categorization, analogies</i>	<i>verbal reasoning, association</i>	<i>compare-contrast, analysis, inference</i>

Language skills needed

There are many aids and tools that teachers use in classrooms. Of these, worksheets are the most used. In this section, we use the examples of worksheets to discuss how key language skills can play a role in the learning of any concept.

Integrating language skills in worksheets for all subjects

Before delving into how worksheets can be created in different subjects, let us look at some basic principles in creating worksheets:

1. Why: The most important factor to decide before preparing a worksheet is its purpose. We must decide if the purpose is conceptual understanding, skill-building, creative expression, skill reinforcement or assessment. For each of these objectives, the design of the worksheet will be completely different. So, it is very important to define the goal of each worksheet before we start on the content.
2. Who: To make an effective worksheet, we must know who we are designing it for. It is essential for the level of the worksheet to be

'just right' for the children who are going to use it. For children at the beginner level, a difficult worksheet will be demoralising, whereas, for children at more advanced levels, a simple worksheet would be uninteresting.

3. What: Before we start, we must define the learning goal of the worksheet as specifically as possible. For example, defining 'reading comprehension' as a broad learning goal is not very useful. We must break it down into more specific goals, such as 'finding similarities and differences', 'summarising key details' or 'expression in own words'. Only when we define a specific, simple and sharp learning goal can our worksheet help children achieve the required outcomes.

Worksheets for science and social studies

For the comprehension of science or social studies in primary school, children must be able to break down the text of the lesson and derive its meaning. Let us take an example of a passage from an environmental science (EVS) lesson on *Seed Dispersal*.

Plants make seeds that can grow into new plants. But if the seeds just fall to the ground under the parent plant, they might not get enough sun, water or nutrients from the soil. So, seeds need to be transported to other places, where they can grow. This is called *dispersal*. The most common methods of dispersal are wind, water, animals and explosion. Seeds from plants like dandelion and cotton are light and can be carried long distances by the wind. Trees along banks of rivers like the coconut

tree use water to disperse their seeds. The seeds have a hard coat and float down the river. Many fruit plants disperse their seeds through animals and birds that eat the fruits and disperse the seeds in their droppings. Some plants, like peas and flax, have seed pods that pop open and scatter their seeds through tiny 'explosions'.

To help children understand the concept of seed dispersal, we can integrate key language skills in our worksheets, as shown in the example.

Section 1: Learning the Vocabulary

Note to teachers: Word meaning and association help children make connections and relate to the concept better

DIS means 'in different directions' SPERSE means 'to scatter'

DISPERSE = DIS + SPERSE, meaning, 'scatter in different directions'

I) Using the meaning of DISPERSE, guess what the following sentence means:

The crowd **dispersed** as soon as the artist left.

- (A) People came together from different directions when the artist left.
- (B) People felt unhappy when the artist left.
- (C) People went away in different directions when the artist left.

Section 2: Expression in the child's own words

Note to teachers: This helps children understand the concept better and relate to it using real-life examples

II) Think and write the answers in your own words.

You find a coconut lying on the banks of a stream.

Can you say its story in your own words? Use the questions below to help you.

- (A) Where was the parent tree of the coconut located?
- (B) How did the coconut travel to the bank where you found it?
- (C) Why did it not sink in the water? What helped it move away to a new place?

Section 3: Sequencing

Note to teachers: This helps children understand order of events in text and build a logical sequence in their minds.

III) Sequence the sentences in the correct order. Write the correct number in the circle.

- It is light and has small hairs on it that help it float in air.
- The cotton seed is ready to leave the plant.
- The seed lands on the soil in a different place and a new plant starts growing.
- The seed flies off the plant and starts floating in air.

Section 4: Giving counter-examples

Note to teachers: If we truly understand something, we must be able to explain it, not just with examples, but also with 'what if' questions. This deepens comprehension.

IV) Read the statement and answer the questions.

All the apples from an apple tree fall directly below the tree and stay there.

- (A) Will the seeds from all the apples grow into trees? Why or why not?
- (B) If yes, explain how. If not, explain what else the apple tree can do.

Section 5: Reasoning and Inference

Note to teachers: The skills of reasoning and making inferences help children understand implied information, even when it is not directly stated in the text.

V) Pick the option that seems correct to you. Using it, write which dispersal method is best suited for apple seeds.

- (A) Apple seeds can float or fly in air.
- (B) Apple seeds have a hard coat so that they can easily travel through rivers.
- (C) Apples are tasty and brightly-coloured to attract birds and animals.

Apple seeds are dispersed through _____ . (wind/water/animals/explosion)

Worksheets for maths word problems

Learning maths is not just learning arithmetic. One of the main reasons that many children find maths difficult is that they fail to understand the words or context of the problems. Instead of prompting children to hastily 'apply the formula' or manipulate numbers, maths worksheets must lead to problem-solving using language skills.

Let us take the example of this worksheet on the concept of *Time*, a recurring topic in primary school.

Problem: Mohit started his test at 7:30 am and completed it two hours later. Two hours after Mohit finished his test, his mother returned home. What time did Mohit's mother return home?

The time now is...

Section 1: Learning the vocabulary

Note to teachers: Children explore the meaning of the words in the problem to understand it better


I) Fill in the blanks with the correct word (**Hint: Later = After** **Earlier = Before**)

- (A) ____ is the opposite of earlier. (B) ____ is the opposite of before.
(C) ____ means the same as before. (D) ____ means the same as after.


Section 2: Understanding through examples


Note to teachers: Children explore the meaning of the words with the help of specific examples

II) Compare the time on each pair of clocks. Fill in the blanks with the correct words – later or earlier. See the example done for you.

(A)  a.m.
later

 a.m.
earlier

(B)  p.m.

 p.m.

(B)  a.m.

 a.m.

Section 3: Sequencing

Note to teachers: Sequencing events in the correct order is a key language skill that is extremely important to solve Math problems

III) Read each statement given in sequence and write the time in the blank.

(A) Mohit starts the test. The time is now _____.

(B) 3 hours pass. The time is now _____.

(C) Another $\frac{1}{2}$ hour passes. The time is now _____. Mohit completes his test.

(D) 2 hours pass. The time is now _____. Mohit's mother returns.

Therefore, time when Mohit's mother returns is _____.

Section 3: Visualizing text

Note to teachers: Conversion of text to pictures helps children understand the meaning of the words and sentences in the Math problem.

IV) Draw the story in the problem as a comic strip. Write your own dialogues.

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Worksheets for English comprehension

Even as other subjects integrate language skills to enhance concept understanding, English worksheets bear the responsibility of building vocabulary, comprehension and expression in the early years.

The problem in many English comprehension worksheets is that they encourage pattern-matching rather than the true understanding of the text. Pattern-matching strategies do not build

comprehension skills. English comprehension worksheets must try not to allow children to guess the answers by just matching patterns in the text without understanding.

Let us take the example of a worksheet for English comprehension to illustrate the difference between a 'copy-paste' response and 'real comprehension' skills that we are looking for.

Read this passage and answer the questions.

A little girl goes to a farm. In the morning, she eats two eggs. Then, she feeds the goats some hay. In the evening, the girl plays on the hill with her dog. They run up and down the hill and have fun.

Worksheet A ('copy-paste' response)

1. Who goes to the farm?

2. What does the girl eat in the morning?

3. What does she feed the goats?

4. Where does she play in the evening?

Worksheet A prompts a 'copy-paste' response. The child can match the words in the question with the words in the passage, and copy the sentences. Even with no understanding of the text, the child can answer correctly. This worksheet does NOT help in identifying learning gaps.

Worksheet B (tests comprehension)

1. Who is at the farm?



2. What does the girl have for breakfast?



3. What do the goats eat?



4. Where does she play in the evening?



Worksheet B modifies the words in the questions and adds picture options. This compels the child to understand the passage and questions. Only if the child comprehends the text, he/she will be able to answer correctly. This helps the teacher identify what the child knows or needs help in.

Another example of a worksheet that encourages comprehension is given below. By compelling the child to visualise the text, it builds comprehension

skills, rather than pattern-matching strategies to find the correct answer.

English Worksheet

Purpose: Comprehension through visualization

Four friends decorate a pumpkin.

- Karthik makes circles for the eyes. He draws a square for the nose. For the mouth, he makes an oval. Write K in the box next to his pumpkin.
- Priya makes triangles for the eyes. For the nose, she draws a circle. She then draws a rectangle for the mouth. Mark Priya's pumpkin with a P in the box.
- Mala decorates her pumpkin by making triangles for the eyes. She draws a star for the nose. For the mouth, she draws a rectangle. Write M in the box next to Mala's pumpkin.
- Vinod makes ovals for the eyes. He draws a triangle for the nose and a circle for the mouth. Write V in the box near his pumpkin.



Harnessing the magic of words in every subject

Teacher and Education Researcher, John Holt said, 'Learning is not the product of teaching. Learning is the product of the activity of learners.' For real learning, children must be able to read, comprehend, question, argue, reason and analyse every piece of information in the different subjects that they learn. Compartmentalising language skills and subject skills in different silos does not help this natural way of learning. Integrating language skills

in every worksheet we create enables children to understand and connect with what they learn in science, social studies and maths.

When we harness the power of vocabulary and language skills in all subject worksheets and resource materials, we realise the significance of Dumbledore's statement that words are truly an 'inexhaustible source of magic', not only in our school education but also in life.



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Worksheets: The Experience of Nizamuddin Urban Renewal

Jyotsna Lall and Hyder Mehdi

The Aga Khan Foundation (AKF), through the Nizamuddin Urban Renewal Project, has been working since 2007 toward the objective of improving the quality of the local community using heritage conservation as a stepping-stone. One key intervention has been the strengthening of the South Delhi Municipal Corporation School in Nizamuddin Basti through the improvement of the physical space, classroom processes and community engagement.

A key element in improving classroom processes has been the introduction and development of teaching-learning material (TLM). Worksheets have been central to TLM, but they took on a different role altogether during the lockdown. With the schools closed, there was no access to online learning in the resource-poor households of Nizamuddin Basti. The weekly educational package delivered to the students became their major academic resource. These were continued even when the schools opened briefly. The AKF team worked with parents, who in turn worked with their children; and older siblings worked with the children in the primary age group, which also increased the confidence of parents to work with their children. The role of this regular academic support was visible when the children were assessed after 12 months.

The education programme in Nizamuddin Basti began in 2008 with a baseline study of children's academic levels with the Department of Education, Delhi University. The study indicated a need to improve the academic levels of the children. A plan with a resource agency was developed and the first activity was a summer camp with the children of classes III to V. The focus of this was to improve literacy and numeracy skills as well as promote creative thinking. In addition to the other TLM, there was a special focus on developing worksheets that the South Delhi Municipal Corporation (SDMC) teachers could use during the academic year as well.

The summer camp and the TLM used showed positive results and it was decided to work towards improving these as this is a long-term project.

Evolution of the worksheet

When the Aga Khan Foundation began working in the Nizamuddin Basti in 2007, it was an underserved community. There was a municipal primary school, but it was barely functional with only about 50-60 of the approximately 100 enrolled children attending school. There were no other educational facilities in the *basti* though there are several other private and government schools in a radius of 3-4 kilometres. The project's baseline survey and discussions with the community had indicated a strong need to improve the quality of education offered in the only primary school.

The project worked to improve the physical infrastructure by using the building as a learning aid, appointing community teachers who understood the reality of the children, improving classroom processes, enriching the curriculum and finally engaging with the community to include them in the functioning of the school – through the School Management Committee and various forums to engage with the community.

The Nizamuddin project has seen three distinct phases in the school improvement programme: Phase I from 2008-11; Phase II from 2011-19; Phase III (the COVID-19 period) from 2020-21. In the first phase, we were in the process of understanding the community and had hired a well-known resource agency to support our programme. They developed about 250 worksheets to support literacy and numeracy. All the worksheets were made interesting with pictures, puzzles and other activities.

Literacy worksheets showed a clear progression:

Class I: Recognition of vowels and consonants with pictures

Class II: Reading words with and without *matras*

Class III: Writing words

Class IV: Writing small sentences

Class V: Reading texts/poems

Maths worksheets showed a similar progression:

Class I: Progressing from pre-numeracy to counting from 1 to 100, addition with single digits, filling

in missing numbers

Class II: Operations with 2- and 3-digit numbers

Class III: Working with 3-digit numbers

Class IV: Fractions

Class V: Division

When this approach was reviewed during Phase I, it was felt that while it had helped the children to a certain extent, there was a need to change as the National Curriculum Framework (NCF) had changed the textbooks and, in particular, the approach to language teaching by moving to the whole language teaching approach from the old approach of learning alphabets, then words, then sentences. Further, the worksheets developed had contexts that were not familiar to children of Nizamuddin. The worksheets for maths also followed a similar linear trend.

The why and how of worksheets

In 2011, recognising how children learn, we changed the approach. This included working with the community teachers so that they learnt the principles of child development and how children learn so that they could plan their lessons better and develop TLM and learning processes for the children they were teaching.

The new worksheets developed used the children's own languages, rhymes that were popular in the community, names that were more common in the community, phrases and expressions that children used often to facilitate reading. Children were encouraged to isolate sounds and then the associated alphabet in the word and then read the word and make new words based on the alphabets and words that they had learnt. These words were then used to develop stories and poems.

Activities in the worksheet encouraged children to be creative and use their imagination. Mathematical operations were broken down into simpler processes that facilitated children's learning with greater independence. The impact of these improved worksheets was visible in children's learning levels. An ability-based assessment indicated an improvement of 80 percent in abilities like writing the name of the object, describing a picture in a sentence, extracting information from a story/poem (indicating better reading and comprehension); in maths, they were able to

differentiate between small and large numbers, write them in ascending and descending order. There was a 40-50 percent increase in children's ability to link the story to their life experiences, as well as a better understanding of multiplication and division with the help of pictures.

Worksheets during the lockdown and after

Parents were given weekly packages comprising worksheets to keep the children engaged with the formal educational process. The community teachers¹ and the municipal corporation teachers together divided the children into three levels, regardless of which grade they were enrolled in. Level 1 comprised children who were new to school and older children who could not read and had limited understanding of numbers (those who were irregular in school); level 2 comprised those children who could read short sentences, but not fluently and could do mathematical operations with numbers less than 50 and the remaining children were in level 3.

Teachers prepared weekly educational packages that comprised eight worksheets – three each for Hindi and maths, and one each for art and environmental studies/hygiene/heritage. Community teachers worked with the parents on a weekly basis so that they, in turn, could work with their children. Instructions were included in the worksheets so that parents could explain concepts to their children. In addition, teachers were available on the phone to clarify doubts. There were several instances when parents requested additional help to first understand concepts like carry-over or division or multiplication themselves before helping their children. Teachers also explained the role of poems, stories in language acquisition and some basics of how children learn to read. This approach worked very well, especially with those parents who were more concerned with their children's education.

In level 1, different themes were chosen to recognise words, for example, the word *fruit*, where a picture of the fruit was given, and the name of the fruit was written in double lines for children to read, colour and write. Familiar names were given for children to isolate sounds and form new words. Parents, older siblings and friends were encouraged to work together to facilitate group learning. Levels 2 and 3 followed the same pattern, but with increasing complexity.

In maths, the activities in the worksheets focussed

on understanding the numeric quality of numbers, units and tens by forming bundles. For children at more advanced levels, hundreds and thousands were also included. Parents were advised to use a variety of objects for children to learn counting – sticks, stones, notes/coins and other household items. Worksheets also included mathematical operations.


Impact

The impact of this regular academic support in the

form of worksheets from teachers to children via parents was that children remained engaged with the educational process and the families became more engaged in their children's education.

An assessment carried out in June 2021 with a random sample of children, thus, indicated that children had retained their core skills and there was an improvement in some. There was a fall in skills and abilities that needed discussion, imagination, creativity and interaction with teachers and other children in a formal setting.

Samples of worksheets used in Phase II

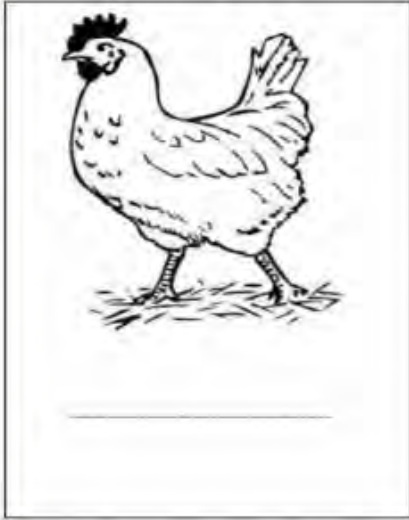
कार्यपत्रक - हिन्दी	
कक्षा 1	
नाम.....	
	मुर्गी माँ घर से निकली झोला ले बाज़ार चली बच्चे बाले चैं-चैं-चैं अम्मा हम भी साथ चलें
1. 'घर' और 'बाज़ार' पर गोला लगाओ।	
2. खाली जगह को भरो।	
मुर्गी माँ से निकली	
झोला ले चली	
बच्चे बाले	
अम्मा हम भी चलें	

कार्यपत्रक - हिन्दी

कक्षा 1

नाम.....

चित्र देखकर नाम लिखो।



कार्यपत्रक - गणित

कक्षा 1

नाम.....

चित्रों को जमा करके खाली डब्बे में लिखें

$$\begin{array}{|c|} \hline \text{4 Apples} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{2 Apples} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{6} \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \text{6 Oranges} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{3 Oranges} \\ \hline \end{array} = \begin{array}{|c|} \hline \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \text{4 Strawberries} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{3 Strawberries} \\ \hline \end{array} = \begin{array}{|c|} \hline \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \text{6 Pears} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{2 Pears} \\ \hline \end{array} = \begin{array}{|c|} \hline \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \text{2 Oranges} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{3 Oranges} \\ \hline \end{array} = \begin{array}{|c|} \hline \\ \hline \end{array}$$

नाम.....

गुणा

एक ही संख्या को बार-बार जमा करने को गुणा कहते हैं।



$$2 + 2 + 2 + 2 = 8$$

दो फूल चार बार = आठ

$$2 \times 4 = 8$$



$$3 + 3 + 3 + 3 = \square$$

$$\text{तीन तारे चार बार} = 3 \times 4 = \square$$



$$5 + 5 + 5 = \square$$

$$\text{पाँच गुब्बारे तीन बार} = 5 \times 3 = \square$$



$$4 + 4 + 4 + 4 + 4 + 4 = \square$$

$$\text{चार लड्डू छः बार} = 4 \times 6 = \square$$



$$6 + 6 = \square$$

$$\text{छः कप दो बार} = 6 \times 2 = \square$$

In conclusion

At the time of writing this article, the schools in Delhi are still closed and we are continuing with the weekly worksheet pack – children’s major link to formal education.

The Aga Khan Foundation team has been struggling

to increase community engagement with their children’s education – previously, while parents were interested in the education of the children and the functioning of the school, they were not very invested in the educational process of their children and believed that the teachers and

school have to be completely responsible for their children's education. A positive fallout of the direct engagement with parents during the lockdown was that they began to take an interest in their children's education – some of it was guided by the fear that their children would be left out and some because they felt that their child's name would be struck off the register which was a proxy identity

document for some migrant families.

Finally, the AKF has now created a 'worksheet bank' with activities that assist in learning to read and write Hindi, almost all the basic primary concepts in maths and several themes in art, heritage conservation, health and hygiene which may be of use to other agencies working in similar areas.

Endnotes

- 1 The Aga Khan Foundation has appointed some community teachers in the Municipal Corporation school.



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Views of Teachers on Worksheets

Akshatha S Belludi

Worksheets, which in pre-COVID-19 times were used very rarely and mostly as homework, gained prominence during school closures due to the pandemic. They were seen both by teachers as well as the Department of Education as the last option to ensure continuity of learning among students. The limitation of worksheets is that they cannot be used as a teaching tool. But worksheets proved to be a good option for reinforcing concepts learnt during the short periods when teachers could spend teaching their students either online or offline. In this article, I would like to give an account of a few of the teachers we work with and their experiences of using worksheets both as a tool for learning as well as for assessment.

Yashoda Patil, Government Lower Primary School, Pampapathy Mandira, Gangavathi*

Our children loved receiving the worksheets and enjoyed filling them up since they were bored with writing in their notebooks. Worksheets also developed confidence among my students since we used to file the worksheets completed by them

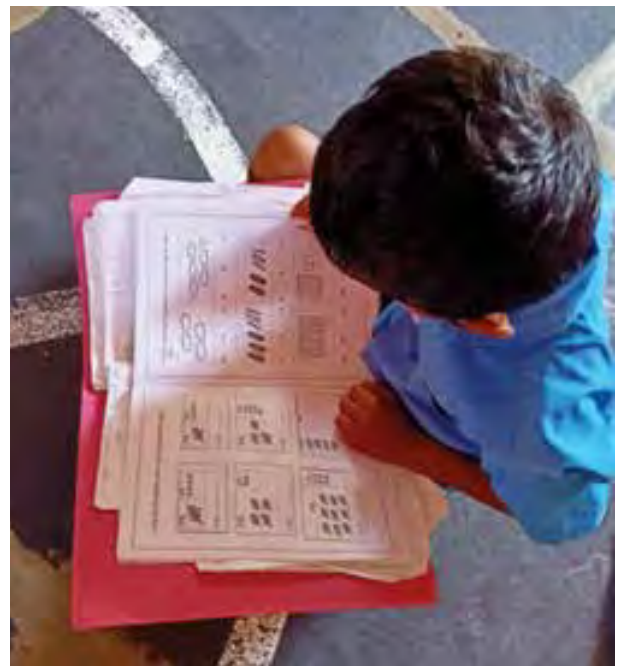


A student busy filling out a worksheet to add it to his portfolio.

in their respective files. We maintained these files to assess their learning levels.

Worksheets generated a healthy competition among my students, who did their best to complete their worksheets. They still look at their files as something that they had accomplished by themselves. Worksheets helped us a lot to reinforce learning of basic learning outcomes among our students. My students were eager to receive the worksheets and return the completed worksheets to me. They enjoyed the worksheets which had activities for colouring and a lot of pictures. They found maths worksheets more interesting than the language ones, though I had to explain to them how to solve the problems since many of them could not understand the questions.

Another reason they enjoyed doing worksheets is that, since the children were not coming to school, their parents used to give them the responsibility of completing household chores. They used worksheets as an escape from the household chores!



A student solving matching objects with numbers worksheet.

Pushpavathy N, Government Lower Primary School, Sangapura, Gangavathi

Initially, it was difficult to make our students understand how to use worksheets and we took the support of senior students who could read the worksheets and make the younger children understand what was expected. A few educated parents were able to help their children.

We also took the support of local youth groups in scaffolding the students' efforts in completing the worksheets which, in turn, helped them to achieve their learning goals. When they came back with their completed worksheets, we gave them feedback on how they could improve. Our students found it easier to complete maths worksheets than the language ones, over which they took time since they had forgotten how to read.

Using worksheets was a good experience during school closure, so we are planning to continue providing them. Our experience shows that working on worksheets will also help our students in preparing for competitive exams like the entrance exams of Navodaya and Morarji Desai schools.

Jayamma K, Government Lower Primary School, Guddada Camp, Gangavathi

We had to give our handwritten worksheets to our students since we did not have the resources for printing, nor could the parents of our students afford to get these worksheets photocopied. Children used to return the filled worksheets to us, and we realised that it was not my students but their parents and siblings who were completing these handwritten worksheets for them.

My handwritten worksheets were not too appealing for my students. Thanks to the workbooks provided by the Azim Premji Foundation, which our children found more attractive, the children began to take an interest and were eager to learn how to do the activities given in the workbooks. During the pandemic, my students were able to complete the workbooks of the previous grade as well as

a few worksheets from their current grade with some scaffolding. These workbooks supported my students to achieve at least a few of their grade-specific competencies.

Tippavva Ullatti, Government Model Higher Primary School, Hirejantkal, Gangavathi

Before the school closures, we used to give questions that children could easily find answers to from the textbook, but we found that with worksheets, we could set more practical and experiential questions. We were also able to introduce various themes to our children and make them learn in an engaging and meaningful way. This made parents participate in their children's learning because they could see what their children were able to accomplish and where they lagged behind. Regular conversations with the parents enabled them to understand what was expected of their children which also helped.

Children enjoy filling the worksheets which have more activities and less writing. Since most of the children of classes II and III had forgotten to read, they were not able to comprehend the instructions given in the worksheets and we had to explain how to complete the tasks. The children really enjoyed doing the worksheets. A child of class II felt a great sense of accomplishment when he handed over the worksheet to me. Other students told us how much they enjoyed filling in worksheets and asked us for more. Our worksheets had limitations – the pictures were not clear, and the children could not make out the illustrations – but with some help and support, they were able to complete these worksheets.

We found that worksheets foster group work and peer learning. This meant that we sometimes could not stop children from copying from each other's worksheets and helping their friends to complete their work! However, after analysing our assessment of the children's learning, the teachers have been able to decide what exactly to work on with the children.

