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 it is 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 (6x3, 9x2) 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.

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Hridaykant Dewan currently works with the Translations Initiative of Azim Premji University, Bengaluru. He has been in the field of education for over 40 years in different capacities and has been associated with efforts in educational innovation and modification of state educational structures. He may be contacted at hardy@azimpremjifoundation.org

Shekhar Dewan works at Deloitte. He has an interest in education, including cognitive science, the psychology of learning, and the philosophy of science. He may be contacted at shekhar.dewan@gmail.com