HANDOUT

Editor's Note: Many handouts are fully formatted for distribution and available for downloading on the NASP website (http://www.nasponline.org).

Helping Students Remember What They Learn: An Intervention for Teachers and School Psychologists

By James A. Tucker & Matthew K. Burns

There are many reasons why some children and youth struggle with reading and math. One common reason often found in research is that they experience memory difficulties. Incremental rehearsal (IR) is a flashcard intervention with a strong research base for increasing retention of newly learned material among struggling learners.

Basically, IR is used to practice (i.e., rehearse) new items within a series of eight or nine known items. In other words, IR uses what students already know to teach them what they need to learn. Doing so makes the intervention less frustrating for students while also providing enough repetition to learn the new information until it becomes automatic. IR is easy to implement and has been used in numerous schools. Researchers have used IR for the following skills and age levels:

- Sight-words to upper elementary-age students identified as learning disabled in reading.
- Sight-words to first-graders who were struggling readers.
- Letter sounds to preschool and kindergarten students.
- Math facts to elementary-age students with severe math difficulties.
- Survival signs and words to high school students and adults with cognitive impairments.

HOW TO IMPLEMENT IR

IR is implemented by writing known and unknown items on flashcards. The unknown items are words, letter sounds, math facts, or anything that has to be memorized. The known items should be words, letter sounds, math facts, and other items for which the student gives the correct response within 2 seconds of showing them the card. Here are the steps for using IR:

1. Start by going through all of the known items to be certain that the student can respond to each one of them correctly within 2 seconds.
2. Show the student the fact (e.g., sight word, letter sound, multiplication fact) and give the answer to the student. For example, you might say, "This is the letter s, and it makes the /ssssss/ sound," or "This is 4 × 4 and it equals 16," or "This word is *occupy*."
3. Show the card and ask the student to provide the correct response. If the response is incorrect, then read the card, model the correct response, and then ask the student for the response.
4. An extra step is added when teaching words. After the student can correctly state the word on the card, ask the student to use the word in a sentence. If the student uses the word in a sentenced correctly, then proceed. If the student does not use the word in a sentence, provide a succinct definition, use the word in a sentence, and then ask the student to provide a different sentence with the word. After the student correctly uses the word in a sentence, then proceed.
5. After the student provides the correct response to the card, then the new fact is rehearsed with the sequence outlined in Figure 1.

While IR is typically used with flash cards, it is the *sequence of presentation* that provides the power of the strategy. Any form of presentation can be used so long as the *order* is maintained. For example, we often use a simple pointer (e.g., finger) when learning new words in a reading assignment. The sequence is followed by simply pointing to the word, rather than by presenting it on a flashcard.

Figure 1 represents the basic format, but if a student makes a mistake on an unknown item in this process, then return to the beginning (with that item). In addition, if a student suddenly begins to miss items that they learned or knew before they started, then the student is tired, the intervention should stop, and no additional new items should be taught in that session.

Figure 1. Incremental Rehearsal Sequence to Rehearse Unknown Items Within Known Items

First Unknown Item First Known Item	**First Unknown Item** First Known Item Second Known Item Third Known Item Fourth Known Item Fifth Known Item	**First Unknown Item** First Known Item Second Known Item Third Known Item Fourth Known Item Fifth Known Item Sixth Known Item Seventh Known Item
First Unknown Item First Known Item Second Known Item	**First Unknown Item** First Known Item Second Known Item Third Known Item Fourth Known Item Fifth Known Item Sixth Known Item	**First Unknown Item** First Known Item Second Known Item Third Known Item Fourth Known Item Fifth Known Item Sixth Known Item Seventh Known Item Eighth Known Item
First Unknown Item First Known Item Second Known Item Third Known Item		
First Unknown Item First Known Item Second Known Item Third Known Item Fourth Known Item		

Note. After completing the sequence, the First Unknown Item becomes the First Known Item. When the Eighth Known Item is removed, a new Unknown Item is introduced, and process starts all over again.

DOES IR WORK?

IR has been called the most effective flashcard procedure in the literature. Students who previously struggled to remember things remembered 90% after one day (Nist & Joseph, 2008) and even recalled two thirds of what they learned one month later (MacQuarrie, Tucker, Burns, & Hartman, 2002). Other flashcard approaches usually result in 23% (Burns & Sterling-Turner, 2010) to 76% (Nist & Joseph, 2008) of the items being remembered.

SHOULD I USE IR?

Flashcards should be used when inability to retain new items interferes with higher order tasks. For example, students cannot solve a word problem with 3 × 4 in it if they cannot recall 3 × 4 = 12 from memory because they will spend so much time solving the computation that they will not be able to apply it to solve the problem.

IR is the most effective flashcard approach, but it requires more time (usually 5 to 15 minutes) than traditional flashcard approaches that use all unknown items. So, IR should be used when other, less effective approaches did not work, for students with the most severe difficulties, or if the material being learned is important enough to make obtaining 90% retention a priority.

CONCLUSION

IR is a well-researched flashcard intervention that has consistently been shown to be more effective than all other flashcard approaches and at least as efficient. However, it is not the appropriate intervention for all students. Flashcard interventions are best for items that just need to be memorized. Teachers could start with traditional drill approaches with 100% new items because it only requires 3 to 5 minutes, and use IR if the first flashcard technique does not work; or start with IR if the information is important enough to emphasize high retention or the student had demonstrated difficulty remembering what they previously learned. Either way, IR can be used by teachers and others to help students who struggle with learning reading and mathematics, or who consistently do not remember what they have been taught. ■

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For More Information

University of Missouri Evidence-Based Intervention Network (http://ebi.missouri.edu/?s=incremental+)

Intervention Central (https://www.interventioncentral.org/academic-interventions/math-facts/math-computation-promote-mastery-math-facts-through-incremental-re)

YouTube (http://www.schooltube.com/video/b75addbfcf292427dad4/Incremental-Rehearsal)

References

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