**Gangavathi is a town in the Gangavathi taluk, Koppal district of Karnataka.*



Akshatha S Belludi is Resource Person, District Institute, Azim Premji Foundation, Koppal, Karnataka. She has worked in alternative schools to understand meaningful learning methodologies. Her interests are experiential learning, travelling, and exploring the indigenous knowledge systems of *adivasis* in various parts of India. She can be contacted at akshatha.belludi@azimpremjifoundation.org

Designing Environmental Science Worksheets

Chandrika Soni

Environmental Science (EVS) is an academic subject that gives children an opportunity to learn through continuous interaction with the environment. Children understand this subject better because it gives them opportunities to develop various skills, like observing, learning by doing, discovering, gathering information, drawing conclusions by doing experiments and presenting these etc. We, as teachers, also have new experiences while working with children on this subject which enrich our teaching-learning process. The teaching of EVS gives us many opportunities to talk to the children about our society, culture, health and conservation. Children also share their views and experiences.

Textbooks include many things that are useful for children at their (grade) level, but there are limitations. For example, the textbook of Chhattisgarh state has limited information – the whole chapter on agriculture is only around the cultivation of paddy. The same is the case with chapters on festivals, historical places, food and modern family etc. So, while working on these topics, we feel the need to widen the scope of the classroom discussion. In order to do that, we use different types of teaching-learning materials (TLMs), videos and other resources. Videos help us to a great extent, but when it comes to working on skills like reading, writing, and comprehension, worksheets are the best option. Therefore, worksheets are used as per the requirements of

a topic. With the help of worksheets, we are not only able to expose children to various aspects of a topic, but we can also assess the children.

We used worksheets regularly during the pandemic period; they became a medium for us to connect with the children and their parents. We were able to send the subject matter to them with the help of worksheets. Sometimes we were successful, and sometimes we failed; because if the children are able to answer the worksheet themselves or with the help of someone else, then its purpose is served. But if the child gets the whole worksheet answered by someone else, then it becomes a futile exercise. Therefore, while preparing a worksheet, we should keep some important things in mind.

The instructions on the worksheet should be clear, the language used should be simple, the content should be according to the level of the child, appropriate illustrations should be used, and the tasks should cater to the children at different levels so that the children can solve the worksheet on their own. While working on the worksheet, we also realised that we should try to get the opinion of the children about the worksheet given to them. We should ask them whether they like it; if they enjoy doing it. Is there any difficulty? What other information do they want? Do they have any questions?

How did you like this workbook? What was the problem in understanding or solving this? Tell us in writing. You can also give your suggestions.

Figure 1. Questions for children

Allowing space for such questions creates opportunities for self-assessment. Such questions, thoughts or suggestions from children open up avenues for us to do better. Children answered these questions in writing, expressing their enjoyment in solving the worksheet, or that they did not understand certain questions, or liked a particular piece of information and so on. In this way, the worksheet is a link that connects the teacher with the children because it conveys their understanding and ideas to the teacher.

Worksheets as an assessment tool

There can be no better way of assessment than when children are solving worksheets in front of the teacher in the classroom because while solving the worksheet, children read, write and look at the pictures with full attention, take help from the teacher when they face a problem. This helps the teacher to check and know each child's level of understanding, their confusion, challenges and also

know whether their problem pertains to language or the subject.

We took several things into account when creating a good worksheet on EVS, for example, in addition to the contents of the textbook, we included information from various sources, such as magazines and the Internet. We included a variety of short stories, poems and pictures so that children could get reading material beyond their books.

For example, in Figure 2, a mouse is searching for his mother. On the way, he meets the animals seen in the picture, but they do not resemble his mother. He meets a frog first. But the mouse felt that the frog did not look like his mother. Further, he meets a parrot. Even the parrot did not look like his mother. Similarly, all the animals he saw on the way, looked different to him. Children are asked to look at the picture and answer questions, such as:

- Is the frog like its mother? _____
- What are the differences between a frog and a mouse? _____



एक चूहा अपनी माँ को ढूँढ़ रहा है। रास्ते में उसे चित्र में दिख रहे जानवर मिलते हैं , लेकिन वे उसे अपनी माँ जैसे नहीं लगते । उसे सबसे पहले मेढक मिलता है । पर वो चूहे को माँ जैसे नहीं लगा, फिर तोता भी नहीं लगा ऐसे ही रास्ते के जानवर उसे अलग लगे ।

प्यारे बच्चों ऊपर दिये चित्र ध्यान से देखिये और बताइये :-

- ❖ क्या मेढक उसकी माँ जैसा है ?-----
- ❖ मेढक और चूहे में क्या-क्या बातें अलग है ?

Figure 2. A short story with questions

For example, while preparing the worksheet on *My Family* for classes III and IV, a short pictorial story was included from the EVS textbook to retain the interest of the children. Similarly, poems and

activities on 'Our Environment' (NCERT) were also included. We also took pictures from the Internet and made an attempt to portray different types of modern families and familiarise the children with them.

नीचे दिये चित्र को ध्यान से देखिये ...



चित्र में आपको एक पालक परिवार (single parent family) दिखाया गया है। आज कल इस तरह के भी परिवार देखने मिलेंगे, जहाँ बच्चों कि देखभाल केवल एक पालक भी कर रहे है, उनके अकेले होने के कई कारण हो सकते है (आगे कभी चर्चा करेंगे)। नीचे कुछ और परिवार के प्रकार (family patterns) दिये गए है, उसे ध्यान से देखिये, और सोचिए इस तरह के परिवार कैसे होते होंगे?-----

Figure 3. My family worksheet

Rationale and structure

In the picture, single-parent families are shown. Nowadays, such families are common, where only one parent is taking care of the children. There could be many reasons for this, which will be discussed later. Some more family patterns are shown in the next worksheets, look at them carefully and imagine how these types of families must be.

While preparing the worksheet, we kept in mind the essential elements that are required to achieve the prescribed learning outcomes. What should be our objectives when we work on the topic of 'the family' with children who are at this (the current) level? Which skills will we be able to develop better with the help of this topic? How should children solve the worksheet, how much of a topic should they read or solve in a day?

Having decided how much work the children should do on a particular day; the worksheets were divided into day-wise tasks so that the children could work on other subjects as well. The worksheet began with

a short story and the children had to write down their feelings after reading the story. A poem given in the textbook was also included in the first day's work. Children have often been able to connect the ideas of a poem with their personal experiences. I tried to cover all the important things in this worksheet, such as types of relationships; where families live; structure of the family -- joint family, nuclear family; modern family; the importance of family; benefits or problems of living in different types of family structures; reasons for changes in family structure etc.

Other than human beings, we included pictures of animal families so that children could understand that even animals have families, they also live in groups and understand that they are dependent on each other for their existence. Another reason for including pictures of animal families was to develop sensitivity in children for those animals and to understand the co-existence of humans and animals in the environment.



ऊपर दिये चित्रों को ध्यान से देखिये । चित्रों में आपको विभिन्न जंतुओं के परिवार दिखाई दे रहे होंगे, मनुष्यों जैसे ही इनमें भी प्यार ,परिवार , एकता ,सहयोग ,,एक दूसरे पर निर्भरता,दोस्ती जैसे भाव होते हैं । क्या आपने ऐसा कुछ (जीव जंतुओं में देखा है)अनुभव किया है ?लिखिए -----

Figure 4. Animal families worksheet

One more section called ‘Family Yesterday, Today and Tomorrow’ was added for the children to give them a new experience. Here different types of families were shown, like a single-parent family, same-sex family, and a family having only pets. We asked the children, according to them, which kind of families do not exist or are impossible to imagine and the children's answers were very amusing.

In the worksheet for class III on this theme, the task of collecting information about adults was also included, so that children could talk to their elders and write answers. Thus, efforts have been made to help the children be aware of and understand various matters. We tried to rectify any shortcomings that were found when children worked on the worksheets.

A final word

We know that there are challenges in whatever we do; in working with worksheets too we constantly face challenges. Some of these include, children not completing the work in the prescribed time or not completing their work at all; getting someone else to do their work instead of doing it themselves. It is not easy to make children, who have some basic difficulty with reading and writing, fill out a worksheet. Despite this, we keep giving them work continuously. Many children are doing well, they are being helped, parents are happy that the children are doing something different, they (especially grandparents) are also learning with the children, and it is very encouraging for us to know all this. And our journey continues.



Chandrika Soni is an EVS teacher in the Azim Premji School, Dhamtari, Chhattisgarh. As a teacher, her special interests include working collaboratively with children, giving new dimensions to their talents through creative pursuits, and skill-oriented teaching of the environment. She can be contacted at chandrika.soni@azimpremjifoundation.org

Worksheets for Measuring and Building Maths Competencies

Gowthama Rajavelu

Puducherry is a small town with a 25km radius in all four directions. There are five educational blocks in the district with a total of 269 schools, including primary, higher primary, high schools and higher secondary schools. There are 1038 teachers who work in the primary grades (I - V) in 151 primary schools and 55 upper primary schools. Azim Premji Foundation's work, primarily, lies with these teachers in achieving foundational literacy and numeracy.

Worksheets have become an integral part in teaching-learning process. Many teachers use it regularly as it is an invaluable tool in the students' learning process. Neurological research highlights that retrieval practice is significant in consolidating new learnings so that information gets stored in long-term memory. In maths, after understanding each concept through a hands-on activity, it is

crucial to make students practice and worksheets are the simplest way to do that. In Puducherry, we tried to use worksheets in one of the NGO schools to measure and build basic competencies in maths. The process we followed was:

1. Assessment: Using a simple worksheet designed with basic outcomes to measure the learning levels of children
2. Activities: Using contextual activities with appropriate concrete materials to teach concepts
3. Practice: Using worksheets relevant to the activities to further strengthen learning

Measurement of competencies

Here is a look at some worksheets used in classrooms and the competencies measured.

We used worksheets to assess the level of the learners as shown in Table 1. For example, one

Worksheet	Competencies	Observation
Counting and matching numbers (Refer to Figure 1)	Is able to count objects up to 10	Student counted and wrote the number and matched it with another box with the same number.
Counting and writing numbers (Refer to Figure 2)	Is able to associate quantity with number	Student wrote the symbol and number name as well. We were able to measure that the student knows how to write the name in words and can associate it with quantity.
Comparing - Which is more? (Refer to Figure 3)	Is able to compare objects based on quantity	Student counted correctly but wrote thirteen as 31 and nineteen as 91. The student lacks clarity in understanding the place value system.

Table 1. How worksheets are used to assess learning levels.

Counting up to 20 : Worksheet

Name: SURESH

Class: III SD

1. Match the groups with the same number of objects

Figure 1. Counting and matching numbers

Numbers 1 to 20: Worksheet:

Name: _____ Class: _____

1. Count and write the correct number

Figure 2. Counting and writing numbers

Worksheet: Comparing Numbers up to 20

Name: Jyesh Class: VI

1. Tick the group with **more** objects





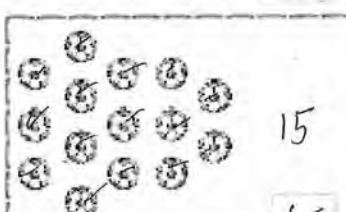



 14 <input checked="" type="checkbox"/>	 31 <input type="checkbox"/>
 14 <input type="checkbox"/>	 16 <input type="checkbox"/>
 15 <input type="checkbox"/>	 11 <input checked="" type="checkbox"/>
 17 <input type="checkbox"/>	 91 <input checked="" type="checkbox"/>

Figure 3. Comparing – which is more?

student was able to count objects but was unable to write numbers using the place value rule. So, we used tamarind seeds and ice-cream sticks to teach counting in tens. This was followed by worksheets (Figure 4). The first one is to count and match with the appropriate name and the second one is related to the place-value rule.

Students were able to do the first one but struggled with the second one. Instead of writing one in the tens place, many wrote ten. We realised that going straightaway to mathematical language, that is, tens-ones, may have confused them. Therefore, we used packets and seeds, bundles and sticks, instead.

To further strengthen their understanding, a story

of two mango sellers, Suresh and Ramesh was narrated. Suresh counts mangoes one by one to give to his customers whereas Ramesh packs the mangoes in tens and gives them to his customer. When asked who sells more mangoes and why, students reasoned that Ramesh would sell more because of his counting ability. By the time Suresh counts ten and gives to one customer, Ramesh may have dealt with two or three customers. This is because he has packed and kept the mangoes in tens, which makes it easy for him to count quickly. This was followed by the worksheet shown below. The real-life example helped students to understand better and we could find minimal errors in the worksheets. Then we used number beads

Worksheet: Eleven to Twenty
 Name: VISHNU Class: III Std

Count and Match

ten and three thirteen

ten and four fourteen

ten and one twelve

ten and two eleven

Figure 4. Count and match practice worksheet

Worksheet: Eleven to Twenty
 Name: Jyothi Class: V

Count and write the number name

Tens Ones

10 0

ten

Tens Ones

10 4

fourteen

Tens Ones

10 1

Eleven

Place value practice worksheet



Activity	Practice																
<p>Students grouped tamarind seeds -- 10 per packet and remaining left loose.</p> <p>Then, they grouped ice-cream sticks – 10 sticks per bundle and remaining left loose.</p> <p>They worked in groups and practised writing the numbers based on two questions:</p> <ul style="list-style-type: none"> - How many packets/bundles? - How many loose seeds/sticks? <p>Then they wrote down the same using tens and ones:</p> <table border="1" data-bbox="161 719 555 832"> <thead> <tr> <th>Packets</th> <th>seeds</th> <th>tens</th> <th>ones</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	Packets	seeds	tens	ones	1	1	1	1	<p>Students practised using the worksheet below individually.</p> <p style="text-align: center;">How many tens and How many ones</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 80px; display: flex; flex-direction: column; align-items: center;">  </div> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 50px; display: flex; align-items: center;"> <table style="width: 100%; text-align: center;"> <tr> <td>Tens</td> <td>Ones</td> </tr> <tr> <td>10</td> <td>0</td> </tr> </table> </div> </div> <hr style="border-top: 1px dashed black;"/> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 80px; display: flex; flex-direction: column; align-items: center;">  </div> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 50px; display: flex; align-items: center;"> <table style="width: 100%; text-align: center;"> <tr> <td>Tens</td> <td>Ones</td> </tr> <tr> <td>1</td> <td>6</td> </tr> </table> </div> </div>	Tens	Ones	10	0	Tens	Ones	1	6
Packets	seeds	tens	ones														
1	1	1	1														
Tens	Ones																
10	0																
Tens	Ones																
1	6																

Figure 5. Worksheet used after activity with seeds, bundles and sticks






Activity	Practice								
<p>Storytelling was followed by roleplaying in which students became shopkeepers and sold mangoes.</p> 	<p>Students practised using the worksheet below, individually.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="display: flex; gap: 10px;">   </div> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center;"> <table style="width: 100%; text-align: center;"> <tr> <td>Tens</td> <td>Ones</td> </tr> <tr> <td>3</td> <td>6</td> </tr> </table> </div> <div style="margin-left: 20px;">There are <u>36</u> mangoes</div> </div> <hr style="border-top: 1px dashed black;"/> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="display: flex; gap: 10px;">   </div> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center;"> <table style="width: 100%; text-align: center;"> <tr> <td>Tens</td> <td>Ones</td> </tr> <tr> <td>4</td> <td>3</td> </tr> </table> </div> <div style="margin-left: 20px;">There are <u>43</u> 3 mangoes</div> </div>	Tens	Ones	3	6	Tens	Ones	4	3
Tens	Ones								
3	6								
Tens	Ones								
4	3								

Figure 6. Worksheet used after storytelling and role-playing

(*ganitmala*) to further strengthen the concept of counting in tens and ones. The worksheet devised is also based on number beads. Followed by number beads, we used base-10 materials for the same concept, that is, counting in tens and ones. The purpose of this exercise is to help students move from the material stage to the pictorial and then to the symbolic stage. After working with the beads, students started drawing tens and ones as in the worksheet shown in Figure 8. This enables them to

move to the abstract stage and they can then stop using materials altogether.

With this counting objects up to 20 came to an end. We consolidated and revised students' learning again using worksheets at the end of the week. Meanwhile, students' progress was also recorded by their performance in worksheets (Table 2), which was mapped with specific competencies as shown in Figure 9.

S.NO	Name	Reads and writes up to 99	Counts in groups of tens and ones.	Uses place value in writing numbers
1.	NEELA MEGHAM	✓	✓	✓
2.	BEVA	✓	✓	✓
3.	DHARMESH	✗	✗	✗
4.	VIGHNU	✓	✗	✗
5.	JAYAPRASATH	✗	✗	✗
6.	SURESH	✓	✓	✓
7.	YOKESH	✓	✗	✗
8.	SHARVIN	✓	✓	✗

Table 2. Students' performance in worksheets

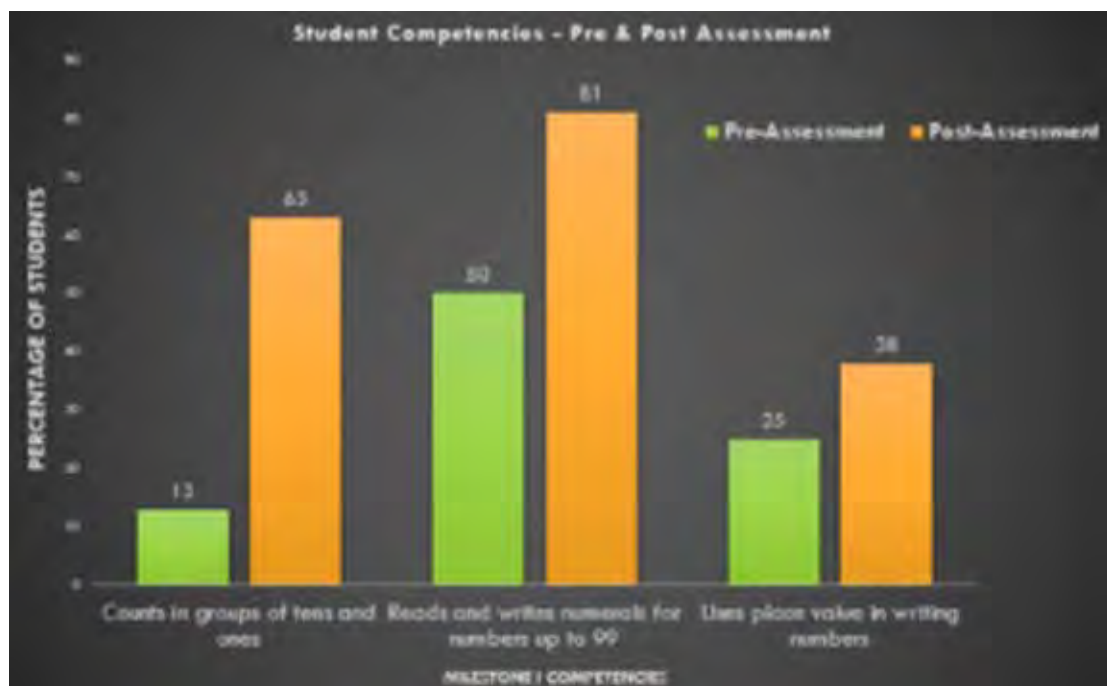


Figure 9. Students' performance mapped with specific competencies

Conclusion

Students enjoyed working on worksheets. They would eagerly ask for worksheets every day. We used worksheets as a means of classroom management strategy to get their attention in some classes. The very idea of solving worksheets gave them the motivation to pay attention in classes. One student was so keen on working on worksheets that he would stay active only during that part of the class.

Also, we were able to see the usage of worksheets in different areas, like enriching teacher-training programmes and strengthening ties with functionaries. We used the worksheets with errors during online training for primary school teachers and it improved the level and quality of interaction. Teachers were able to note where children struggle and think in terms of solutions. As discussed, in various teacher-education studies, starting with the students' work made the discussion richer and created awareness amongst the teachers about students' problems.

**Names have been changed to protect children's identities.*



Gowthama Rajavelu is an educator who believes in bringing about an active environmental and mathematical mindset among kids through strategic planning with teachers and functionaries. Currently, he is working as a maths and EVS Resource Person at the Azim Premji Foundation, Puducherry . He may be contacted at gowthama.tr@azimpremjifoundation.org

Integrating Maths Worksheets with Other Subjects

Janak Ram

As a parent or teacher, there is always something new to learn while working with children. One of these is how the understanding of children's play, art and other subjects in the curriculum, along with maths can be integrated with their understanding of the things around them and their overall learning. Through classroom observations and discussions with subject teachers of environment science, Hindi, and English, I was able to build an understanding of the elements that should be in consonance when preparing a worksheet. Worksheets should be prepared in such a manner that a natural relation can be drawn between maths and other subjects, such as environmental science, languages, arts and sports. Children should not feel burdened by worksheets. They should be able to read, understand, and solve a maths worksheet with as much ease and interest as they would any other subject.

Preparing worksheet content

Worksheets should be prepared in such a manner that they allow children to engage in learning at home and in the classroom as much as possible. They should enable children to understand the subject as a whole. Children have individual differences in their pace of learning and worksheets should give them the freedom to learn at their own pace. Greater emphasis has to be placed on 'how children understand' so that children may link their experiences to their learning and learn independently.

My decision about the content of the worksheets was guided by the recognition of the relationship between maths and other subjects - maths and language (L1, L2), maths with EVS and English, maths and art, and maths with sports, music and library.

Besides this, there were discussions about children and their environment with other teachers. This was done with the view that it may help the other teachers too to prepare worksheets for their specific subjects.

Interrelation between maths and Hindi

Besides keeping the language simple, it is important to include specific terminology related to maths in the worksheets. Worksheets should feature relevant pictures and words to help children understand the subject easily. For instance, there could be a description of an incident that took place in their surroundings that children may read and enjoy. Keeping all this, and the relationship of Hindi and maths in mind, I prepared a worksheet that could be used for both classes IV and V. I took help from Rajasthan state's workbook for the same. (Figure 1)

Interrelation of maths with EVS and English

Children often spontaneously engage with their surroundings during class. Relating classroom discussion with what they have discussed during previous lessons is a treat for them. To do this, I often speak with other subject teachers to know which concept from which subject area is being taught in a particular class. Fellow teachers also share their classroom activities and challenges. I worked on preparing the following worksheet for class III keeping in mind three subjects – maths, EVS and English. To solve this worksheet, children will have to rely on their understanding of the environment and English. Children's understanding is aided by moving from the concrete to the abstract in maths. In this worksheet, children can think in the abstract as well. (Figure 2)

Interrelation between maths and English

Currently, our school is transitioning towards English as a medium for instruction. So, children at our school need more exposure to the terminology of maths in English, be it through listening, speaking or writing. Keeping this in mind, a worksheet based on the relationship between maths and English was prepared. Short English sentences were used in making 'word-based' questions. (Figure 3)



1- धमतरी में चार दिनों के लिए एक किताबों का मेला लगा। उसमें बिकी किताबों के आंकड़ें नीचे दिए गए हैं। उनको देख कर पूछे गए सवालों के जवाब दीजिए-

दिन	1	2	3	4
किताबों की बिक्री	4518	3217	5419	7511

(क) मेले में कुल कितनी किताबें बेचीं गयीं? _____

(ख) दूसरे और चौथे दिन में से किताबों की बिक्री किस दिन अधिक हुयी और कितनी ?

(ग) मेले में एक किताब की 20 प्रतियाँ 6000 रूपये में बेचीं गयीं। उस किताब का मूल्य कितना होगा ?

(घ) आप किताबों के मेले से कौन-कौन से किताबें खरीदोगे ? नाम लिखो।

Figure 1. Interrelation between maths and Hindi

Interrelation between maths and art

Aesthetics plays a crucial role in the understanding of mathematical concepts. One may wonder how. Each number or geometrical figure, in its composition and presence, conveys its own aesthetic sense. Let us take 'zero' as an example. Adding zero to any number can increase its value. Through this, children may be given the idea that everything present in the world is important and

thus, it is necessary to respect each entity.

Incorporating colours in the teaching of maths also makes children happy, so I included this aspect too. While preparing a worksheet based on this, care was taken to see that children not only get the chance to colour but also to draw. This also helps in developing fine motor skills and hand-eye coordination in children whose pace of learning is slower. (Figure 4)

Worksheet-02

How many legs do?

A. 9 lions have



B. 6 spiders have



C. 5 snakes have



D. 8 girls have

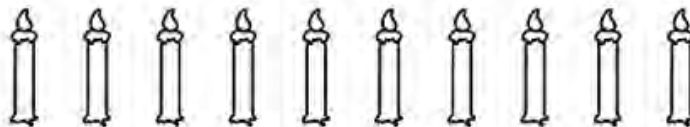


Figure 2. Interrelation of maths with EVS and English

Worksheet-20

Coloring: Odd & Even

1) Color the odd candles.



2) Draw 12 mangoes and color the even mangoes.



3) Draw 7 vases and color the odd vases.

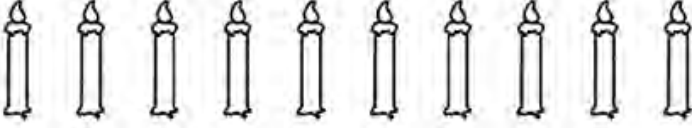


Figure 3. Interrelation between maths and English


Word-Problems and Multiplication Class—Name: _____ Date: _____
Azim Premji School Dhamtari Chhattisgarh

Worksheet-20
Coloring: Odd & Even

1) Color the odd candles.



2) Draw 12 mangoes and color the even mangoes.



3) Draw 7 vases and color the odd vases.




Figure 4. Interrelation between maths and art

A relationship was also drawn with English. Children were given the opportunity to use words, such as *candle*, *vase*, and *mango* in making sentences. During all this, their understanding of mathematical concepts was also tested. The worksheet also featured various geometrical shapes which children enjoyed colouring. This worksheet also fulfils the purpose of assessment.

Interrelation of maths with sports, music and the library

Children love to make up their own stories and poems. Space was given in the worksheet for this. They were given the opportunity to frame numbers, multiplication tables and puzzles in the form of stories or poems. The number worksheet also gave them the opportunity to count the things around them, conduct a population survey of the village, make a purchase from the market and maintain an account of the money, and collect data on the number of books in the library. To ensure that children use the library resources, questions from various magazines subscribed by the library, such as *Champak*, *Chakmak*, *Cycle*, *Pluto*, *Balhans*, *Akkad-Bakkad*, *Tell Me Why*, and *Wisdom* were collated and presented to children through worksheets.

This was done so that in finding solutions to these questions, children would get familiarised with the magazines. I also tried to include magazines published by newspapers, such as *Dainik Bhaskar* and *Hari Bhoomi*.

When children understood how to make a multiplication table, we also created a relationship with music as children composed songs on tables to memorise them. Worksheets on factors and multiples for class V drew a connection with sports using an activity given in the NCERT textbook. Space was given in the worksheets of classes III, IV and V for children to read, write, learn and understand numbers through the game of *Ludo*.

In conclusion, this whole exercise of working with worksheets helped me at various levels, including learning to use the computer keys and software in many ways and I was initiated into the process of building an understanding of the relationship of various subjects with maths. My understanding of how children learn according to their own potential and experiences and how worksheets facilitate their learning deepened. The suggestions given by the organisation on the worksheets have always inspired me to work more on these. I was able to

collect multiple learning resources for children and teachers in one place. Creating such worksheets for children with learning difficulties, which they

can solve on their own, remains a challenge. Challenges such as this, constantly inspire me to learn and do better.



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Multidimensional Use of Worksheets

Mamta Sharma

It is the endeavour of everyone involved in the field of education to create learning opportunities for children in which they can learn and interact with their classmates while also working individually. This concern deepens when children are not in school but are part of neighbourhood groups in which children of every grade and level are present. The challenge before the teacher is to ensure that all the children learn according to their learning levels. We are all aware that during the COVID-19 pandemic, when schools remained closed, children's learning suffered greatly. As a result, we are now adopting the process of teaching multi-level groups. At present, we need more reference material to work with the children and ensure that it is readily accessible to them. At the same time, teachers are trying their best to make children's work useful and meaningful.

We used worksheets as a medium to engage all the children in a group in an interesting way. We found that Azim Premji Foundation's worksheets for classes I-V are ideal for developing language skills. The activities given in these are less content-oriented and more skill-oriented, so we used them to develop the language skills of the children and it proved to be a unique experience for us.

Reading and understanding together

We used storybooks from the library along with the worksheets. Children were given worksheets according to their learning levels. This gave them an opportunity to read and understand together with their classmates. Children read the stories given in the worksheet, wrote the answers to the questions, constructed the story based on the picture, completed the incomplete story/poem and wrote poems using their imagination. All these activities related to reading and writing were done by all the children together. It was not necessary for all the children to be from the same class. Since teachers plan the usage of worksheets one day before, it becomes easy and useful for them to work with a multi-grade, multi-level (MGML) group and ensure their learning.

Linking learning to experiences

For learning to happen, the content should be linked to the child's environmental experience, and conversations should take place in the context that they are familiar with. Consequently, the contents of the worksheets prepared for primary classes are helpful in doing meaningful work with children of upper primary classes as well. We have asked children of all classes to communicate, write dialogues with their friends, understand the content of the text from their own experience and express their views through these worksheets. This is proving to be very beneficial for them. For example, there was a description of famine in one of the worksheets. When we asked a question about famine linked to children's own environment, they wrote that they do not have famine in their area! Then, we felt the need to explain the concept of famine to them. This led to a discussion on famine and its impact and was followed by showing a video to them.

Worksheets are a powerful way for children to discuss, express, analyse a situation and use their experiences to express themselves freely. Soon, children who could recognise only words were trying to write names with the help of pictures; those who could read simple sentences and stories could now understand them and were answering the questions. Some children made up their own questions by reading a passage/story. Thus, every child in the group worked with the worksheet as per his/her understanding and this helped the teachers to create a learning environment in MGML groups.

Meaningful use in language-learning

The worksheets are designed based on lessons from textbooks for primary classes, as well as non-textbook materials. The activities related to reading stories/poems, understanding new words and using them in sentences have been very advantageous for children. They are given opportunities to think by putting themselves in the place of a character or by replacing the character with another character and rewriting the same story/poem.

These activities help children to use language creatively in their writing. They read each other's writing in the group which facilitates learning from their peers.

After assessing the learning levels of the children, a large group of children was divided into smaller groups. Activities were tailored to suit their learning needs and worksheets were compiled and used for individual work, subgroup work and assessment. These worksheets are helpful in working with children of classes I to VIII.

Multifaceted use in regular classrooms

Children are now working in a systematic schooling system, and our team has been successful in the multi-faceted use of worksheets in classrooms. We are trying to ascertain that the worksheets that have been created for the primary classes not only help those children in learning, but also the children who are one or two classes behind their class level on the learning achievement indicators. For this, the type of worksheet we have used with children of upper primary level include: reading with comprehension and writing down their thoughts; reading a story or poem and connecting that understanding with their experiences; reading the passage and answering questions and revising the concepts of grammar; creative writing on the basis of the picture; analysing the social, cultural and economic situations after reading the questions and writing down their own ideas, etc. Three groups are formed based on the children's levels of learning in each class. The use of worksheets in

these groups is of great help to children in learning and working together.

Adequate availability of worksheets and their activity-based nature has proved to be beneficial for both the children and the teachers, who are able to understand the learning needs of the children and plan accordingly. These worksheets are proving to be a breakthrough for teachers in their work with children of varying learning levels by creating a three-level plan.

Participation and learning

While working with worksheets in groups, we came across many aspects that play an important role in children's learning. When children solve the same worksheet, they read and understand the story or poem together. Some children help those who have reading difficulties and discuss the meaning of new words in familiar contexts. They also discuss the pictures given in the worksheet in their groups and write their experiences related to the pictures.

In summary, worksheets prepared by the Foundation have helped the children to learn and develop their linguistic skills and have also given them opportunities to work together in multi-grade, multi-level (MGML) groups. The worksheets also provide strategies for teachers to work systematically in MGML groups. As far as children's learning is concerned, these worksheets were useful, not just in the mohalla teaching during the pandemic, but they are also of great value in regular teaching in school.



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Leveraging Worksheets to Enhance Classroom Learning

Meghana Baasri

In the intermittent periods during the pandemic, when teachers were able to reach their students for short periods, priority was given to L1 (first language) and maths, and, as a result, the loss of learning of L2 (second language) was greater and the gap between lessons wider. Here are some learnings from how different teachers successfully used worksheets to help their students cope with these difficulties.

In one school, teacher A, an English teacher, found that due to a six-month gap, her class III students had forgotten all the basics that they had learnt, including the alphabet. For some students, recognising the letters was a problem, for others, writing in English was difficult. At the time, the Department of Education, Karnataka, had provided teachers with a whole range of worksheets to help them support their students in bridging the learning gap. However, teacher A faced a dilemma: with students forgetting even the alphabet, how were they supposed to complete the worksheets? Her solution to this was to use guided reading and writing lessons combined with the worksheets to help her students learn all that was taught in class prior to the closing of the school again.

Guided reading/writing worksheets

Guided reading and writing can be a useful tool to help students bridge the gap between what they now remember and what they once knew. The students are expected to complete the worksheets based on the guided reading and writing lessons not independently, but with the teacher's guidance and support. These worksheets can be post-reading activities to enhance the students' learning and understanding of the lesson being taught.

Teacher A's plan to help her students was quite similar to a guided reading and writing lesson. She made a concerted effort to allow students to read without prompts and planned a small writing activity based on the day's lesson. Since many of the learners were struggling to keep up with the class and particularly with the writing tasks, teacher A

grouped the students based on their current levels and went around to each group offering them the support they needed to complete the worksheets. The worksheets given to the students were the same, however, the level of support each group of learners received varied and teacher A guided them accordingly.

For students who have forgotten how to read the alphabet, the teacher can provide a dotted pattern of the alphabet to trace and then practise writing the alphabet. For others, who have trouble with decoding or understanding some words, she can ask pointed questions to help them understand the word. For a third group, teacher A's support is not required at all; she simply needs to check the accuracy of their responses.

Through trial and error, teacher A learnt that a worksheet with only text was harder for a majority of her students to complete. Instead, worksheets that combine pictures and text were received more favourably by her students, more so if they could colour the pictures after completing the worksheet. Teacher A attributed this change in her learners to their forgetting letters and words in their time away from school. Even though the worksheets were based on the contents of her day's class, she assumed that her students needed more time to familiarise themselves with the contents before reproducing or applying their relearnt knowledge to complete the worksheets.

When she initially adopted this new way of teaching in her class, her worksheets had very basic tasks and exercises, like matching the items. She also found that lengthy worksheets were off-putting for the learners, perhaps because the long gap between the times they were in her class had negatively affected their attention span as well. The first few worksheets that teacher A provided to her class were single-task worksheets, and she gradually began increasing the number of items and tasks in the worksheets as her students became more comfortable with completing them.

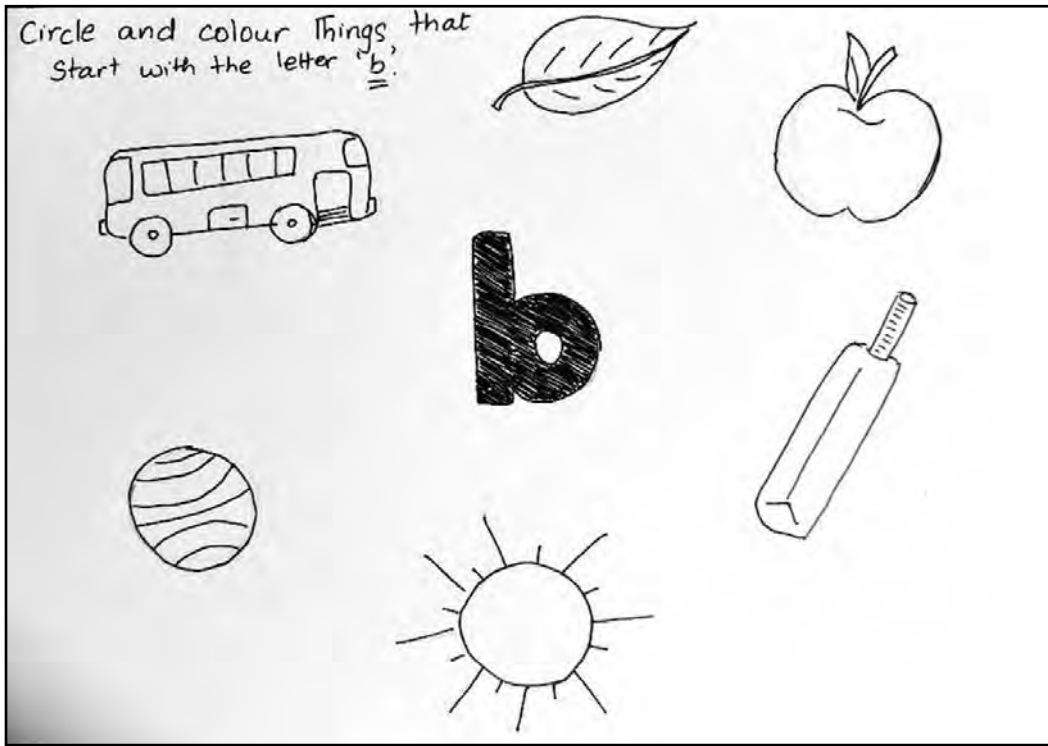


Figure 1. Identifying pictures that start with a particular letter

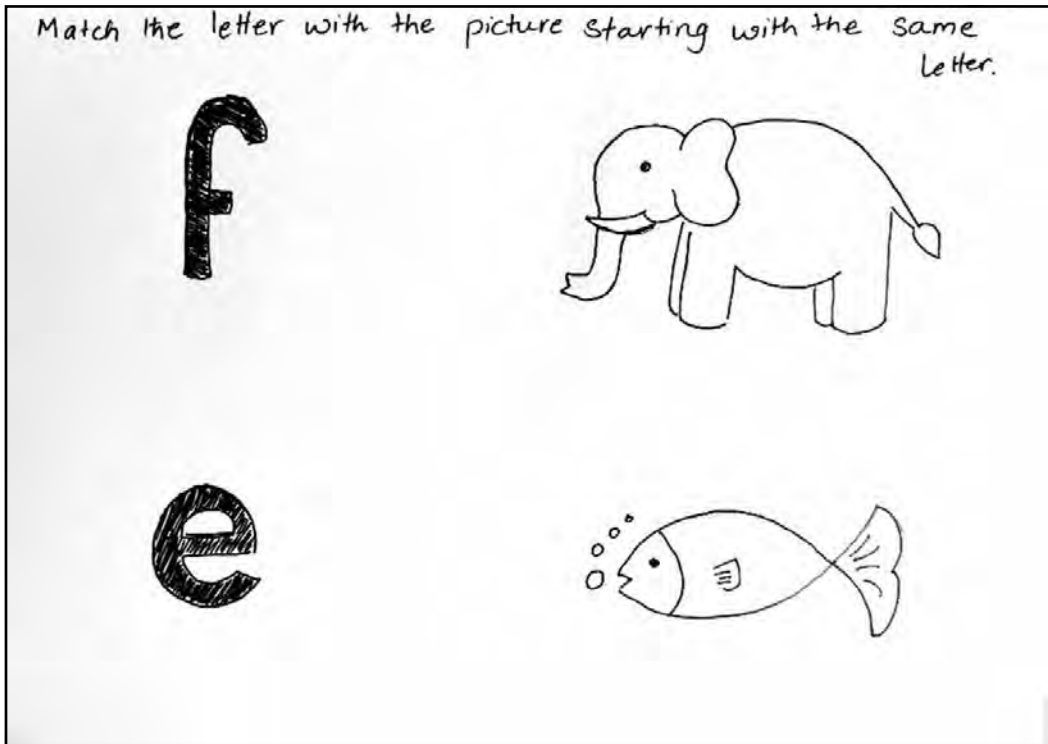


Figure 2. Matching the letters to the pictures starting with it

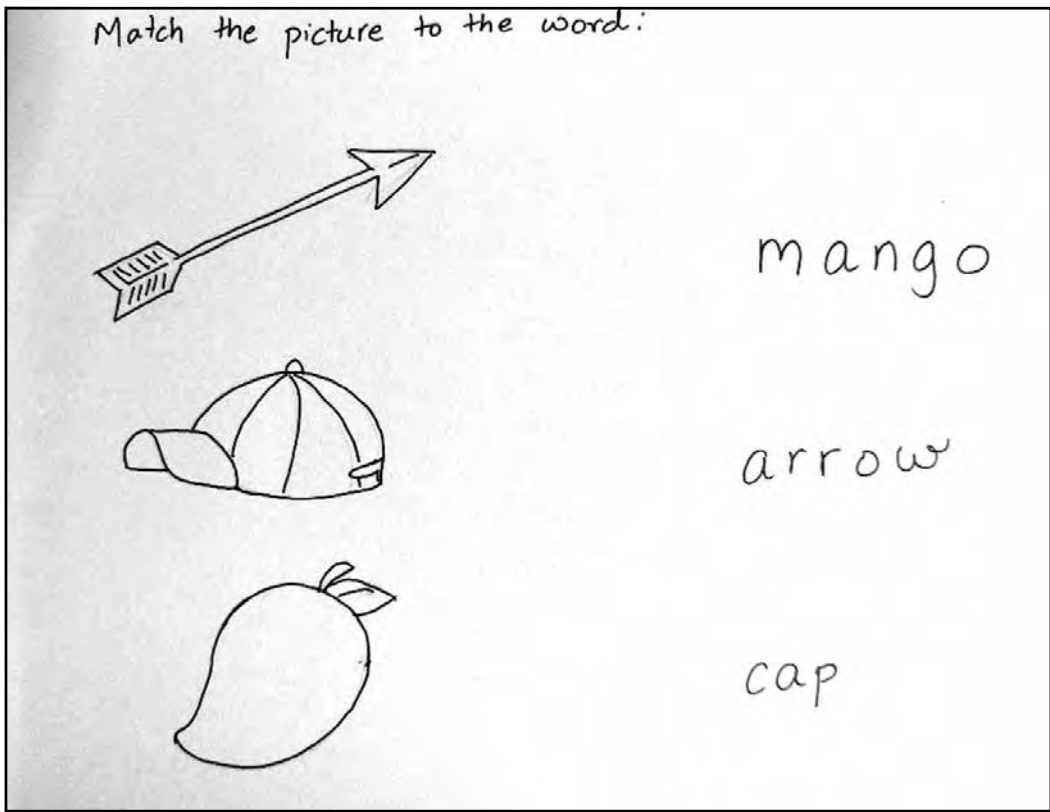


Figure 3. Matching pictures to the words

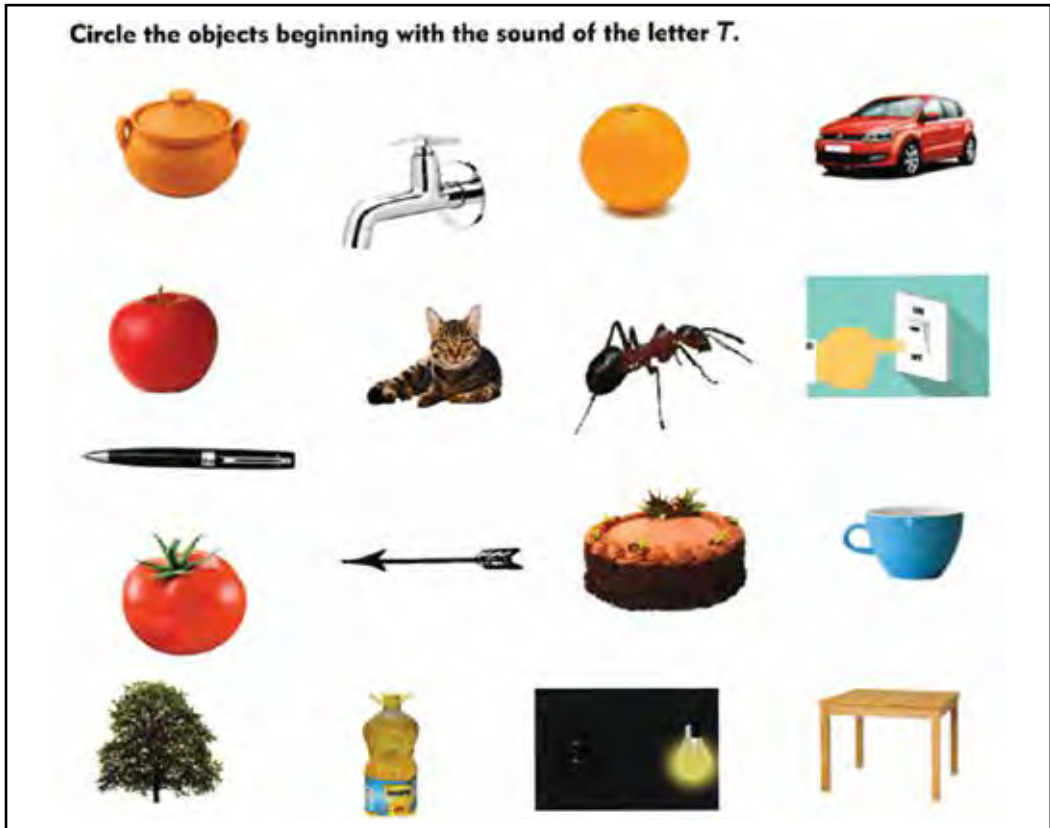


Figure 4. Recognising objects starting with a particular letter

Another thing teacher A discovered was that it was easier to jog the memories of her learners when she used the class I textbook for her lessons. Since the class had already engaged with most of the lessons and poems, they found it easier to understand and, later, complete the worksheets when they were based on the familiar text. However, she made sure to use content simpler than that (in the textbook) in her worksheets. Students in higher-level groups would be assigned the task of attempting to complete some of the exercises in the textbook after completing their worksheets.

Evaluation worksheets

Another teacher, teacher S, found another way to get her students used to writing again. She designed worksheets based on the level 1 English *Nali Kali* (ENK) cards. The tasks in these cards include strokes, letter-tracing and reproduction, and identifying objects which start with a particular letter (from a range of familiar pictures). Some of her worksheets included an activity: to colour objects starting with a specific letter in a colour (like objects that start with the letter 'c' in red, or those starting with the letter 'a' in blue). Each of her worksheets reintroduced the letters of the alphabet in chunks and had several simple tasks to help learners regain the skills of letter recognition and letter reproduction. The worksheets in teacher S's class were also distributed after she made the students 'echo read' and engage in oral activities that focussed on the specific set of letters she was teaching them. Once her students were comfortable with completing letter-related worksheets, she began to re-introduce basic concepts, such as in-out, up-down, etc. in worksheets.

Worksheets, when given at the end of every class, ensure that the students are comfortable with writing tasks and also gives the teacher an idea about how well each student has understood the concept or content taught. They are a useful tool that help learners practise what they have learnt and remember it for a longer time. Another useful (and perhaps more common) purpose to using worksheets is for evaluation. However, the problem arises when the worksheets are too lengthy (to cover all the aspects of the unit taught) and contain more text. The problems faced by teachers when providing worksheets at the end of each lesson (mentioned above) also hold true in this, and the teacher will have to consider the current levels

of her students when deciding the number of exercises and length of the worksheet.

Evaluation worksheets do not necessarily have to be given at the end of teaching the entire unit. Rather, these can be provided on a weekly basis to introduce learners to the idea of *applying* their knowledge, rather than solely the content (which is advisable for daily worksheets). Periodic-assessment worksheets should also include unfamiliar words and texts that the learners can decode and then understand. Most often, the worksheets given to students contain only the content and exercises that the students have worked on in their classroom. The problem with this lies in the fact that many students often memorise the required answers and simply reproduce them from memory, but when it comes to applying their skills in other areas to read or write new words, they often struggle. After all, the point of teaching a language is not just to build knowledge but enhance language skills of the learner.

Worksheets along with oral work

Many learners do not perform well on worksheets since they have difficulty in reproducing their knowledge on paper. Therefore, using only the worksheet to gauge the students' learning is also not a very accurate indicator of their actual learning. Understanding this issue, teacher M, another English teacher, sought a solution to get a better understanding of the level of each of her students. After she had corrected the worksheets, teacher M would call each student to her desk while the others were given a task to work on independently. She would orally rephrase the items the student had responded to wrongly and check if he/she could answer the question. Though this was a time-consuming task, teacher M was able to not only understand each student's level, but she could also get a clear picture of which of them required more instruction or support and could identify those who had difficulty in writing (reproducing).

All in all, worksheets are an accurate tool that can help teachers re-familiarise their students with writing (especially in the current circumstances), help them practise writing tasks by providing support, and also understand their students' learning. For optimal results, teachers not only need to understand their learners' current levels and when to use worksheets, but also on what kind of exercises can help draw learners' interests

back to writing and reproducing their knowledge on paper. Shorter, more frequent worksheets with a wide array of tasks can be completed with the

teacher's guidance to enhance students' learning and help them recall knowledge and skills that have been unused, thereby, bridging the learning gap.



Meghana Baasri currently works with the Azim Premji Foundation in the Ramanagara district of Karnataka. Before joining the Foundation, she worked briefly as an English teacher for high school students in an aided school in Bengaluru. She has always been interested in teaching English at the primary level. She may be contacted at meghana.baasri@azimpremjifoundation.org

Worksheets as a Learning Resource

Pooja Vishnoi

My journey as a schoolteacher started meaningfully with the Azim Premji School, Barmer, in March 2019. In our school, we believe in the holistic development of children, and everybody works towards it. With dialogue as a mode of conflict resolution, we focused on providing meaningful academic experiences to children. In the first three grades, we provide oral and written exposure to them through a print-rich environment, a variety of teaching-learning materials (TLMs), audio-visual aids, rhymes and stories etc. I was the class teacher of class II and taught English. As it was my first teaching experience where I was deeply involved in dealing with children at different learning levels, I had to learn and unlearn a lot of things as a new teacher. From spending a whole week working only on one rhyme to the proper planning of a theme/chapter, daily interactions with the children helped me become a better teacher.

In my planning and execution of a specific theme/chapter, I prepared various activities with diverse resources. While doing this, worksheets emerged as a great learning resource for my students. Here is a short description of using worksheets as a resource.

Worksheets as a resource

I began using worksheets specifically for engaging level-1 children, that is, those who were not at grade level. Since engaging multi-level children together becomes a bit difficult, I planned level-wise engagement for three groups for all activities other than oral and common work with the class. As level-1 children required more interesting activities and engagement to pay attention to learning, I provided them extra resources in their class time.

Initially, I downloaded worksheets from the internet, mostly related to hand balance and alphabet practice. After realising how useful

these worksheets were, I got a few more which were associated with the theme I was covering. Along with the level-1 children, I distributed some worksheets to other children who showed interest in working on these rather than in their notebooks. So, I got worksheets with colouring exercises for all the children. From then on, there was no stopping in the making of worksheets as a classroom resource for the children.

Customising worksheets according to theme and level

When I realised how meaningfully I could engage children through worksheets, I planned to bring worksheets into the classroom, so that children get comfortable with worksheets when they get them as their assessments or classroom exercises. When I planned my teaching chapter-wise, I incorporated the worksheets into my content-mapping (Figure 1), so that I could design worksheets according to my plan and the requirement of the theme. It is essential for a teacher to understand when, where and how many worksheets to use according to the theme. For example, there were a few chapters where I did not need worksheets because classroom activities, TLMs and homework exercises were enough to cover the theme but for other chapters or themes, I designed worksheets based on the chapter or theme objectives. So, the theme and its objectives guide a teacher in how to plan activities, worksheets, and assessments. In a classroom, we have children under three (major) levels, so a teacher should provide contextual and level-wise learning resources to every child. I also customised theme-based worksheets, according to children's levels, for example, the worksheets would incorporate colouring exercises, hand balance, letter-word exercises, simple sentence exercises and exercises that challenged the children to create stories etc.

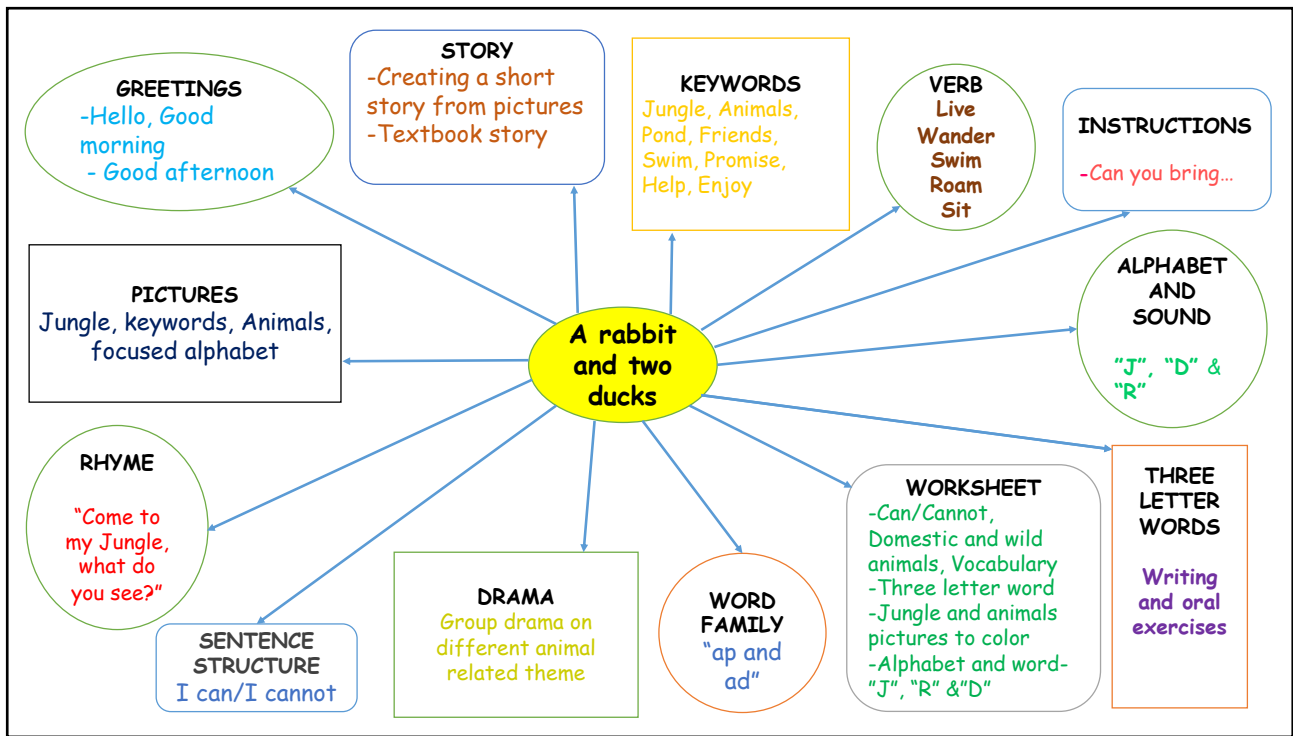


Figure 1. Content mapping

Designing worksheets

Often teachers find it difficult to work with worksheets because those available online may have been designed by experts or people with good knowledge of technology, but often the worksheets are not contextual for children. So, teachers find it difficult to find relevant worksheets. One can try designing worksheets according to one's needs. Initially, I created worksheets for hand balance and letter-word practice by hand and got them photocopied; children simply joined the dots and practised writing the letters and words in the given

lines. With time, I made these worksheets on my laptop with clip art images from the internet so that children get to colour the images and can relate to these images better. So, introducing contextual and easy-to-colour images was my priority to develop children's interest.

Besides getting good colouring worksheets, I also made worksheets according to the objectives and exercises of the topics we were doing in class, because textbooks were limited, less interesting and the exercises, which focused primarily on writing, were difficult. So, I tried to design

Name- EKTA Date- 17-02-22

Let's write your family members names and occupation:

	Name	Occupation
Grand father	Umasam	Doctor
Grand mother	Sanda	Home makes
Father	Madan	Driver
Mother	Sarita	Taibor
Brother	Amr	student
Sister	Surbhi	student
Pe	Mina	student
Me	EKTA	student

Figure 2. Information gathering home assignment

worksheets which provided practice on different concepts and children could explore information-gathering, identifying, self-creation etc. which not only developed their interest but also enhanced their reading and writing skills.

Children's response

Children respond with great interest and enthusiasm to anything that is out of their routine or different from their textbooks or the regular work that they do in their notebooks. That is why it is important to incorporate diverse activities and TLMs to build interest and support the learning process. My plans also involved activities and TLMs, but when worksheets were introduced, children took great interest in self-learning; colouring, practising and information-gathering worksheets were of great interest to them.

Talking specifically about the three-level groups I had in my class, the level-1 children showed great improvement in their writing skills, their hand balance and letter-word learning through different tasks and interesting games in the worksheets. Sometimes, writing the same letter or word ten times in a notebook becomes just a mechanical homework exercise to complete but when the same letter is worked on through five different exercises in a worksheet, the child takes a keener interest in doing it. Similarly, levels 2 and 3 children showed great improvement in learning new vocabulary, sentence structures, creating mixed-language (Hindi and English) stories, inventing spellings using their letter-sound knowledge etc. Children also worked very creatively on experimentation with colours and expression through drawing.

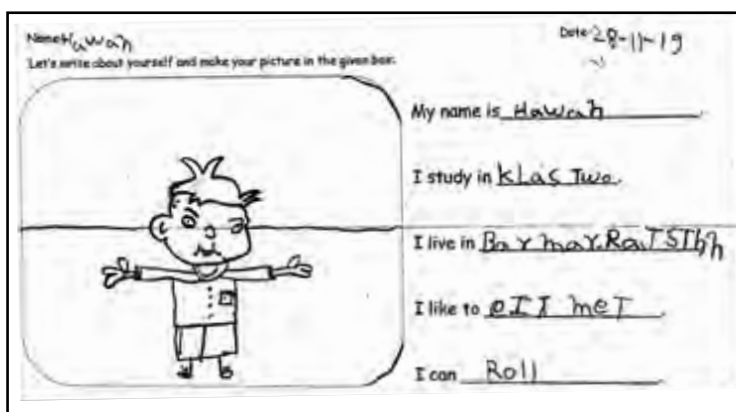


Figure 3. Sound-letter association



Figure 4. Colourful work of a child

Using worksheets for various purposes

Although worksheets are mostly used for assessment in schools, they can serve many other purposes. A teacher can provide meaningful practice to the children, assess their learning, track their progress over time, engage a multi-level class simultaneously, etc. Worksheets served all these functions in my classroom. For example, along with the worksheets, I incorporated into my routine, lesson planning for practising different concepts, even as children continued to practise the same concepts and skills in their notebook as homework. I attached their worksheets in their portfolio file, so that I, other teachers and parents could easily see how a child had progressed in reading and writing skills over time.

I designed their mid- and end-term assessment sheets using the same patterns that we had worked on in the worksheets but changed the exercises so that I could understand whether the children had learnt what they had been taught, and they could

understand the exercises easily. As they were familiar with the instructions, they did not face any difficulty in understanding the questions. So, worksheets helped me in preparing my children for assessment exercises, tracking their progress over time, providing them with the practice of different concepts and deepening their interest in learning, etc.

Summing up

With worksheets, I gave my class the opportunity to become familiar with other resources too. Picture cards, game boards, posters, videos etc., were all used so that children get to see, hear, and then practise in their notebooks and worksheets. Worksheets alone cannot do all the magic; they support the learning process.

The importance of worksheets as practice tools has been established by the government during school closure. Workbooks were created for children to practise at home whatever they were taught in school. These worksheets are being used by teachers who may not have the experience of incorporating

them with their routine work; so, the task is likely to be limited to simply filling the exercises without other oral or written reinforcement of the concepts

covered. Hence, proper guidance is required to use this resource meaningfully in schools, so that children can benefit and learn through them.

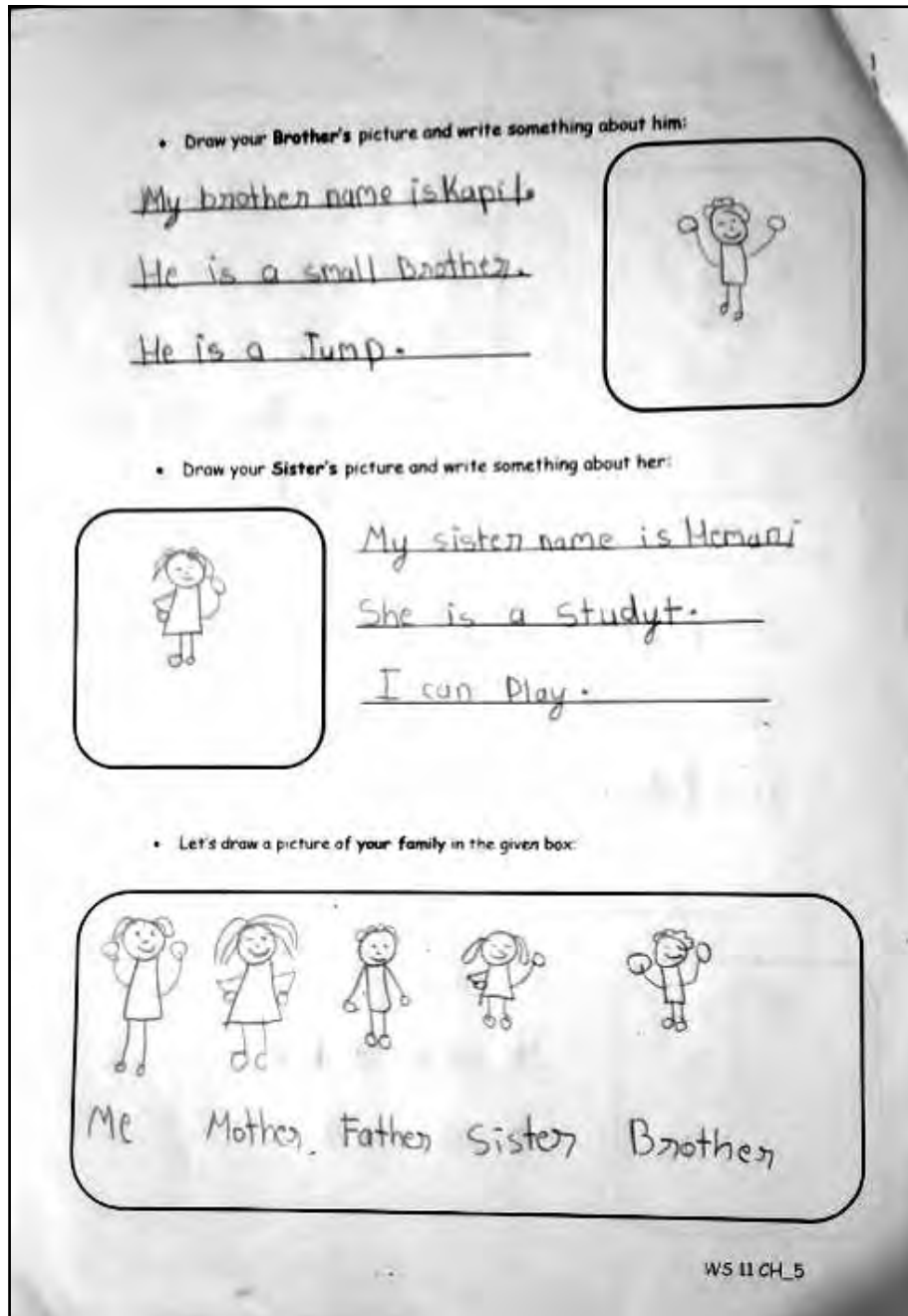


Figure 5. Introduction to self and family



Pooja Vishnoi completed her master's degree from Azim Premji University, Bengaluru in 2018 and joined the Azim Premji Foundation, Barmer. She has taught in a government school and has worked as an English teacher in the Azim Premji Foundation School. Her area of interest is understanding how the second language can be taught/learned with the help of the first language. She may be contacted at pooja.vishnoi@azimpremijfoundation.org

Evaluating the Utility of Maths Worksheets

Richa Pandey

‘Corona, ma’am,’ responded a seven-year-old when I asked for real-life examples of the three-dimensional shape ‘sphere’. The entire class burst into laughter. I could not help but admire the child for coming up with such an obvious yet unusual example of the concept.

I teach at the AIMEE International School, a private school based in Vijayawada, Andhra Pradesh. The school is affiliated to Cambridge International Education and follows an inquiry-based approach to learning. As we began planning to welcome our first batch in June 2021, we drew up a bridge-course plan to identify where each of our learners were. Consequently, we decided to spend one month working on the ‘number system and basic operations’ with classes IV to VII and ‘understanding counting and sequence’ for classes I to III. Our school initially operated in the online mode for the months of July-October. The offline classes were officially started for all the students after the Dussehra break and the online classes were completely suspended.

As a school, we aim to inculcate a spirit of inquiry in our students. Our general approach to the learning of maths is to first establish the need and relevance for learning any concept. We do so by exploring real-life scenarios, inviting applicability of the concept being taught and then moving to the specifics of the concept. We follow a Concrete-Pictorial-Abstract path of learning of concepts. Hence, worksheets play a significant role in shaping the learning experience of our students. This article explores the kind of worksheets I have used in the last six months, how I used those worksheets and why I find some of these very useful but others not so much.

Different worksheets, different purposes

While exploring the publicly available support material on the internet, our team came across a gamut of printable worksheets mapped with grade-specific learning objectives. (A list of resources is provided at the end.) There are many more resources that can be helpful if one wants access

to the worksheets. But with time I learnt that, ultimately, the strategy of implementation makes a lot of difference to the impact of these resources.

I have used several worksheets at different stages for different purposes:

- a. *To generate curiosity:* Our learning approach focuses on establishing the need of learning any concept. Rather than telling a child that they will use a given concept when they grow up, we aim to highlight the relevance of maths in their life now. For example, to discuss odd-even numbers with class III, we provided them with a home environment-based worksheet. This was done also because this topic was discussed during online classes, and we intended to use their homes as a learning lab. The worksheet required children to explore different parts of their home (kitchen, bedroom, living room) to count a few objects and then decide whether the number of objects was odd or even. They were also expected to talk to their parents and find out the number of family members and cousins. This worksheet was to be completed partly at home and the ‘checking by pairing’ aspect was to be done in class. It was designed to generate excitement about the concept and hence was used as a warm-up exercise at the beginning of the lesson.
- b. *To facilitate the transition from concrete to abstract:* We actively use the concrete learning material available at Jodogyan (<https://jodogyan.org/>) to provide hands-on experience to our learners. For example, the base-10 system was introduced to primary grades through blocks. Students played with the blocks as they learnt how to count in steps of constant size: 2, 3, 5 or 10. In no time they realised that counting in tens helps them to count easily and quickly. This discovery was followed by the introduction of the place-value system which was appropriately facilitated through the base-10 system worksheet. As the worksheet has pictures of blocks being bundled as tens and hundreds, it helped the learners move seamlessly from what

they could see and touch (the blocks) to what they had to eventually imagine and use (the numbers). This experience extended to upper primary classes also as the students learnt fractions first through cut-outs of shapes and then with the help of a worksheet consisting of pictorial representation of fractions.

- c. *To consolidate learnings from different concepts:* Classes I to III learnt about different shapes (2D, 3D, prisms and pyramids) by working with the *Jodo* straws. They had fun while putting their imagination to work in making different kinds of shapes. The straws also allowed them to examine and understand the different properties of the shapes that they were learning about. This was particularly useful for 3D shapes. At the end of each session, a worksheet was provided with crosswords and riddles that required the students to apply their understanding. This helped in tying up loose ends and providing a recap of the different concepts learnt.

Utility of worksheets in post-pandemic world

The COVID-19 pandemic has resulted in a learning loss in children across the globe. A study conducted by the Azim Premji University in January 2021 revealed that, on average, 82 percent of the students have lost at least one foundational ability in maths from the previous year across all classes. The students in our school are no exception. Half of our class VI learners struggle to perform basic mental calculations and our class II learners are actually at class I.5 (if only there was a grade like that). Some of the students have managed to stay at their expected level of learning, mainly through online learning, but this number is a mere one or two in a class of ten. Consequently, as a teacher, I am required to cover the basics before I begin working towards grade-appropriate learning objectives. Again, I am supported by the available resources in multiple ways.

- a. I used some of the worksheets meant for students of class III for my class VI learners. This is because their fundamentals are not strong as a result partly of the pandemic and partly owing to the memorisation (rote-learning) of fundamental concepts prior to the pandemic. Since the worksheets do not mention the grade level, it is possible to use them without hurting the pride of students.

- b. Some of my class II students do not enjoy writing as much as they enjoy playing games online. These worksheets help a lot in ensuring learning without compromising on the fun element.
- c. One of the biggest advantages of using worksheets is that they allow scope for differentiated instructions. Since my class has students of diverse learning levels, using standardised learning material would mean some of them will be either left out or will be bored. Hence, I try to prepare two levels of worksheets for a given concept where possible. This helps me keep most of my learners productively engaged.

What works, what does not

In the last few months, I have explored hundreds of worksheets and used many of them. While some of the worksheets have been quite engaging, there is a particular kind that I do not find useful. I try not to use the worksheets that are a replica of the textbook. Worksheets which do nothing but mention a few numerical problems for children to solve are useful only for a revision class or short assessment. Otherwise, the same kind of exercise can be easily done by the students in their notebooks. These worksheets hardly support actual learning and are purely focused on practice.

In contrast, a worksheet that I really found useful for my class VI students was about 'investigating circles'. This worksheet invites students to work independently or in a group and examine the circumference and area of any circle. The worksheet on graph paper contains three circles with different radii. Students are expected to find the circumference of each of these circles by using a thread to measure the boundary of these circles. They are required to note the observations in the space given in the worksheet. The students estimate the area by counting the number of squares it takes to make the circle. As they work around it, I notice how many different ways they adopt to count the squares. Some stop after counting each complete square, others count complete squares first and then try to mentally combine incomplete squares to estimate the closest possible answer. One student was able to visualise the circle as four quarters and went on to count the squares in one quarter before he multiplied the number by four to find the total number of squares. This kind of brainstorming is essential for developing mathematical thinking.

Conclusion

With the schools being reopened after months of closure, the onus lies on the teachers to go the extra mile and support the learners who suffered due to the lack of adequate learning support at home. Fortunately, there are plenty of resources available online that can help teachers in ensuring the learning of these students. While I enjoy

designing my own learning material, it helps to have guidance from experts who have been working in this domain for a long time. The availability of such material allows me to spend my energy in helping the learners use the material effectively and create a space for them where they get to experience the *Aha!* moment more often.



Grade - 3**Subject:** Mathematics**Topic:** Odd and Even Numbers**Learning Objective:** To recognize even and odd numbers in context of real-life scenario.

Task	Simon says....	How many are they?	Are they even or odd in number?	Time for a quick drawing. [Check your answer by making their pairs.]
A	Go to your kitchen.			
	Count the number of cups.			
	Stay in the kitchen. Count the number of plates, now.			
	One last thing, count the number of spoons.			
B	Explore all the rooms in your house.			
	Count the number of chairs you have.			
	Also, count the number of tube lights you have.			
C	Go to your bedroom.			
	Count the number of toys you have.			
	Count the number of footwears you have.			
D	Discuss with your parents and recall			
	How many members are there in your entire family?			
	How many cousins do you have?			

*Worksheet designed by author***Resources**

Interactive Games and Worksheets

1. <https://www.mathgames.com/>
2. <https://www.turtlediary.com/>
3. <https://softschools.com/>
4. <https://www.topmarks.co.uk/>

Printable worksheets

1. <https://www.education.com/>
2. <https://www.twinkl.co.in/>
3. <https://www.liveworksheets.com/>
4. <https://www.mathsisfun.com/>

Simulations (supportive for online classes as well)

1. <https://illuminations.nctm.org/>
2. [Interactives.ck12.org](https://interactives.ck12.org)
3. <https://www.mathlearningcenter.org/apps>
4. <https://www.coolmath4kids.com/>



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Introduction

The year 2021 was one where schools across the country witnessed multiple phases of partial re-openings. After the state-wide lockdown of two months ended, government schools in Bangalore District officially resumed classes for middle school and high school students first. In the following months, primary as well as pre-primary schools also underwent a similar manner of phased reopening.

Children were back in classrooms, and teachers bore the huge responsibility of bringing them back on track with learning and finding pedagogical strategies to bridge the gaps in basic competencies without causing anxiety and fear among students.

Worksheets became a widely used medium to engage children, during this crucial period across schools in the district. Children were not entirely unfamiliar with worksheets as these were handed out during school closure as part of some initiatives by the Education Department as well as by other educational organisations.

On working closely with English language teaching with a focus on foundational literacy, I was more interested in understanding how, in classes I to III, worksheets for English provide support for student learning, and when used along with the textbooks, whether they are sufficient and effective for teaching a second language. The article tries to explore these questions and is based on my observations of language classrooms and takeaways from co-teaching in a few government schools in Bengaluru after the schools reopened.

While working with young children, it is important to remember that no child can learn a concept from worksheets alone and hence, worksheets should not be disconnected from meaningful learning experiences. These are to be employed alongside other activities and games that are relatable and arouse the interest of children. Otherwise, they might fall short of the objective they are meant to achieve.

How do worksheets support learning?

Across grades, mainly in classes IV and above, it

could be generally noted that worksheets play a useful role in revising and reinforcing the topics and themes covered in class, through repetition. Worksheets are also less instructional in nature. The role of the teacher is minimal once she gives instructions at the start on how to work on the questions. These instructions then help children in using their own understanding for finding solutions to problems. For instance, it was observed that for those children who were not new to reading, worksheet exercises allowed them to spend more time with keywords, such as names of characters, action words and sight words appearing in a story and in turn, get more familiar with their usage.

Getting opportunities to recollect and retell what was learnt previously is important for internalising a new idea. Along with this, worksheets also contribute to the objective of facilitating independent learning.

Shortcomings of worksheets

However, when it comes to teaching the early grades, this need not always be the case and some shortcomings of worksheets could be seen, which are explained here. The limitations of using worksheets in classrooms have little to do with the worksheets themselves but more to do with *how* they are used. The major challenge is that worksheet exercises are mostly carried out in isolation; in classes I-III, when they were employed for independent work or as merely practice sheets, they were shown to be not quite as effective as in the higher classes, and more and more children showed signs of inattention while doing worksheets and resorted to copying answers from classmates with the motive of somehow getting done with the exercise. This is particularly true of children who are either new to school and have no prior exposure to print in a formal manner or may have had some level of introduction to print which is still not sufficient for them to read and write with an attempt for meaning-making. For the same reasons, none of the advantages mentioned above, except that of repetition, takes place here, and repetition without understanding or building associations

hardly ever contributes to learning. It, therefore, becomes necessary to use other teaching-learning tools that can supplement worksheets in helping children internalise a concept better.

In the context of second language teaching where we see a similar practice of using worksheets in isolation, there could be other challenges. Factoring in the foreign language element of English, we see that it is different from a known, regional language, like Kannada, for instance, with regard to its language structure and general non-phonetic nature. Banking on worksheets need not ensure effective learning in this case and meaning-making would still be a distant goal.

Keeping this in mind, I tried an intervention for a month with the help of the teachers, in some of the English classrooms. The aim was to approach worksheets along with other teaching aids, with the objective of improving learner interest and

understanding of basic concepts in the English language.





With the idea of introducing the names and sounds of letters, simple worksheets were developed for each letter, with a focus on vocabulary building and letter identification. Following the *Nali-Kali* approach, wherein letters of the alphabet are introduced in groups progressively, five letters, (both vowels and consonants) C, O, A, P and T were included.





In the following worksheets, the exercises include matching picture-to-word (words are given on both sides), identifying the symbol of the letter in day-to-day objects and finally, filling in the missing letters. The final exercise is not given much emphasis, the intention here is to only check whether children, with a lot of oral exposure, are able to gradually make better sense of the sounds and letters.

Name:

Class:

Match the pictures in column A with the words in column B


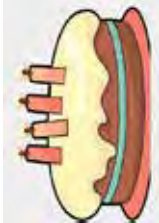
 <p>cap</p>	<p>car</p>
 <p>cake</p>	<p>cow</p>
 <p>car</p>	<p>Cap</p>
 <p>cow</p>	<p>cake</p>





	cat	coffee
	coat	cot
	coffee	cat
	cot	coat

Circle the objects in which you can see the letter "C"



Fill in the blanks with the correct spelling:

	__ a p
	c __ k e

	<p>__ a __</p>
	<p>c o __</p>
	<p>__ a t</p>
	<p>c __ a t</p>

The worksheet also consists of many pictures to help children relate to the words better. A drawback is that due to using colour pictures, this worksheet lacks clarity when printed in black and white.

Word games to pave the way

Instead of directly using these worksheets after introducing letters in the class through stories and explicit instruction, some more activities were included in the process, such as the use of TLMs and language games, with the intention of making the process of letter-sound recognition more tangible, engaging and clear.

Language games are an interesting way to stir up children's interest. The benefit is that games provide an opportunity for children to learn without being aware of it. A game called the 'sound-game' or 'phonics-game' was played regularly to enable children to pay more active attention to what they hear and to make a connection between the letter and the sound through the process of playing and experimenting. This game requires no materials and can be played using speech alone. Students

were first asked to watch and listen to a set of words uttered; here, words starting with the /k/ sound of the letter C, such as *coffee*, *cap*, *cake* etc. were used along with the flashcards. These were also words that were familiar to children.

Following this, children were instructed to close their eyes and listen carefully to the same words, once again. These words were uttered slowly and repeated a few times. Students were then asked to open their eyes and repeat the words they had heard. Some of them got all the words right, while others hardly managed a couple. Questions specific to the sounds uttered were asked, for instance: Did you hear the sound /k/ in *coffee*? Does it come at the beginning or end? In *cake*, how many times can you hear the sound /k/?

One such TLM used for letter recognition was cut-outs of shapes of letters. For this, we require cut-outs of some basic shapes in different sizes which can be easily prepared with any recycled, day-to-day cardboard material or hard paper. We know that the letters of the English alphabet are mostly made up of commonly seen shapes, such as curves and



Class I children playing with cut-outs of letters.

lines. The objective here is to provide children with a concrete experience of physically constructing letters through shapes they can touch, feel, and play with. This gives them a stronger understanding of how letters are represented symbolically and this eventually, acts as a foundation when they start writing. The cut-outs were first laid out in front of the children. It must be ensured that each child gets a mix of all shapes in many sizes. They were initially asked to make anything they like using these shapes and then were slowly channelled towards forming letters of the specific sounds used in the sound game.

It was after introducing children to these two activities, along with using flashcards regularly, that the worksheets were given to the children for individual work. In most cases, it could be seen that the tendency to copy answers mindlessly was less



Class I children using cut-outs to make words with the help of flashcards.

when other learning opportunities were provided. At the end of this, another game of *Pictionary* was usually played whenever possible. This game helps to cement the meaning of newly introduced vocabulary in children's minds as there is an attempt to express a meaning using one's own imagination and prior knowledge.

Worksheets are rarely treated as a medium which falls in the continuum of teaching-learning. As teachers and practitioners in education, we need to look at them as another resource that enables learning and not as the only one available and in turn, design worksheets that are engaging, relevant to the needs of our learners and provide scope for children to make both mistakes and predictions.

Endnotes

- i *Nali-Kali* (joyful learning) is a teaching-learning approach that started as a UNICEF assisted project to address the challenges posed by multi-grade, multi-level classrooms in primary grades.



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Worksheets for Meaningful Learning

Vimal P Thomas

Suma is a primary school teacher who teaches maths and EVS to classes IV and V and uses worksheets extensively across grades. She gives worksheets to her students after teaching a new topic/concept with the aim of giving them practice in it. Most of these worksheets are given as homework, which she then corrects and returns to the students.

Anish is also a primary school teacher. He is the home teacher of class III in a school, that is, he handles all the subjects for class III. For Anish, worksheets are primarily an assessment tool. After teaching a concept, he uses worksheets to check the students' understanding of what he has taught and also to keep the students engaged when he is dealing with other administrative work in his school.

It goes without saying that worksheets are an integral part of the teaching-learning process. Like Suma and Anish, most teachers make use of worksheets in their classrooms – primarily for practice and assessment. In this context, it would be useful to discuss worksheets in detail – what are the components of a good worksheet and what are the different ways in which a worksheet can be used effectively in the classroom.

Features of an effective worksheet

Connects to students' lives

A variety of worksheets on all topics is available on the internet. However, it is very important for the teacher to select the ones that are relevant to or connected with the lives of their students. Let us take an example: For the theme *Pet Animals*, which of these worksheets would be interesting and meaningful to students?

- The textbook has a short paragraph in which a boy describes his pet cat. The teacher gives a worksheet to students with the same para but where they can change (insert) the cat's name and colour.
- The teacher gives a task to the students where they have to prepare an ID card for their pet animal. The worksheet has a template for the ID card.

The second worksheet would definitely create more of a buzz in the classroom because, in contrast to the first one, the second worksheet is more connected to their lives, and they get to describe their own pet – real or imaginary.

Pet ID Card

Name of the pet: _____

Owner's name: _____

Animal type: _____

Colour: _____ Gender: male female

Age: _____ Eats: _____

Identification marks: _____

Address: _____

Paste the photo or drawing of your pet here.

Figure 1. Pet ID Card worksheet

Study Tour - 2019

Worksheet 1

1. DESTINATION

Options:

- 1) _____
- 2) _____
- 3) _____
- 4) _____

Destination finalized: _____



2. DATE & TIME

Date: _____

Time

Start time: _____ End time: _____



3. MODE OF TRANSPORT

Options:

- 1) Train
- 2) Bus
- 3) Ship

Mode of transport chosen: _____

4. PARTICIPANTS

Total no of participants:

Boys: _____ Girls: _____

Teachers / Parents: _____



5. FOOD

- Breakfast:
- Tea and snacks (morning):
- Lunch:
- Tea and snacks:
- Dinner:

No. of vegetarians: _____

No. of non-vegetarians: _____

Figure 2. Tour details

Travel Plan

Starting point : _____

Place of visit 1 : _____

Place of visit 2 : _____

Place of visit 3 : _____

_____ : _____

_____ : _____

_____ : _____

_____ : _____

End point : _____



Distance Between Places of Visit



From starting point to place of visit 1 : _____ kilometers

From place of visit 1 to place of visit 2 : _____ kilometers

From place of visit 2 to place of visit 3 : _____ kilometers

_____ : _____

_____ : _____

_____ : _____

From place of visit __ to end point : _____ kilometers

Total distance : _____ kilometers

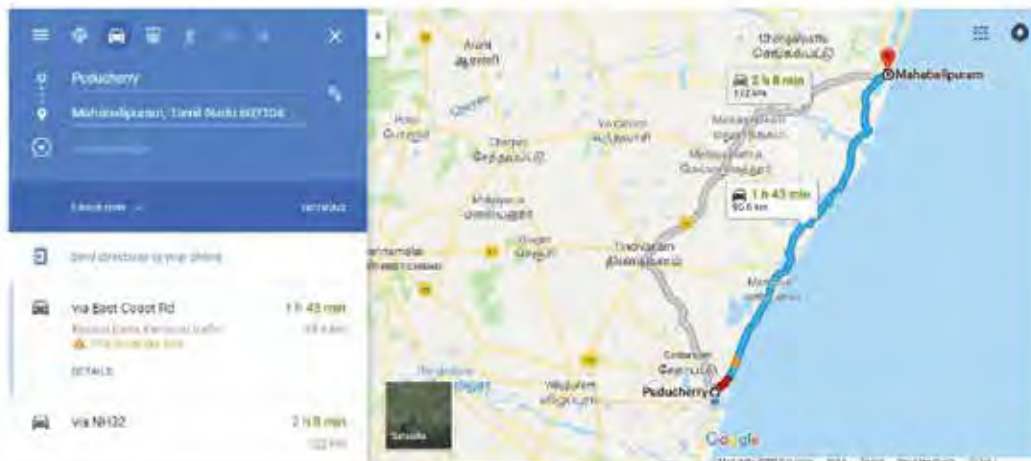


Figure 3. Places to visit and route map

List of things to be taken:

1. Identity Card
2. Water bottle
3. Cap
4. First aid kit
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____



Figure 4. Items to be carried

Involves multiple skills

Worksheets must involve multiple skills – thinking, speaking, drawing, crafting etc., though another common notion about worksheets is that they should be filled up with writing alone. For instance, the Pet ID card worksheet gives the students the opportunity to observe their pets, describe them appropriately, represent them in drawing or paste their photos.

Is attractively designed

If one were to glance through a children’s magazine or storybook, the colours, images, illustrations and font are sure to grab attention. The design of any material created for children should be attractive. Teachers can keep this aspect in mind while selecting or designing worksheets for students. The Pet ID card worksheet has used an attractive font and the worksheet itself is designed to resemble an ID card.

Is flexible

Worksheets need not be too rigid in terms of what is expected from the students. They should have scope for some level of flexibility, that is, the opportunity for the student to express his/her thoughts and feelings freely. Besides, the student should not get a sense of being evaluated or judged based on his/her work. Before sharing the Pet ID card worksheet, the teacher could have a discussion with the class on the different pets people have - cats, dogs, horses, fish, goats, donkeys and tortoises, so that even students with unusual pets do not feel left out. Similarly, the teacher could bring in possible imaginary pets, such as orange elephants, horses with wings or goats with coloured horns.

Multi-grade worksheets on travel

Rukma is a primary school teacher who teaches English to classes I-V in her school. She decided to create some interesting worksheets on *Travel*, a theme that runs across the textbooks of all classes. While trying to figure out which worksheets or activities could create interest among her students, an idea struck her - what better occasion than the annual school tour to discuss travel? She jotted down the different aspects of travel that could be discussed around the school tour and ended up with several ideas for worksheets.

To begin with, Rukma decided to involve her students right from the planning phase. To do this, she designed a worksheet (Figure 2) in which

students could list down the places that they would like to consider for their tour and then choose one from the list. She also included details, such as date, time, mode of transport, number of students and food options in this sheet. She planned to use this worksheet with all the grades.

In another worksheet designed for classes IV and V, Rukma gave her students the opportunity to describe the places selected for visits. She gave them the option of writing about these places and/ or pasting pictures. For the lower grades, she designed a worksheet where they could just collect pictures of the chosen places from newspapers or magazines and paste them into the assigned boxes.

A third worksheet (Figure 3) had the route map. Rukma leveraged the availability of the smartboard in her school to project and use *Google Maps* to make students discover the distance between places and the approximate time required to cover these distances. This worksheet was again conceived for classes IV and V.

In another worksheet (Figure 4) she got the students to prepare a list of items that they should carry along with them during the tour. The worksheet had some picture clues as well.

Needless to say, all her students enjoyed engaging with these worksheets, given the fact that the school tour was an event that they eagerly looked forward to and anything about it got them excited. Rukma later went on to add a few more worksheets in which the students could plan their meals for the day and create name lists for their respective classes.

Thus, the school tour turned out to be a joyful occasion for the students and at the same time a great learning opportunity for them. They got to experience the different aspects of planning a journey – right from deciding the date, time and place to the finer details of route and meals. The set of creative worksheets designed by their teacher complemented their learning experience.

Observations

The case of Rukma and her students helps us draw some conclusions on using worksheets as a tool for learning. While Suma and Anish utilised worksheets for practice and assessment respectively, Rukma went many steps ahead to tap into the multiple possibilities of worksheets and made them an effective tool in her teaching process itself. She ensured that the worksheets were relevant to her students and connected to their experiences. She

also brought in aspects that involve many other skills besides writing and drawing, such as thinking, discussing and planning. She made sure that the worksheets, as well as the entire tour, turned out to be a process owned by her students. The broad objective of helping her students understand the topic of 'travel' was not compromised either. Learning was a by-product of the whole process.

Summary

It is important that worksheets create a sense of ownership in students. Students could also design worksheets for themselves or improvise on an existing one. For instance, for the Pet ID card worksheet, the teacher could take the students'

opinions on what other information they would like to add to their Pet ID cards. The teacher could even take the students' opinions before designing the worksheet and create one incorporating their suggestions. Likewise, worksheets completed by the students need not be collected by the teacher to store in the school. These can be displayed in the class/school or returned to the students so that they can show these to their friends and family. Students may also maintain a portfolio of their work. All these would develop a sense of ownership of the worksheets/activity among the students and not make them see it just as work enforced upon them by the teacher.

Reference

Link to the worksheets *Travel – Class V*: <https://www.azimpremjifoundationpuducherry.org/resource-catalogues/travel-class-v>



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Use of Worksheets for Children with Dyslexia

Mala R Natarajan and Gowri Ramanathan

Dyslexia and its impact on academic performance

Dyslexia is a life-long neurological condition which has no physical manifestations. Children with dyslexia have average to above-average IQ with unique potential and abilities for out-of-the-box thinking, yet there is a significant disparity between their potential and their actual performance. In class, a child with dyslexia could struggle to read, spell, write or do maths. In turn, a lack of fluency in these skills could make it difficult for the child to retain, recall and take exams. The degree of dyslexia – mild, moderate or severe-determines the extent of the difficulty faced. Dyslexia could be suspected in children who struggle in class I (or later) and a standardised assessment test could ascertain it.

Structured, multi-modal teaching based on Individualised Education Plan (IEP) helps to build essential academic skills and concepts. Remedial teaching leverages the strengths of the child to help him or her cope with the difficulties in acquiring these skills and concepts. For instance, a child with mild dyslexia can be helped by a trained mainstream teacher within the classroom. Additional support required by a child with moderate dyslexia could be given by a special educator in a Resource Room set up within the school. Extended full-time remediation would be essential to help a child with severe dyslexia to overcome the large divide between the expected grade-level performance and the actual performance.

Teach them the way they learn

The teaching-learning process aims to impart understanding of concepts and skills such that the learner internalises these and can recall them at a later date. The recalled information is further used as the basis for expressing understanding, generalisation, application or acquisition of new knowledge.

Everyone has individualised ways to learn, process and retain new information, more so children with dyslexia; they learn best using the multi-modal approach. At the *Ananya Research and Learning Centre*, a project of the Madras Dyslexia

Association (MDA), the teaching methods are closely interwoven with the Multiple Intelligences (MI) approach.

To enable a child to achieve appropriate academic milestones, the essential skills that are in focus in primary school are reading, spelling, writing and maths (with sub-skills). For example, in order to accomplish a meaningful and independent reading session, the sub-skills involved are: instant recognition of sight words and decodable words, understanding of the contextual meaning, making cumulative meaning of a sentence and then a paragraph. Automaticity (or fluency) is essential to accomplish this.

Writing involves skills of writing legibly within the space provided and expressing thoughts cogently and fluently using appropriate words which are put together using correct grammar, spelling, sentence structure and presentation.

The ideology *teach them the way they learn* drives the teaching methodology adopted at our centre. In this scheme of teaching and learning, worksheets come into play only after the child has completely internalised a concept or skill; they are used as a tool to evaluate the child's outcome of learning and to monitor their progress.

Planning and creating worksheets

Worksheets have always been in use at our centre. They have specific objectives, for example, in Worksheet 1 (shown in Figure 1), the objective is to assess not just the internalisation of vowels. It drills down to examine the acquisition of a specific essential skill - vowels with a *short* sound. Graded and individualised worksheets are administered to a child, based on his or her strengths and areas that need to be strengthened.

After the initial worksheets validate the acquisition of the alphabetic principles, Worksheets 2 and 3 (shown in Figure 1) illustrate worksheets that can be used at different stages of building reading skills. Starting from the correct identification of aspects like vowel sounds and consonant blends, it progresses to reading and choosing the correct

word to check both reading and comprehension. These start with simple consonant-vowel-consonant (CVC) words and progress to phrases and then to complete sentences. This ensures that the child's writing skills do not come in the way of assessing the reading skill.

Many children with dyslexia face difficulties as they progress from one skill to another closely-related skill, leading to a breakdown of a previously-attained skill. The following example shows how a worksheet is employed to test the use of short and long vowel sounds in words with a silent e. This series (as shown in Figure 2) begins with a word list and progressively leads up to the use of words in a sentence. As mentioned earlier, the child starts with minimal writing and gradually, the quantum of writing is increased.

Similar graded worksheets (Figure 3) are used to assess multisyllabic words, compound words and vocabulary.

Reading and writing are closely related and can be developed only when a child develops language

skills. Oral vocabulary-building activities, like naming of objects around them and generating words linked to an object or a specific concept are done every day. This then, becomes reading practice along with strengthening spelling and finally ends in written work. Exercises, like *Show & Tell* and *Circle Time*, build skills required for ideation and for organising thoughts. *Picture Helps* (Phelps) is the next activity that aids the child in strengthening sentence structure and grammatical skills. Skills are progressively built to first write a few lines as points and then, a short paragraph.

While these essentials are acquired gradually, the child gets ready to attempt worksheets that test his or her writing skills related to grammar, sentence structure, passage structure and ideation. This graphic (Figure 4) shows the sequence of administering the worksheets - an exercise on completing sentences by arranging the given words in the correct order, followed by a worksheet with questions that use a visual cue to rearrange the given words into a semantically correct sentence and finally a worksheet with a graphic tool and

<p style="text-align: center;">Worksheet 1</p> <p style="text-align: center;">Circle the odd one out</p> <ol style="list-style-type: none"> 1. bun, sun, run, pen, gun 2. cat, hut, bat, hat, mat 3. pin, tin, bin, ten, win 4. den, fan, fen, pen, men <p style="text-align: center;">Consonant Blends</p> <p style="text-align: center;">put under correct heading</p> <p>spoon, star, smoke, snake, slide swan, clock, fly, brush, tree small, snow, spin, flat, stop</p>	<p style="text-align: center;">Worksheet 3</p> <p style="text-align: center;">Read and tick the correct answer</p> <ol style="list-style-type: none"> 1. Sam likes to wear red car / cap. 2. Priya rides the car / cot to school. 3. After school Dinesh plays with log / dog. 4. At 9 'O clock Sita goes to bed / bud. 5. The dog bangs / barks at a man. 6. The letter d says big / done 7. In the word black take away 'l' Then read word back / dack . 8. Mira has a book / took. 9. Yesterday Suresh and his mother went / want for a walk. 10. My father drew cash / fish from the bank.
<p style="text-align: center;">Worksheet 2</p> <p style="text-align: center;">Tick the correct word</p> <ol style="list-style-type: none"> 1. The ball is (smell / small) 2. The blue bird is in the (nest / best) 3. We have a (test / rest) today 4. He (west / lost) his pen 5. Ram is the (must / best) boy in class 	

Figure 1. Graded and individualised worksheets

Short and long vowels: silent 'e'

1 Short vowels	2 Long vowel Add an e to make the vowel say its own name	3 Short vowels	4 Long vowel Add an e to make the vowel say its own name
-------------------	--	-------------------	--

a

1. at	ate
2. can	can__
3. hat	hat__
4. mad	mad__
5. mat	mat__
6. man	man__
7. tap	tap__

i

1. bit	bite
2. hid	hid__
3. kit	kit__
4. pin	pin__
5. pip	pip__
6. rid	rid__
7. rip	rip__
8. win	win__

Cross out the wrong word

1. The plumber repairs the (pip, pipe).
2. All of us like to eat (ripe, rip) fruits.
3. I (lick, like) to watch T.V on Sunday.
4. Prema has a very (cute, cut) doll.
5. We can use a match to light the (fir, fire).
6. We must not eat (stall, stale) food.
7. Mothers take (care, car) of children.
8. The hair on the lion's neck is called (man, mane).

Figure 2. A word list leading up to use of words in a sentence

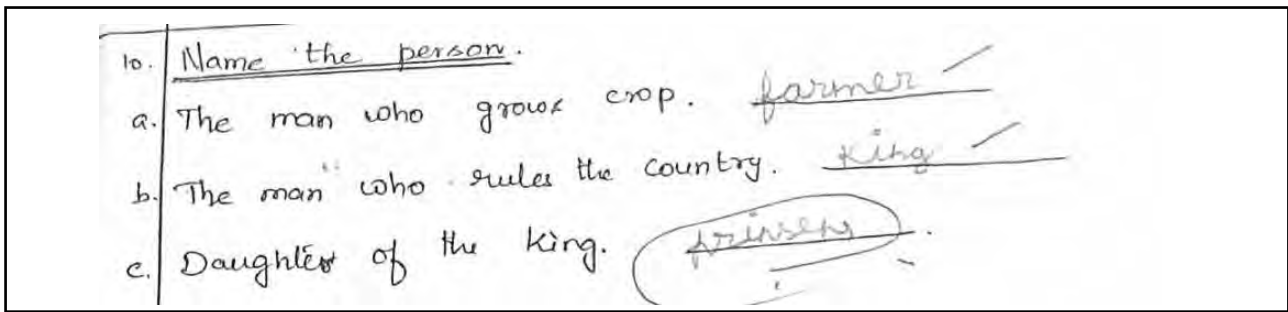


Figure 3. Worksheet used to assess multisyllabic words, compound words and vocabulary

1

Read the words and complete the sentences

Sam has a bad cat

At last Fat _____

Dan can _____

The rat ran as fast _____

Nan can hand _____

a
cat
bad
pam
can
tag
maps
pass
the
cat
as
the
the
tacks
Dad

→

2

Read the words and write the sentence

the can. at

 is

Sal mad

Sal is mad at the can.

van. has

the Ann

3

New dress

Presents Balloons

Blow Sweets

Guests Birthday Party Caps

Invitation Cake

Thankyou Friends Gifts

1. invite friends 2. I blow candles 3. Guests sing happy birthday 4. I cut cake 5. My friends give me presents 6. We eat chips, sweets, cake and ice cream 7. I give return gifts 8. We play games 9. I thank my friends

Figure 4. The sequence of administering the worksheets

leading sentences/phrases to test the skill of writing sentences related to a given topic.


Expressive writing requires essential foundational skills. Some of these are – knowing categorisation, identifying the sequence of events and arriving at the main idea of a paragraph. These skills are

essential for developing reading comprehension as well. Extracts from worksheets that check the acquisition of these skills built in the remedial sessions through multi-sensory and interactive activities are shown in Figure 5.

In Figure 6, a worksheet which is similar to the one

Menu Mix - Up

Directions: Circle names of vegetables in green.
Circle names of drinks in red.
Circle names of desserts in pink.



Directions: Write each food word on the correct line.

Drinks	Vegetables	Desserts
_____	_____	_____

In what order did events happen?

Everyone in my family was in the show. First my sister danced. Then Mom and Dad acted a scene from a play. Third on the stage was my brother reading a poem he had written. I was the last member of the family to appear, and I sang my favorite song.

Circle the words that describe the sentences.
hiding acting cooking singing
dancing reading running whispering

Write the words you circled in the order that events happened.

1. _____ 2. _____
3. _____ 4. _____

Someday we will all have robots that will be our personal servants. They will look and behave much like real humans. We will be able to talk to these mechanical helpers and they will be able respond in kind. Amazingly, the robots of the future will be able to learn from experience. They will be smart, strong and untiring workers whose only goal will be to make our lives easier.

Which sentence from the paragraph expresses the main idea?

- Someday we will all have robots that will be our personal servants.
- We will be able to talk to these mechanical helpers and they will be able to respond in kind.
- They will look and behave much like real humans.

Figure 5. Multi-sensory and interactive activities

that is used in mainstream schools is shown. This is a comprehensive assessment of a child's reading, spelling and writing skills and is administered when the child is sufficiently proficient in these skills.

Worksheets based on strengths and needs

The special educators at our centre use the Multiple Intelligences (MI) approach to design worksheets, that is, the worksheets are based on a child's dominant intelligences. According to this theory, an individual is vested with eight different intelligences in varying degrees of dominance. The dominant intelligence is tapped to facilitate learning. For example, a child with dominant Logical-Mathematical Intelligence and

Interpersonal Intelligence would be able to learn effectively through group activities that include puzzles.

An extract of a worksheet that would be attractive to a child with a high Logical-Mathematical Intelligence and Linguistic Intelligence is shown in Figure 7.

Dyslexia is a condition that is often accompanied by auditory and/or visual processing difficulties. This means that despite having no issues with vision or hearing, the individual could have difficulties in processing visual or auditory inputs, for example, difficulty in:

- Differentiating an object from its background,

making it hard to scan text for relevant information

- Retaining and recalling letters/objects in the correct sequence, for example, perceiving *help*

as *hlep*

- Spatial management, for example, managing the spacing between words

Name _____

Ben's Frog
Ben had a frog in a box.
The frog was little and green.
Ben found it in the park.
The frog was by a rock.
He gave it to his friend.



1. What did Ben have?

2. Where did Ben keep his frog?

3. What color was the frog?

4. Where did Ben find the frog?

5. What was by a rock?

6. What did Ben do with the frog?

Figure 6. A comprehensive assessment of reading, spelling and writing

<p>n o s w - it is white in colour found on mountain</p> <p>r o w g - it happens to living things</p> <p>l e o w b - part of a body</p> <p>o a g t - is a grass eating animal</p> <p>r o c w - it is a black bird</p>	<p>Give one word for :</p> <ol style="list-style-type: none">1. It is the opposite of cruel k __ d.2. A person who cannot see is b ___ d.3. A young boy or girl is a ch __ d4. A cow is a domestic animal but a lion is w __ d.5. The past tense of sell is s __ d.6. It is the opposite of hot c __ d.
---	--

Figure 7. For a child with high Logical-Mathematical Intelligence and Linguistic Intelligence

A child's difficulties (for example, visual processing difficulties) are also borne in mind, while designing a worksheet. The exercise given in Figure 8 will not be given to a child with difficulties in 'visual figure'

background and sequencing. Instead, he or she may be given an alternative like the one shown in Figure 9.

Put a ring round all the /sh / words that you can find in this word snake.

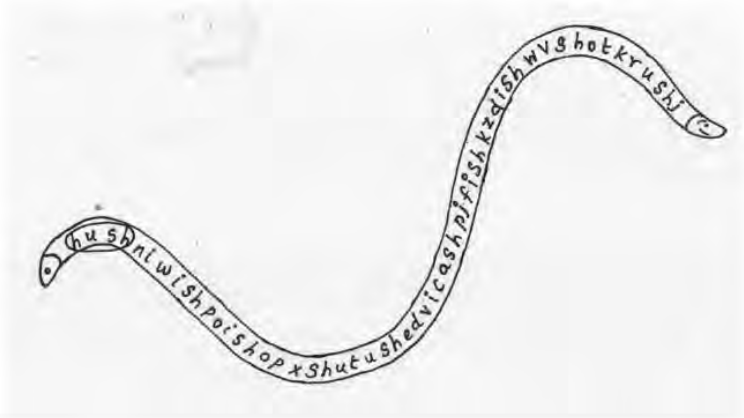


Figure 8.

Say the "sh" sound

Fill in / sh / in each space, then rewrite the sentences. (Remember, every sentence begins with a capital letter and ends with a full stop.)

1. Mum got fi __ at a __ op.
2. I wi __ I had a di __ of fi __.
3. __ ut my __ ed.
4. __ e has got a lot ca __.
5. Ben got on a __ ip in a ru __.

Figure 9.

Children at our centre are also trained to build and develop certain essential skills, like visual-perceptual skills using play-way methods, circle time, and role play are some interesting ways to develop them. Worksheets like the one shown in Figure 10 are given to assess the acquisition of such skills.

These are some examples of how worksheets are individualised (one of the basic tenets of remedial teaching) for each child in our centre. The language and the format of the worksheet are kept uniform for a child. This reduces the confusion that could stem from some of the instructions, thereby hampering performance.

A child with dyslexia could have deficits in *executive function* - an important set of skills that regulate one's thoughts and actions. This is required not just for academics, but also for day-to-day functioning. Remedial teaching helps a child develop strategies to cope with this difficulty too. Worksheets present a child with opportunities to practise the skills of paying attention, recalling, planning and organising the appropriate response and self-monitoring the responses.

Administering worksheets to a child with dyslexia

The special educator watches the child while the worksheet is being completed. The worksheets are not set up for struggle or failure. If required, the child is encouraged to answer orally as a preparatory step to filling in the worksheet. If the child is unable to attempt the worksheet with some level of confidence and ease, the special educator replaces it with an easier level of worksheet. This not only keeps the child motivated, but it also helps the child practise resilience and overcome the impulse to quit. The child goes through some additional reinforcing sessions before attempting another worksheet.

When children have satisfactorily built and developed the essential skills and strategies and demonstrate the same in various activities, they are prepared to integrate with the mainstream teaching-learning process. They are then progressively trained to do worksheets given in mainstream schools.

Worksheets are, hence, very relevant to special education. They can be aligned with the principles of remedial teaching and check acquisition of specific skills and sub-skills, thus meeting the objectives of remedial teaching.

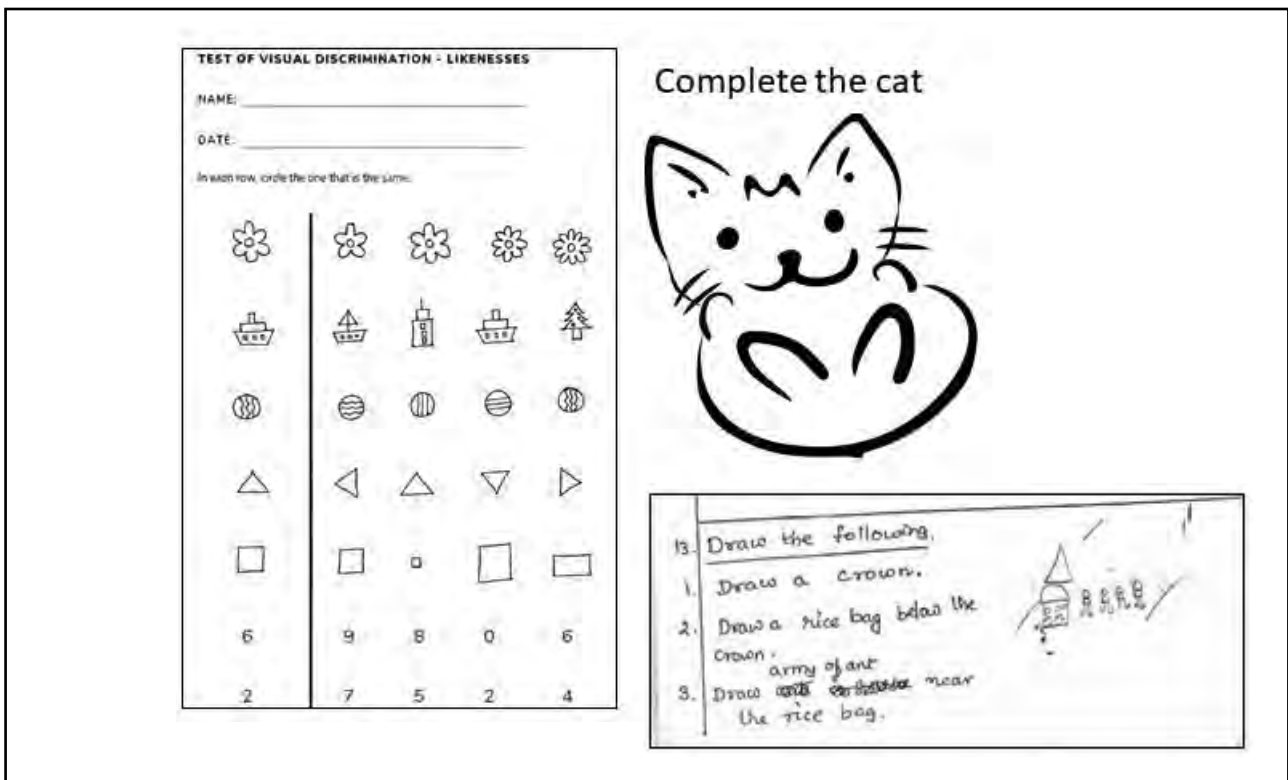


Figure 10. Worksheets to assess the acquisition of essential skills



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Gowri Ramanathan is Principal, Ananya Learning and Research Centre, Chennai. She believes that every child is unique and can shine. In 2002, she joined the Madras Dyslexic Association as a special educator for teaching children at the pre-primary and primary levels. Over the last 18 years, she has played various roles including teaching children, assessing children for dyslexia, monitoring resource rooms and school administration. She may be contacted at gowri@gmail.com

Designing a Good Maths Worksheet

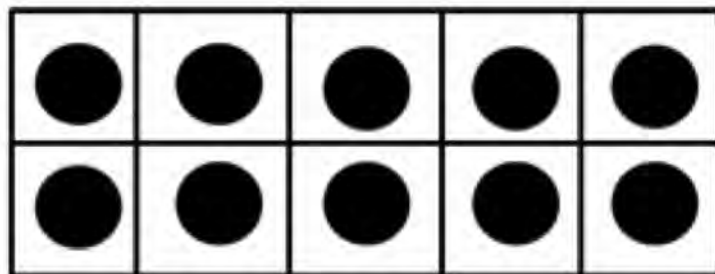
Sneha Titus

In my experience as a maths teacher, I have found that students are sharply divided into two mutually exclusive sets – those who love maths and those who do not. There are no neutrals here and the reception accorded to a maths worksheet is similarly highly polarised. There are those who seize it, relish every challenge it provides them and submit it with happy anticipation of more and then there are those who gloomily sit over it, delaying putting pencil to paper and submit it with dread, knowing that every mistake will be marked and made much of with the teacher's pen and returned without the student even beginning to understand what he/she was expected to do.

How can we move the student from the second category to the first? Secondly, how can we change the treatment given by the teacher to a student's responses to a worksheet? Can a worksheet be an evangelical tool which changes a student's attitude

to maths? In its present avatar, a worksheet is most often seen as providing much-needed drill and practice of a particular concept. While I do not contest the need for this, I would like to suggest some ways in which a worksheet becomes an invitation for a student to enjoy doing maths. I use as my example a worksheet on addition and subtraction. The ideas may be extended to multiplication and division and in fact, some of the problems that are used set the foundation for the same.

A very useful foundational step for applying the algorithm for addition is understanding the decomposition of 10 and where else to find a helping hand than at the end of your own arms! From our fingers to tens frame makes for an organic progression and tens frames are easy to replicate in worksheets.

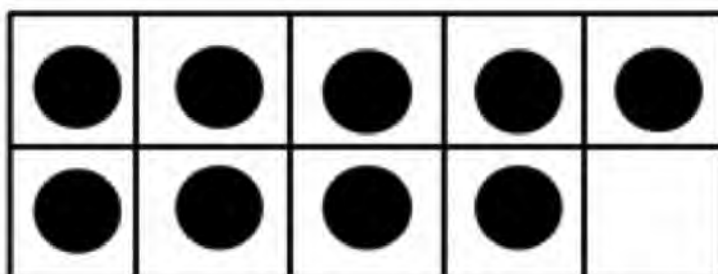


A tens frame is a simple 2×5 grid of dots

Removing any/some dots leads to powerful learning.

Here are some questions for the beginner's level:

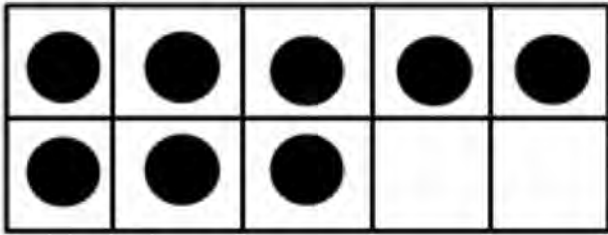
For each of the following tens frames, write down the addition fact you see. Make a subtraction fact from it. The first one is done for you:



$$9 + 1 = 10$$

$$10 - 1 = 9$$

$$10 - 9 = 1$$



An important part of the symbolic representation of number statements such as $9 + 1 = 10$; $10 - 1 = 9$ and $10 - 9 = 1$ is the conceptual understanding of the meaning of these statements. Hence, a follow-up question could be to write or draw a story using a particular number statement. A student who is able to show a set of 9 pencils and then add 1 pencil to it has a deep understanding of the numerals 9, 1, 10 and the '+' and '=' signs. The use of the tens frame also helps the students to visualise the different contexts in which addition is used:

- Increasing a number by another quantity (I had 9 pencils and I was given 1 more pencil)
- Finding the required amount to raise a given number to a higher number (I have 9 pencils, how many more should I add to get 10 pencils)
- Combining two groups (one pencil box had 9 pencils and the other had 1 pencil, how many pencils in both pencil boxes altogether).

Once the student has mastered addition facts for 10, pairs of tens frames may be used to add one-digit numbers. For example, finding $8 + 4$. Most students tend to use counting on, but their practice of completing the ten will help them to break down the sum into $8 + 2 + 2$ and this helps them to arrive at the total of 12 much faster. This may be encouraged by giving multi-step problems, such as $7 + 5 = 7 + \underline{\quad} + \underline{\quad} = 10 + \underline{\quad} = \underline{\quad}$

The practice of this sort of problem may be done using the tens frame and then abstracting the students' understanding with a worksheet using hops on a simple number strip (Figure 1).

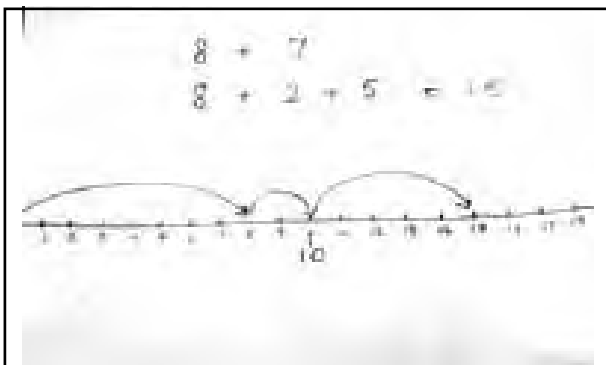
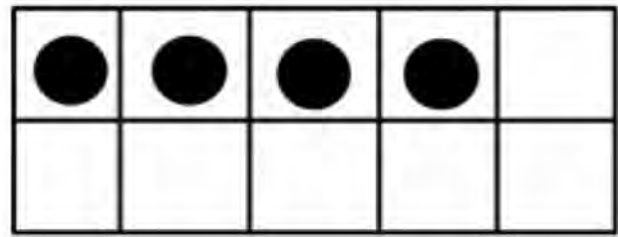


Figure 1. Source P Shirali; Addition Pullout: At Right Angles, July 2013



Here, the worksheet plays the important role of consolidating students' understanding and building the foundation to help them understand two-digit addition problems later. Of course, before launching into the algorithm, the student should have practice in adding multiples of ten and in using bundles and sticks to visualise the 'carrying over' process (Figure 2).

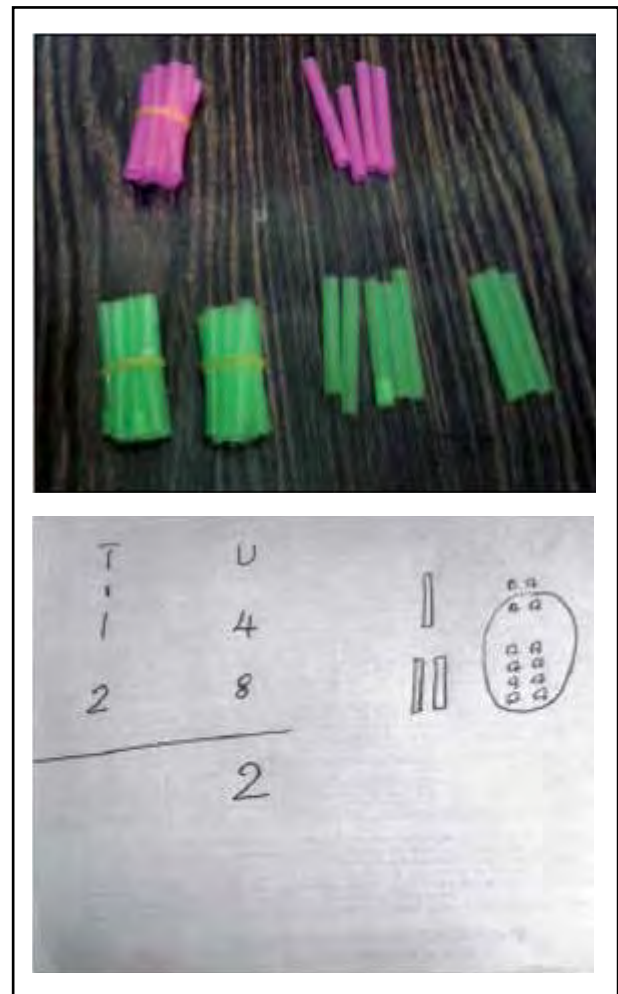


Figure 2. Source P Shirali; Addition Pullout: At Right Angles, July 2013

Notice the documentation of the activity. This is very important – most worksheets have multiple problems on column addition but bridging the gap between activities and algorithms is often neglected and worksheets are a useful tool to do this. Taking a cue from Figure 2, the teacher can design multiple questions using a three-column format.


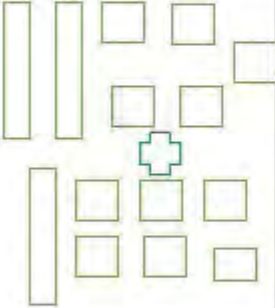
Column 1	Column 2	Column 3								
										
										
		<table border="1"> <thead> <tr> <th>TENS</th> <th>ONES</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>7</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	TENS	ONES	3	5	4	7		
TENS	ONES									
3	5									
4	7									
Fill in the three columns when the sum is 87										

Table 1. Three-column format to design questions

Questions can be open-ended if only the sum is given (as in row 4), students can also design their own problems once they have gained confidence.

This may be extended to multi-digit addition without the use of manipulatives when the student has understood the meaning and value of the number carried over.

A similar approach to subtraction will help the learner not only understand the meaning and process of subtraction but will also prepare him or her to understand clearly when to apply which operation. The contexts in which subtraction are used are:

- Subtraction as a take-away (removing from a pile)
- Subtraction as a comparison (how many more/ how much taller)
- Subtraction as the inverse of addition (how many to be added)

Worksheets on subtraction should make use of the *ganitmala* with students observing all three contexts by moving backwards and forward and by finding the number of beads between two given beads. Again, this may be reinforced with worksheet problems using hops on the number strip.

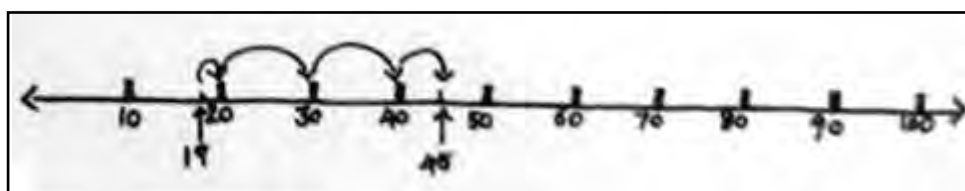


Figure 3. Source P Shirali; Subtraction Pullout: At Right Angles, November 2013

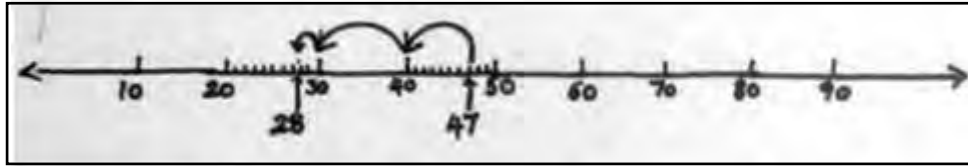


Figure 4. Source P Shirali; *Subtraction Pullout: At Right Angles*, November 2013

Here, the hops are forward, the corresponding question in the worksheet could be based on the third context and may be phrased as: How many to be added to 19 to get 45? Scaffolding may be provided by initially marking the points 19 and 45 on a graduated number strip and expecting the student to draw only the hops. Later problems may require students to mark the two given points and finally, even graduate the number strip before solving the problem.

Backward hops may be used to frame questions in the second context: By how much is 28 less than 47?

By the end of the worksheet, the student should be able to grasp that subtraction is the difference between two numbers and draw out or write short word problems which include the first context of subtraction i.e., subtraction as a take-away (removing from a pile).

Worksheets usually point towards accurate answers, but this means that a student is either right or wrong. Adding questions which estimate the answer helps students recognise that the answer they have got is wrong and attempt to correct themselves. For example, in the above example, a preliminary question on 'the difference between 28 and 47 is between ___ and ___' may be easily estimated by the student by actually seeing that $47 - 28$ is between $48 - 28$ and $38 - 28$. Such questions also provide invaluable insight to the teacher regarding the student's conceptual understanding and thus, help in formative assessment and remedial teaching.

By class IV, when students do addition and subtraction of four-digit numbers, it is important for them to practise again on the open number line by moving to the nearest ten, the nearest hundred and the nearest thousand. This helps them negotiate difficult problems, such as $2415 - 1099$ and in fact, develop their own shortcuts to finding the difference. A worksheet should have the space for the student to describe how they solved the problem; they may be given the opportunity to draw or state in point form how they got the

solution. This helps students to not feel constrained to follow a standard algorithm but exercise their own conceptual understanding to arrive at the solution. Further, worksheets which relate the algorithm for column addition to the hops on the number line help to move them to competence in this skill.

When students reach the stage of requiring drill and practice once they have demonstrated conceptual understanding, a problem like this has interesting spin-offs.

Wahida made 104 *laddus* for Eid to distribute to her eight neighbours.

She laid out 8 trays and put 2 *laddus* in each tray. How many *laddus* did she have left?

She repeated this till all the *laddus* were over. Show how many *laddus* were left with her at each stage. How many *laddus* did each neighbour get?

Can you suggest a quicker way for Wahida to distribute the *laddus*?

Clearly, this repeated subtraction is paving the way for division. Notice that such a problem can be set even if the student has only learnt addition or subtraction. By asking the student for a quicker way, the problem gives the child scope to appreciate the long division algorithm or at least the thinking behind it, when they do learn it in the later years. Careful facilitation of the discussion of the answers provided by different children can help the teacher arrive at 10 added 8 times (or 8×10 if they have done multiplication) = 80 and $108 - 80 = 24$ which gives each neighbour three more *laddus*, bringing the total share to $10 + 3$ *laddus*. This is exactly the reasoning followed by the long division algorithm. Such an introduction helps students to circumvent problems such as the zero in the middle of the dividend (which can lead them to say that 404 divided by 4 is 11 if they blindly follow the algorithm without understanding). Again, here questions on estimation will also help avoid such errors.

It also makes sense of the fact that division is the only arithmetic operation for which the algorithm begins with the highest place value (i.e., from the left).

Designing a good worksheet is, therefore, not just a matter of providing students with enough material to keep them occupied 'productively'. In summary:

- It starts with understanding what we mean by productive, in other words, the learning outcomes of the unit for which the worksheet is being designed have to be very clear to us.
- Figures and images are powerful tools in a worksheet and can be used to stimulate reasoning, dialogue and problem posing.
- Worksheets can provide a powerful bridge between the concrete and the abstract and following an activity, worksheets should provide practice of the abstracted version of the same activity.
- A worksheet should provide the opportunity to students to develop and hone their process skills of visualisation, representation, communication and estimation.
- Scaffolding questions which allow students to realise if their answer is wrong and attempt to

backtrack and self-correct, provide powerful opportunities for self-assessment.

- Drill and practice of algorithms for arithmetic operations should be administered only when the teacher is certain that the student has a strong conceptual understanding of what has been taught.

How does the teacher harness the opportunities provided by a worksheet? It is important that the insights which can emerge from cleverly-designed questions are addressed in direct or group discussion so that the student understands his or her mistakes, if any. Making a portfolio of solved worksheets helps the student reflect on his or her progress and enables them to become aware of the careless mistakes or repeated errors which they tend to make. Above all, the teacher should give the student ownership of the worksheet, this is the student's work and he or she should be given the opportunity and the insights to be proud of it.



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Creating Effective Maths Worksheets

Swati Sircar

Worksheets have been used in maths classrooms for a long time, much before the pandemic. There are some resource groups that teachers can subscribe to, which periodically share worksheets on various topics over emails. Worksheets are related to workbooks: the note to textbook writers at the beginning of NCERT syllabus for classes I-V states categorically that the 'class I and II books would be workbooks'. So, we can consider a workbook to be a collection of thoughtfully created and ordered worksheets. So, why are worksheets particularly popular in maths?

Simple drill and practice

One big reason for this popularity is that drill and practice and maths are inseparable. Most traditional

maths pedagogies include a high dose of practice. Worksheets can not only achieve that easily, but they also carry some form of self-corrective features if they are designed with some creativity. Figure 1 is an example of how the colours can indicate if the answers are correct. A more interesting worksheet would be Figure 2, in which the sheet is split into many areas, each containing a sum. Once the sums are completed, and the areas coloured according to the given code, a picture emerges. If the sums are done incorrectly, the picture will be distorted, conveying that not all the answers are correct.

Exploration with something learned

While there is ample scope for creativity in the development of such worksheets, they offer very

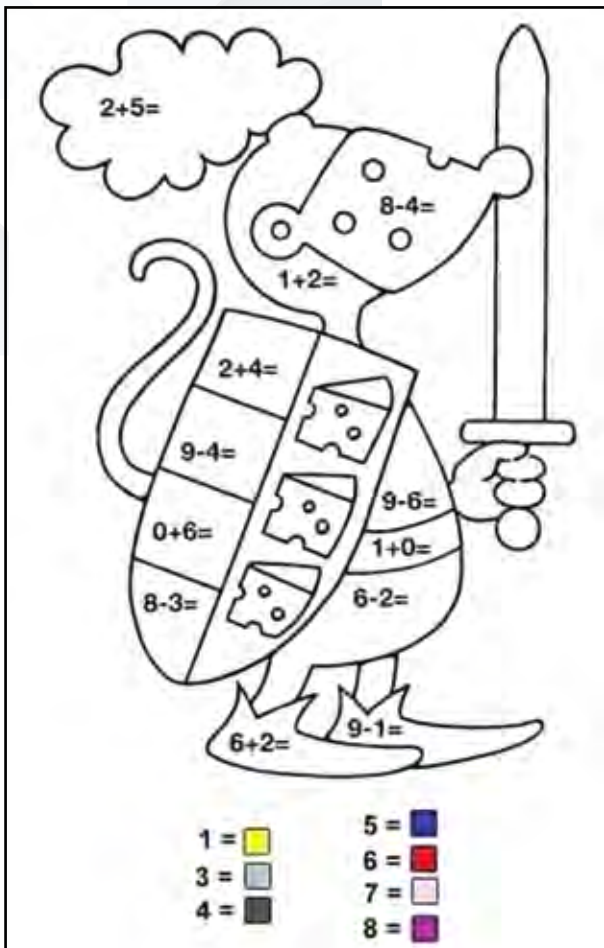


Figure 1. Colours indicate correct answers

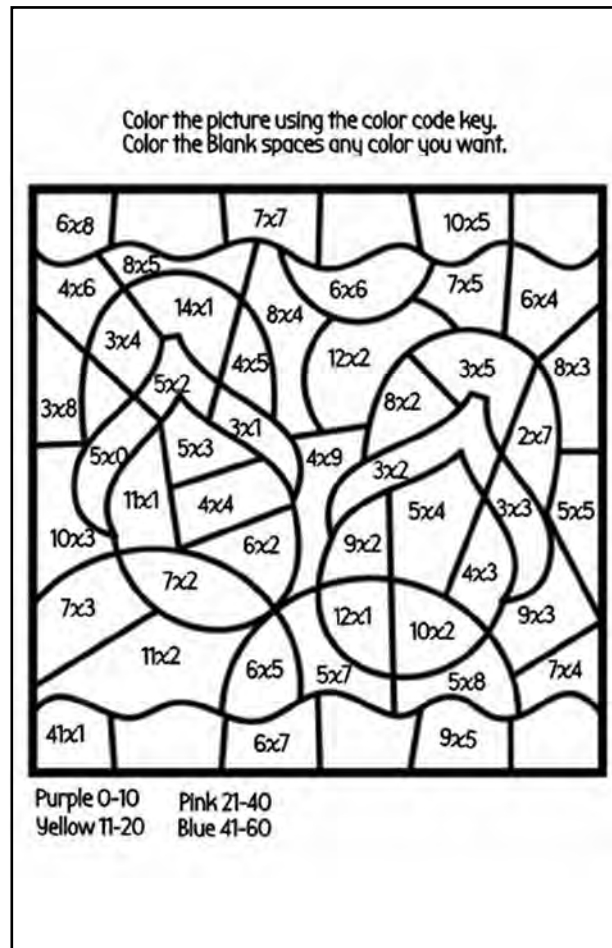


Figure 2. Source <https://teachersherpa.com/>

little beyond drill and practice to the learner. At the same time, even at this basic level of operation with single-digit numbers, a good worksheet will include operations with zero. A drill and practice worksheet can be made more interesting by including Multiple Choice Questions (MCQ) and matching. For children in classes I and II, MCQ can take the form of, (i) Colour the correct one, (ii) Circle the biggest/longest/..., (iii) Tick the smallest/shortest/

etc. Similarly, matching can include three-way matching with three columns and/or one column can have a few more entries so that the last pair is not an automatic match. Many such examples are included in the NCERT textbooks for classes I and II in particular (Figure 3).

In the beginning, particularly in class I, a lot of vocabulary related to measurement and spatial understanding has to be learnt – some are

Subtract and Match

Figure 3: NCERT, Class 1, Chapter 4, p.66

$4 - 2$	3	$9 - 5$
$7 - 2$	4	$8 - 2$
$9 - 1$	2	$7 - 4$
$5 - 1$	5	$8 - 0$
$6 - 3$	6	$5 - 3$
$7 - 1$	8	$8 - 3$
$5 - 0$	0	$7 - 7$

Figure 3. Source NCERT, Class II, Chapter 4, p. 66

mentioned in Table 1. At this stage, the teacher will need to help the children wherever required. While worksheets (including pictures) are a good way to provide practice as well as assessment, one must remember that in primary classes, this experience may not be possible through a worksheet. *Longest-shortest* or *thicker-thinner* can be taught visually and therefore, through a worksheet. But heavier-lighter has to be *felt* first. Based on that primary experience, the worksheet can and should come as the next step. But without the primary experience, there is a possibility of developing a misconception that bigger is always heavier. So, care should be taken to avoid the same.

To develop a drill and practice worksheet with numbers, one must have a list of competencies that needs to be practised. Care should be taken to ensure that no resulting number is larger than what the learners have been exposed to. For example, at the class III stage, learners are taught numbers only up to one thousand. So, a sum of $748 + 509$ would be inappropriate and may confuse the learner.

It is also highly recommended that one includes a few open-ended problems, that is, problems with multiple possible correct solutions (as well as some wrong ones) in the worksheet. Figure 4 provides an example of a set with open-ended questions. These kinds of arrangements also break the monotony of a drill and practice worksheet.

Such number worksheets can also nudge the learner into observing some properties of addition and multiplication – commutative, in particular (Figure 5). However, it is an inductive process, where one checks case-by-case, something that

does not provide for generalisation or justification.

Interlinking different concepts

Some worksheets can help learners transit from addition to subtraction (Figure 6) and similarly, from multiplication to division. These are the great stepping-stones to reach the next concept while, at the same time, providing drill and practice. The *Ganit Bodh* series by *Digantar* is a great example of how concept-formation can be assisted by a thoughtfully sequenced and developed set of worksheets.

In many such worksheets, the key idea is that since the task is self-evident, the learner has less to read. Often, there is a worked-out example at the beginning, illustrating what needs to be done. Also, it is expected that the learner does all the work in the worksheet itself. So, adequate space should be provided not only to write the answers but also to do some necessary rough work. If the worksheet occupies only one side of the page, then the back side can be used for rough work. Regardless of how it is planned, spacing and layout should be comfortable, convenient and clear. While the font size should be large enough for the learner, instructions for the facilitator could be included at the top or bottom of the worksheet in a smaller font.

Such worksheets do not have to be colourful. Simple line drawing works fine. Thus, they are not expensive to produce. *Ganit Bodh* by *Digantar* and *Khushi Khushi* by *Eklavya* are great examples of simple but effective worksheets, which not only provide drill and practice but do much more. While

Bigger smaller	Biggest smallest
Taller shorter	Tallest shortest
Longer shorter	Longest shortest
Thicker thinner	Thickest thinnest
Wider narrower	Widest narrowest
Heavier lighter	Heaviest lightest
Faster slower	Fastest slowest

Table 1. Early maths vocabulary

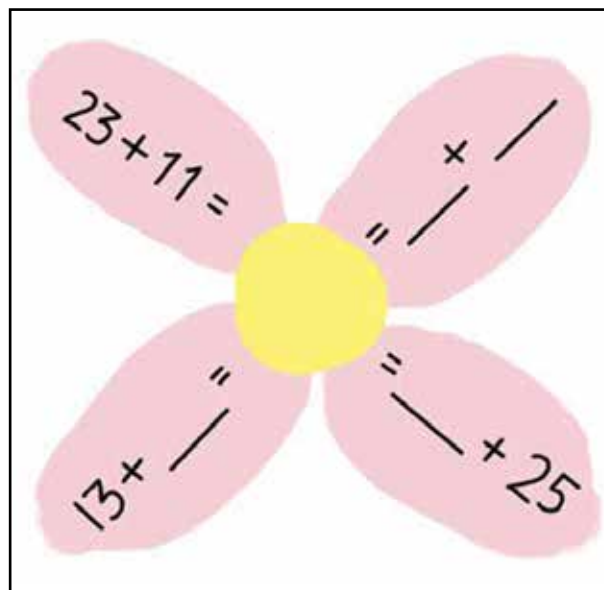


Figure 4. Source Sikkim maths textbook, class II, p. 54

Ganit Bodh builds up the concepts step by step, *Khushi Khushi* excels at linking various concepts and challenging the learner (Figure 7).

Addressing misconceptions

Worksheets need not be limited to just drill and practice. Let us consider the worksheet, *TearOut: Area-Perimeter* (link in References). It is for older children and therefore includes more text. It describes the parameters – unit length and unit

area, and the dos and don'ts at the beginning. Then, the first couple of questions not only assess the basic understanding of the concepts of perimeter and area but are also open-ended questions, allowing the learner some degrees of freedom. In addition, these also ask the learner to observe and document his/her observations. Most importantly, they help the learner understand the difference between area and perimeter. Further questions build on these: illustrate how the perimeter in the



	$4 + 1 = \square$ $1 + 4 = \square$
$2 + 1 = \square$ $1 + 2 = \square$	$1 + 5 = \square$ $5 + 1 = \square$
$1 + 1 = \square$	$2 + 4 = \square$ $4 + 2 = \square$
$3 + 1 = \square$ $1 + 3 = \square$	$3 + 3 = \square$
$2 + 2 = \square$	
$3 + 2 = \square$ $2 + 3 = \square$	

Figure 5. Source *Ganith Bodh* 3, p. 61

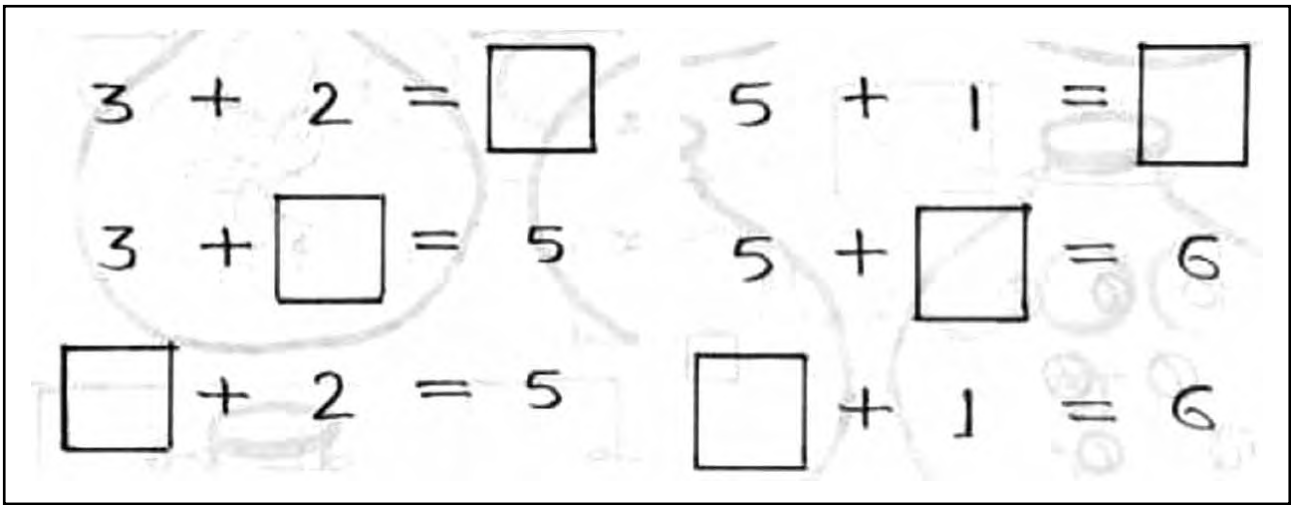


Figure 6. Source Ganith Bodh 3, p. 65

तितली और घर

● हर खाली घर में एक तितली बनाओ।

- ऊपर बने चित्रों में घर चिन्हें। सबसे ज्यादा घर वाले चित्रों में पीला रंग करो।
- सबसे कम घर वाले चित्रों में हरा रंग करो।
- आठ घर वाले चित्रों में कौन सा घर है? ● चार घर वाले चित्रों में कौन सा घर है?
- कौनसी आकृति सबसे बड़ी है? पट्टी पर या फूल में 4, 8, 9 घर वाली और आकृतियाँ बनाओ। 5, 6, 7 घर वाली भी तरह-तरह की आकृतियाँ बनाओ। हर संख्या की कितनी तरह की आकृतियाँ बना पाएँ?

- Draw a butterfly in each empty cell.
- Count the number of cells in each picture. Colour the one with the greatest number of cells yellow.
- Colour the picture with the least number of cells green.
- How many pictures have 8 cells? ___
- There are ___ pictures with 4 cells each.
- Which is the biggest shape? Make such shapes with 4, 8 and 9 cells. Also make different shapes with 5, 6 and 7 cells. For each number, how many different shapes did you make?

Figure 7. Source Khushi Khushi, Class II, p. 8

shape obtained as the difference of two rectangles, can be equal to or longer than that of the bigger rectangle. And the final task gets the learner to apply this knowledge to generate new shapes with the given specifications from an existing shape.

The goal of this worksheet is not only to eliminate the misconception that if the area reduces, then the perimeter also reduces and vice versa but to

illustrate how one can be preserved while the other changes. It also shows how to increase the perimeter while reducing the area. Thus, a worksheet can focus on a misconception and go beyond that. This particular worksheet was inspired by (i) the *Education Initiative* video on misconceptions children have related to perimeter and (ii) a problem from the *Thinking Skills* pull-out.

So, as described in this article, worksheets can be used for a wide range of things. Last, but not least, they are useful for both formative as well as summative assessment as shown in textbooks and workbooks.

Language, look and accessories

It is important to indicate what the learner should know beforehand, that is, the prerequisite knowledge to fill in worksheets. While worksheets for younger children (class I and II) should not be text-heavy, older children (classes IV and V and older) can be expected to read and follow instructions. The language should be simple, crisp and unambiguous. It is a good idea to test out a worksheet and check if it is conveying what the creator intends to. If necessary, one should add a diagram or an example to clarify things further.

While for class IV and upwards, the font size can be regular; for the primary classes, it should be bigger. For older children, layout etc. are not very important, especially because they may solve the worksheet in their notebooks. However, the stages should be distinct, especially if the worksheet builds up (for example, Low-floor, high-ceiling or LFHC).

A worksheet can be accompanied by accessories. For example, some of the initial subtraction tasks in *Ganit Bodh* requires learners to place buttons or

pebbles at the designated spots and then remove some to get the answers (Figure 8), the *TearOuts* are based on dot sheets and sometimes interlocking cubes. Ideally, a worksheet should be just 1-2 pages long. Therefore, it must focus on a specific topic, rather, a specific aspect of some topic.

Limitations of worksheets

So, is there anything that a worksheet cannot do? Yes, there are limitations to worksheets. Note that a worksheet is essentially textual material with some diagrams/pictures printed on paper or seen on a screen (mobile, laptop etc.). It can provide direct experience of 1D (length, distance, perimeter) and 2D (area) but not of 3D (volume and capacity). So, experience with 3D and solid shapes must take place before worksheets can be used to harness maths concepts further. Unless the learner is able to visualise solid shapes and map them on 2D figures, worksheets will not be of much help. Thus, developing a conceptual understanding of capacity/volume and developing an intuitive sense for it, is difficult through worksheets alone. Similarly, worksheets are not sufficient to provide full exposure to all possible situations involving size and weight. That needs to be done separately (see the teacher pages for *Measurement* in the Sikkim class I textbook).

Keep m , remove n , how much is left (for $m - n$) बाकी की अवधारणा (ठोस चीजों से)	
<p>3 रखो ○○○</p> <p>1 निकाल दो।</p> <p>कितने बचे- <input type="text"/></p>	<p>5 रखो ○○○○○</p> <p>1 निकाल दो।</p> <p>कितने बचे- <input type="text"/></p>
<p>4 रखो ○○○○</p> <p>1 निकाल दो-।</p> <p>कितने बचे- <input type="text"/></p>	<p>6 रखो ○○○○○○</p> <p>2 निकाल दो।</p> <p>कितने बचे- <input type="text"/></p>

Figure 8. Source *Ganit Bodh* 3, p. 67

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SAMPLE WORKSHEETS



Sample Worksheets: Some Notes

Preschool – I-III

Detailed notes are provided on each worksheet.

Maths – Classes II-III

This worksheet can be done by children individually or in pairs. It deals with various addition-subtraction situations and how these two operations are related. Children have to draw the situation described, express the same using numbers and an operation, and then solve to find the answer. The mathematical version can be an expression like $a + b$ or $a - b$, or it can be an equation like $a + \underline{\quad} = b$ or $a - \underline{\quad} = b$ or $\underline{\quad} - a = b$. The drawing should help children navigate the situation, figure out what is given and how they are related to the quantity to be found.

For Children with Dyslexia – Class III

This is for children with difficulty in reading, spelling and writing. Their assessment indicates that their reading, spelling and writing skills are at class-III level. This worksheet tests the reading, spelling, writing and language targeting the word family '-dge'. The instructions are in simple language using terms familiar to the child. They are worded in the same manner across all worksheets to ensure clear understanding.

Hindi – Classes III-IV

वर्कशीट बनाते समय हमें इन बातों का ध्यान रखें:

1. वर्कशीट बनाते समय हमें टॉपिक से सम्बंधित लर्निंग आउटकम ध्यान में रखने चाहिए। तथा इसकी मदद से हम विषयगत किन-किन कौशलों पर काम करना चाहते हैं, वह स्पष्ट होने चाहिए।
2. सरल भाषा तथा शब्दावली का प्रयोग कर हम बच्चों को बेहतर तरीके से वर्कशीट से जोड़ सकते हैं।
3. वर्कशीट को हम एक माध्यम के रूप में देख सकते हैं जहाँ बच्चे स्वयं तथा पालकों की सहायता से पठन कार्य कर सकते हैं। इसलिए वर्कशीट में पढ़ने के भी भरपूर अवसर होने चाहिए।
4. बच्चों को अपने सवाल, शंकाएं, अच्छी बातें, प्रश्न हल करते समय आने वाली दिक्कतों के बारे में लिखने की जगह वर्कशीट में देनी चाहिए। इस तरह की फीडबैक से हम आगे और बेहतर वर्कशीट पर डिजाइन कर सकते हैं।
5. पाठ्य पुस्तक के अलावा हम विभिन्न बोर्ड, प्रकाशन, internet जैसे resources से content ले वर्कशीट को enrich कर सकते हैं।
6. वर्कशीट बच्चों से संवाद का एक अच्छा माध्यम हो सकता है, इसलिए हमें वर्कशीट में बच्चों के रूचि को ध्यान में रखने हुए स्तरानुसार तथा उनके परिवेश से मिलती जुलती बातें भी रखनी चाहिए, जिस पर बच्चे अपनी अभिव्यक्ति प्रदर्शित कर पाएं।

Sample Worksheets: Some Notes

English – Class IV

This worksheet can be done by children individually or in pairs. Teachers need to encourage children to read the text of each passage several times before attempting to answer each question. Teachers can also discuss how to approach each question with different examples. Before children attempt the worksheet, teachers can do an introductory activity in sequencing. Children may be asked to draw any easy picture in their notebooks. Then, without showing their partner what they have drawn, they give instructions to their partner to draw the same. They can then see how well the two pictures match.

In sections 1 and 2, children identify 'transition words' that provide clues to the order of the sentences in any passage. In Section 3, children can first try to describe the steps in their own words orally, before they start writing.

Section 4, where children describe how to make a stick puppet, can be further extended to any craft activity done in the class. Once children complete an art or craft activity, they can be asked to describe what they did in steps. Children must be allowed to say the steps in their own words and must not be coached into memorizing the 'correct' set of steps in each instance.

After they complete the ordering of the dialogue in Section 5, they can write their own dialogues on paper, cut up the different sentences, and give it to their friends to order them correctly.

The activity in Section 6 can be extended to making a timeline of different events in each child's life - when they were born, which year they joined school etc.

Environmental Science – Classes IV-V

This worksheet is best done by children in pairs or in small groups. Initially, teachers can ask children to read the paragraph in their groups and encourage discussion and questions about each section of the worksheet. If children need support, teachers can demonstrate one example in each section. Section 1 provides scope for children to look for key details in the text and comprehend the text better. Section 3 allows children to sharpen their skills of sentence comprehension. In this section, the incorrect options are as important as the correct ones, and teachers can ask them what they think the incorrect ones mean and how that is different from the correct meaning of the given sentence. For Sections 2, 4 and 5, there are no correct answers, only more opportunities for children to explore the concept in their own way and express their ideas.

Worksheet 1

Goal: Children become effective communicators

Age group: Preschool I (3-4 years)

Early Learning Outcomes:

- Begins to use active listening skills and communicates needs clearly.
- Follows one or two simple oral instructions.
- Displays the use of prewriting/emergent skills (scribbling, stamping, finger-painting, using thicker crayons, markers/brushes etc.) for variety of purposes.

A drawing and scribbling worksheet for a theme like 'Market'. Children fill their empty basket with vegetables and fruit they want to buy from the seller by drawing and colouring their choices. They write or label what they have bought using imitative writing. Alternatively, children scribble their shopping list and then draw it. The teacher does model writing on each worksheet and draws the child's attention by pointing and reading out what she has written. The children can then count orally and present what they have purchased.





Draw and colour!



Worksheet 2

Goal: Children maintain good health and well-being

Age group: Preschool II (4-5 years)

Early Learning Outcomes:

- Expresses own preferences, interests and makes choices.
- Exhibits fine motor skills and performs tasks that require more complex eye-hand coordination such as cutting out shapes, free-hand drawing, colouring, threading beads, stringing, copying, tearing, pasting, lacing etc., with reasonable of precision and control.

A cutting, pasting, and colouring worksheet for a theme like 'Special Occasions'. Children 'dress up' the boy/girl figure with clothes they would like to wear on their birthday, by choosing from an assortment of options like socks, sandals, shirt, trousers, jacket, shorts, frock, sweater, etc. Children also draw their own accessories on the figure like a bag, sunglasses, a hat, etc. The teacher lets children pick and choose their attire even if it does not conform to gender norms e.g., it is fine if a boy chooses a frock. Some children might require assistance in cutting and pasting, which is provided by the teacher and peers.





Draw and colour!



Worksheet 3

Goal: Children become involved learners and connect with their immediate environment

Age group: Preschool III (5-6 years)

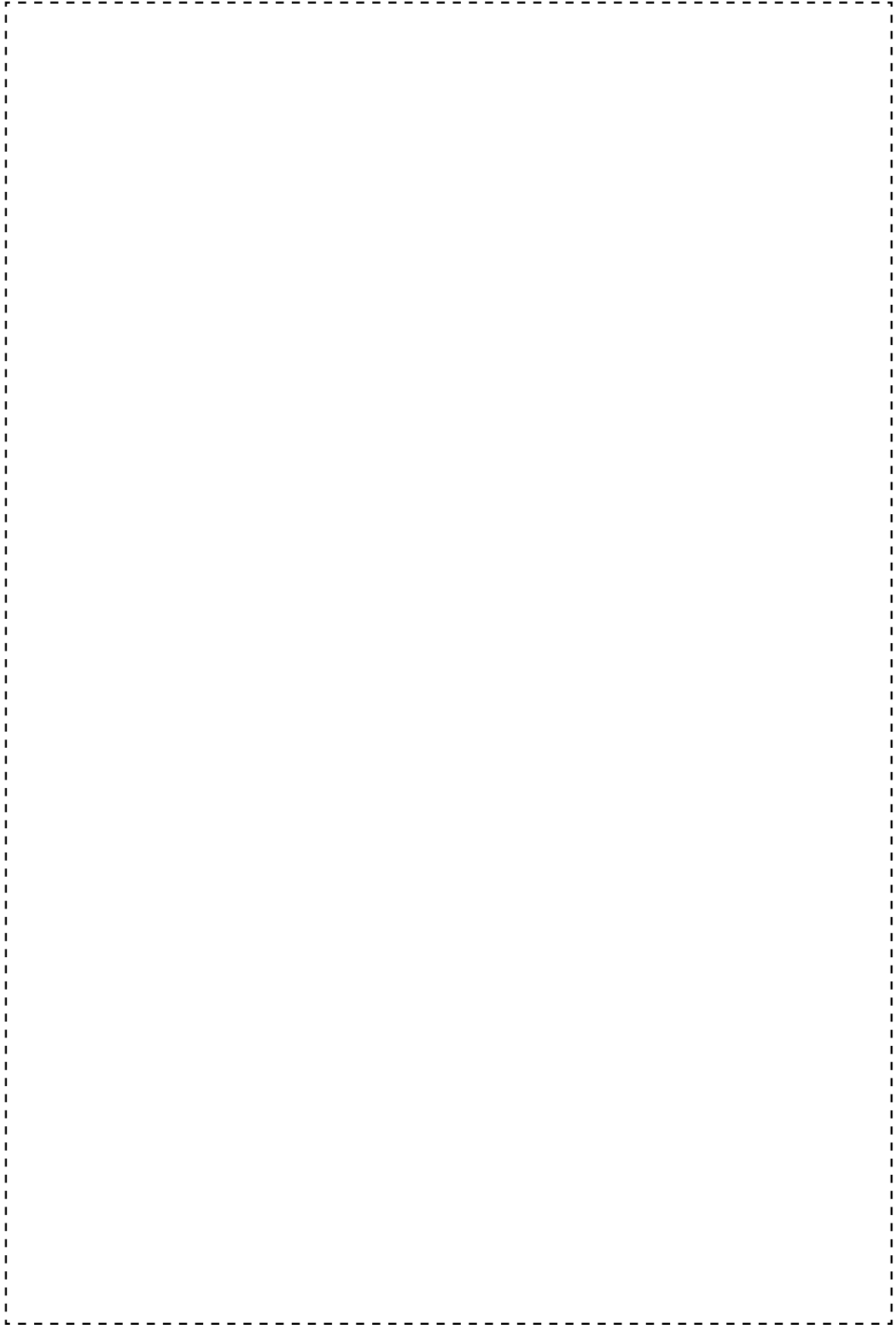
Early Learning Outcomes:

- Notices and describes finer details of common objects, sounds, people, pictures, animals, birds in the immediate environment.
- Provides solutions to simple problem-solving situations with reasons
- Uses all five senses to observe and explore the environment

This is a problem-solving worksheet, using the matching format. Even in Preschool III, it is not expected that children read the given text independently. They listen to the hints read aloud by the teacher, decipher the answer by observing small details in the picture, then write the correct names in the boxes provided. The worksheet also helps the teacher take note of children's listening comprehension skills.



This is your page! Draw and colour!



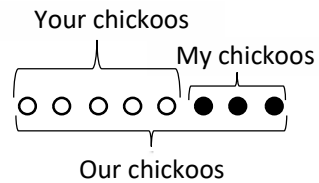
Word Problems

1. Combine:

- a. You have 5 chickoos, I have 3. How many do we have together?

Our chickoos = your chickoos + my chickoos

$$= \underline{\quad} + \underline{\quad} = \boxed{\quad}$$

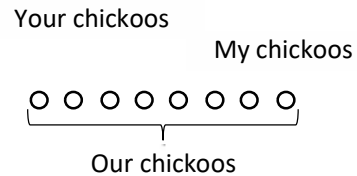


- b. We have 8 chickoos and you have 5. How many do I have?

Our chickoos = your chickoos + my chickoos

$$\underline{\quad} = \underline{\quad} + \boxed{\quad}$$

So, $\underline{\quad} - \underline{\quad} = \boxed{\quad}$

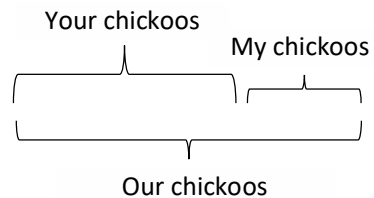


- c. We have 8 chickoos and I have 2. How many do you have?

Our chickoos = your chickoos + my chickoos

$$\underline{\quad} = \boxed{\quad} + \underline{\quad}$$

So, $\underline{\quad} - \underline{\quad} = \boxed{\quad}$

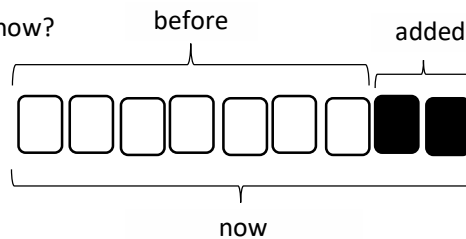


2. Change: increase

- a. You had 7 cards. I gave to 2. How many do you have now?

Now = before + added

$$= \underline{\quad} + \underline{\quad} = \boxed{\quad}$$

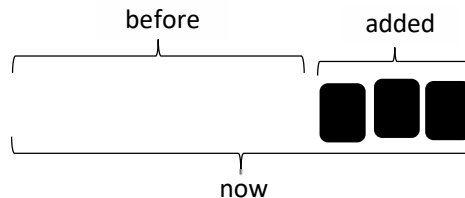


- b. I gave you 3 cards and now you have 7. How many did you have before?

Now = before + added

$$\underline{\quad} = \boxed{\quad} + \underline{\quad}$$

So, $\underline{\quad} - \underline{\quad} = \boxed{\quad}$

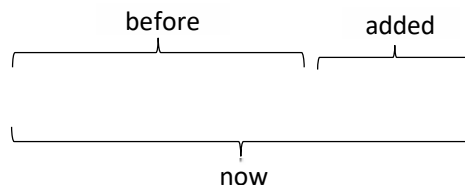


- c. You had 5 cards. I gave you some and now you have 7. How many did I give you?

Now = before + added

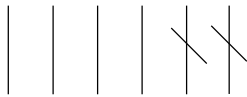
$$\underline{\quad} = \underline{\quad} + \boxed{\quad}$$

So, $\underline{\quad} - \underline{\quad} = \boxed{\quad}$



3. Change: decrease

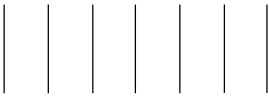
- a. I had 6 pencils and 2 of those broke. How many do I have now?



Now = before – gone

$$\underline{\quad} - \underline{\quad} = \boxed{\quad}$$

- b. I had 7 pencils and some of those broke. If I have 4 now, how many broke?



Now = before – gone

$$\underline{\quad} = \underline{\quad} - \boxed{\quad}$$

$$\text{So, } \underline{\quad} - \underline{\quad} = \boxed{\quad}$$

- c. I broke 3 pencils and have 2 now. How many did I have before?

Now = before – gone

$$\underline{\quad} = \boxed{\quad} - \underline{\quad}$$

$$\text{So, } \underline{\quad} + \underline{\quad} = \boxed{\quad}$$

4. Compare:

- a. You have 5 pencils and I have 3. Who has more and how many more?

You:

$\underline{\quad}$ pencils

$\underline{\quad}$ have more,

I:

$\underline{\quad}$ pencils

$\underline{\quad} - \underline{\quad} = \boxed{\quad}$ more

- b. You have 7 pencils and I have 6. Who has less and how many less?

You:

$\underline{\quad}$ pencils

$\underline{\quad}$ have less,

I:

$\underline{\quad}$ pencils

$\underline{\quad} - \underline{\quad} = \boxed{\quad}$ less

- c. You have 4 pencils and I have 1 less than you. How many do I have?

You:

Your pencils – 1 pencil = my pencils

I:

$$\underline{\quad} - \underline{\quad} = \boxed{\quad}$$

- d. You have 6 pencils and that is 2 more than how many I have. How many do I have?

You:

Your pencils = my pencils + 2 pencils

I:

$$\underline{\quad} = \boxed{\quad} + 2 \quad \text{So, } \underline{\quad} - \underline{\quad} = \boxed{\quad}$$

- e. I have 3 pencils. You have 2 more than me. How many do you have?

I:

My pencils + 2 pencil = your pencils

You:

$$\underline{\quad} + \underline{\quad} = \boxed{\quad}$$

- f. I have 2 pencils and that is 1 less than how many you have. How many do you have?

I:

Your pencils – 1 pencil = my pencils

You:

$$\boxed{\quad} - \underline{\quad} = \underline{\quad} \quad \text{So, } \underline{\quad} + \underline{\quad} = \boxed{\quad}$$

1. Circle the correct word from the given list and fill in the blanks

- i. This heavy chest will not _____ when we push it.
budge, fudge, smudge, grudge
- ii. Meera wears her school _____ every day.
bridge, budge, badge, dredge
- iii. Tom loves to eat chocolate _____.
fridge, fudge, sledge, dodge
- iv. The boy jumped to the right to _____ the ball thrown at him.
dodge, budge, bridge, dredge

2. Read the sentences given below. Fill in the missing letters to form the correct word

- i. The glass which was on the e_____ fell and broke.
- ii. The j_____ sent the man to jail for five years.
- iii. We stayed in a l_____ when we went to Ooty.
- iv. My friend gave me a n_____ to say that the teacher has come to class.
- v. A new b_____ has been built across the river.
- vi. The s_____ on the paper is due to the leaking pen.

3. Read the following passage. Select the correct words from the given set of words to fill in the blanks.

bridge judge nudge smudge fridge wedge fudge

We went to a court yesterday to see how it works. The courtroom was packed. The _____ walked in at 10 am. I _____d my friend to say that we need to stand up. The judge apologised for the delay and said it was due to the traffic jam on the _____. He then listened to the arguments and gave his judgement by 12.30pm. The ink from the pen he used _____d the paper and hence had to wait till he got another one.

Then we had potato _____s and chocolate _____ for lunch. We reached home at 3.30pm.

4. Complete the following:

- i. I kept the glass tumbler on the edge, so _____
- ii. Maya did not wear her school badge, so _____
- iii. As the boy did not dodge the ball, he _____
- iv. We went down the mountain on a sledge as _____

5. Rearrange the words and rewrite the sentences correctly.

- i. pulled by/The sledge was /four strong reindeers.
- ii. by a long bridge/ were connected/ The two islands
- iii. in the oven/ were baked /The potato wedges
- iv. on her badge/was written/ of the nurse /The name

6. Read aloud the words given below. If the word has a silent letter, circle the silent letter

- i. knife
- ii. kite
- iii. work
- iv. write
- v. wrist
- vi. what
- vii. wrong
- viii. knock
- ix. keep
- x. knuckle
- xi. wrinkles

7. Read the sentences given below. Fill in the missing letters to form the correct word.

- i. I k _____ how to w _____ neatly with a pen.
- ii. I k _____ ed at the door with my k _____ k _____ s as there was no doorbell.
- iii. Out of the 4 questions I answered, only 1 was w _____.
- iv. I sprained my w _____ when I tried blocking the ball in today's match.
- v. My grandmother still looks very young as she has no w _____ on her face.



बच्चों ध्यान से देखो इस चित्र में क्या हो रहा है ? आपको जो समझ आ रहा उसे नीचे लिखो।



इस चित्र में चिड़िया के छोटे-छोटे बच्चे क्या कर रहे हैं ?

चित्र देखकर आप में से कई लोगों के जवाब हो सकते हैं, कि चिड़ियां के बच्चे अपनी माँ के पीछे-पीछे जा रहे हैं, उनकी माँ उन्हें राह दिखा रही है। चित्र एक में एक व्यक्ति मिट्टी का बर्तन बना रहा है और दो बच्चे भी बनाने की कोशिश कर रहे हैं या बनाना सीख रहे हैं, यहाँ सीखने का काम हो रहा है।

आप लोगों ने भी कई बातें किसी से सीखी होगी, जैसे आपको साइकल चलाना किसी ने सिखाया होगा, मेहँदी बनाना, रंगोली बनाना आपने किसी से देखकर ही सीखा होगा। हो सकता है कई बातें आपने स्वयं से इच्छा अनुरूप भी सीखा हो, सीखना जीवन भर चलता है, हम किसी न किसी से कहीं न कहीं सिखाते रहते हैं। आप सब स्कूल भी सीखने के लिए आते ही हैं, तो चलो बच्चों हम एक कविता पढ़ते हैं।

फूलों से नित हँसना सीखो,
भौरों से नित गाना ।
तरु की झुकी डालियों से नित,
सीखो शीश झुकाना ॥



सीख हवा के झोंकों से लो
कोमल भाव बहाना ।
दूध तथा पानी से सीखो
मिलना और मिलाना ॥

सूरज की किरणों से सीखो
जगना और जगाना ।
लता और पेड़ों से सीखो
सबको गले लगाना ॥



मछली से सीखो, स्वदेश
के लिए तड़प के मरना ।
पतझड़ के पेड़ों से सीखो,
दुःख में धीरज धरना ॥



दीपक से सीखो जितना
हो सके अँधेरा हरना ।
पृथ्वी से सीखो प्राणी की
सच्ची सेवा करना ॥

जलधारा से सीखो, आगे
जीवन-पथ में बढ़ना ।
और धुएँ से सीखो हरदम
ऊँचे ही पर चढ़ना ॥

नोट: कविता लय पूर्वक गाएँ (पालक सहयोग करें)

सीख हवा के झोकों से लो

कोमल भाव बहाना ।

दूध तथा पानी से सीखो

मिलना और मिलाना ॥

अब आप ऊपर दिए पंक्तियों को पढ़कर, उसके बारे में नीचे दिए स्थान पर लिखें

इनसे हम क्या सीख सकते हैं

1. फूलों से हम क्या सीख सकते हैं ?

2. सूरज की किरणों हमें क्या संदेश देती हैं ?

3. दीपक दिन-रात जलकर हमें क्या सिखाता है?

4. जलधारा हमें क्या सिखाती है ?

प्र. १. इस कविता में आए उन शब्दों को लिखो जिनके तुक मिलते हों, जैसे बढ़ना-चढ़ना ।

प्र. २ समान अर्थवाले शब्दों की जोड़ी बनाकर लिखो ।

सुमन

पृथ्वी

वृक्ष

सूरज

वायु

फूल

रवि

पवन

धरा

तरु

योग्यता विस्तार

- सोचो यदि ऐसा हो तो क्या होगा?
- हवा न बहे
- पेड़ न हों
- सूरज न उगे
- दीपक जलके रोशनी न करे
- अपने आस-पास ध्यान से देखो की वहां क्या-क्या है? फिर उनके नाम इस तालिका में लिखो और उनमें से जो तुम्हें पसंद हों, उनके चित्र बनाओ ।

फूल के पौधे	वृक्ष	लताएँ	जलधारा /नदी

चित्र यहाँ बनाये

Sequencing

Language Goals

- Converting long text into simple steps
- Re-ordering information logically
- Expressing information/instructions in clear steps

Here are some instructions that describe how to start using a new mobile phone that your parents have just bought.

However, the instructions are not ordered properly. Re-write the instructions as a set of simple steps in the correct order.

Once the phone is charged, insert the sim card. Finally, you can install some of your favourite apps and start using your phone. When the sim and memory cards are in place, register your phone number on the company's website. The first thing to do after you take the phone out of the package, is to charge it for at least 12 hours. Add additional memory cards into the slots of the charged phone, after you have fitted in the sim card.



- 1 Ask yourself, 'What must we do first?' and 'What must we do at the end?' and write down the first step and last step in your own words.

First step:

Last step:

- 2 Which words in each sentence gave you a clue that it was the first or last step?

First step clue words:

Last step clue words:

- 3 Now write down all the instructions as simple steps in your own words. Don't copy the sentences from the paragraph. One of the steps has been done for you.

Step 1:

Step 2: Insert the sim card.

Step 3:

Step 4:

Step 5:

- 4 You have an ice-cream stick, a paper circle, some glue, and a sketch pen. Write in simple steps how you will use these items to make the stick puppet shown in the figure.

How to make a stick puppet:



Step 1:

Step 2:

Step 3:

Step 4:

- 5 The following dialogue happens between a customer and a waiter at a restaurant. Re-order the dialogues by writing the correct number in the circle.

- 'Certainly, I will bring it to you right away!'
- 'I'm sorry, we don't serve tea.'
- 'I would like to have a cup of tea.'
- 'Can I have some juice instead?'
- 'May I take your order please?'

- 6 Read the paragraph and fill the boxes.

- Eureka School was built in 2012. It only had a kindergarten block at that time. 50 children joined the school.
- After a year, a new primary classroom block was built, and the enrolment doubled.
- The next year, the school grew in strength to add 80 more children.
- In the subsequent year, a new science lab was inaugurated at the school. There was no increase in the number of children at the school.
- The next year, with the construction of a new library and a games room, 20 new students joined the school.

What was constructed?		No. of children
	2016	
	2015	
	2014	
	2013	
	2012	

Compare and Contrast**Concept Goals**

- Unique aspects of living in Srinagar
- Different ways of living in different terrains

Language Goals

- Words to use for similarities and differences
- Sentence comprehension
- Compare-contrast technique

Read the passage and do the activities that follow.

Srinagar is a busy city in Kashmir. Dal Lake is a large lake in Srinagar. Srinagar has a large population. While some people live on land, others live on Dal Lake.

People live in houses made of stone and mud on land, but some people live on boats called 'dongas' on Dal Lake. There is even a floating market on the lake! People on the lake go by boat and get their supply of vegetables and flowers from this market. On the other hand, people who live on land walk to a neighbourhood market. Fresh flowers and vegetables are available at this market too.

Children living in houses on Dal Lake use boats to go to school. However, children who live on land either walk to school or take the bus. While the people on land work on agriculture, weaving and tourism related activities, fishing is an important source of livelihood for those living on Dal Lake.

It is wonderful to see different ways of living in one place.

- 1 Compare & contrast the lives of people who live on land with those who live on Dal lake. How are they similar? How are they different?**

Aspects/Attributes	People who live on land	People who live on Dal lake
Where do people live?		
How do people go to the market?		
What can you buy at the market?		
How do children go to school?		
What work do people do?		

- 2 Use these words in your own sentences to talk about similarities and differences.**

SIMILAR	DIFFERENT
and, as, also, like, alike both, just as, likewise, similarly	but, although, yet, whereas, however, different from instead, unlike, on the other hand, on the contrary

3 Match the Sentences!

Read each sentence. Match it with the option that means the same.

The first one is done for you.

1. Some people live in houses, whereas others live on boats.

- Everyone lives in houses.
- Some people live in houses. Some people live on boats.
- Many people live in houses but only a few live on boats.

2. There are markets, not only on land, but also on Dal Lake.

- There are no markets on the land.
- There are markets, both on land and on Dal Lake.
- There are markets on Dal Lake, but none on land.

3. While people on land work on farms, fishing is the main livelihood for people on the lake.

- People on land earn money through farming. People on the lake earn money through fishing.
- People on the lake do not like work on farms. They only like fishing.
- People living on land work on both farming and fishing.

4. People walk to the market on land, whereas people on the lake go by boat to the floating market.

- People, both on the land as well as on the lake, go to the floating market.
- People on the lake cannot go to the market on land.
- People on the lake take a boat to the market, but people on land walk instead.

5. In Srinagar, some children go by boat to school but some walk to school.

- All children in Srinagar walk to school.
- Some children in Srinagar walk to school, whereas others use a boat.
- In Srinagar, boat is the only means of transport that children use to go to school.

4 Would you rather live on land or on the lake in Srinagar? Give 3 reasons.

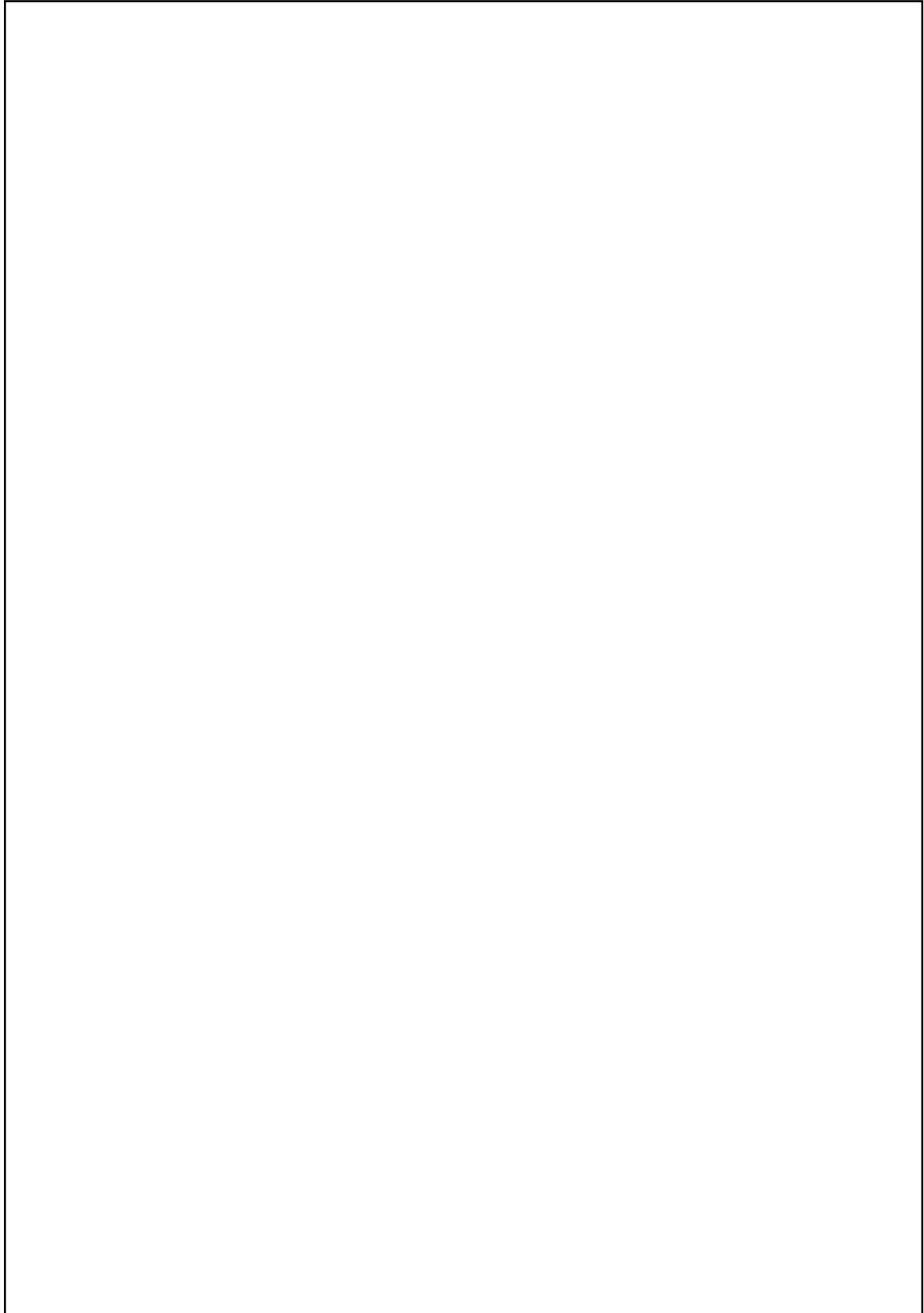
1.

2.

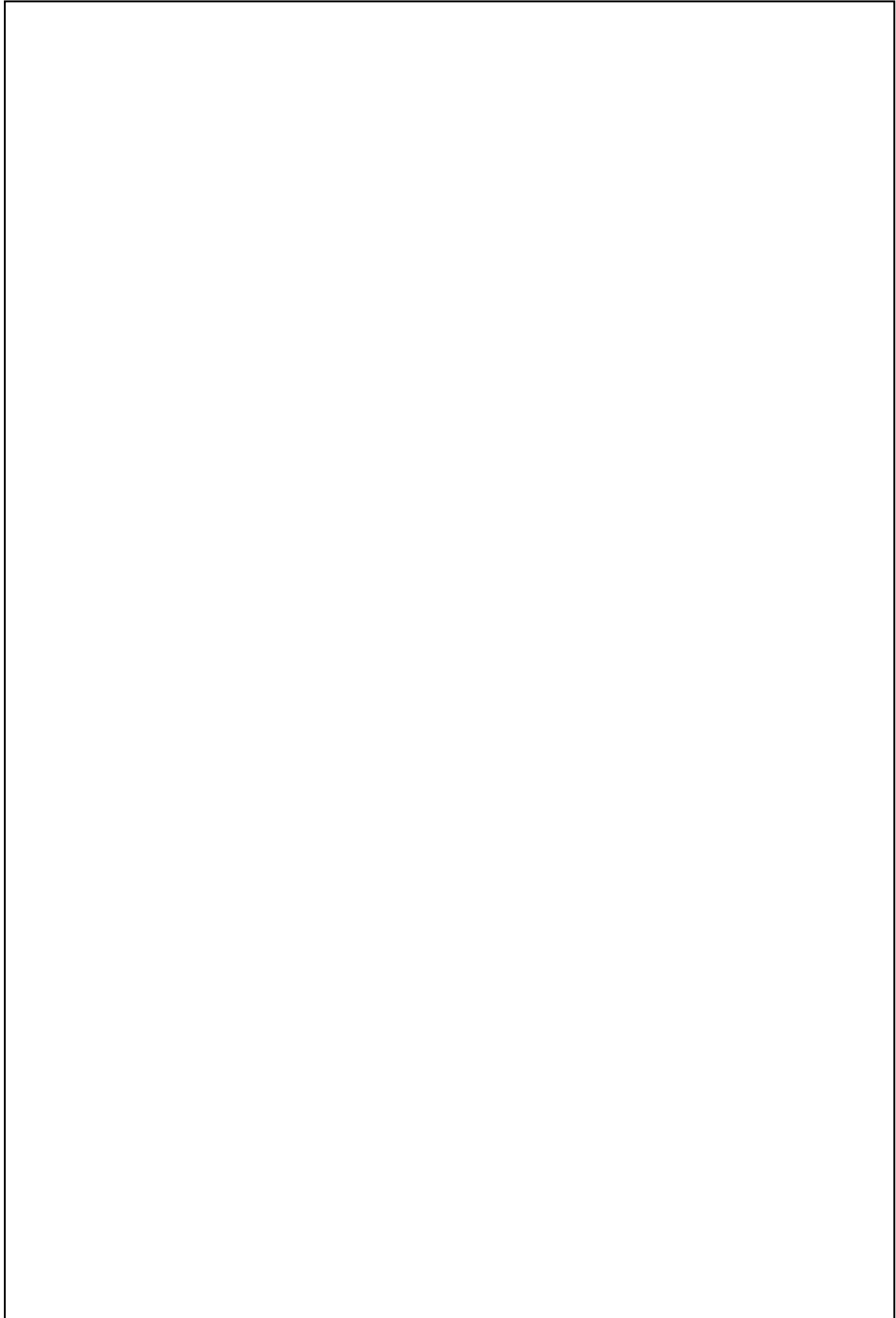
3.

5 Draw it out!

Draw a picture of one thing that is the same about living on land and living on Dal Lake.



Draw a picture of one thing that is different about living on land and living on Dal Lake.



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