
Contents

Prologue	ix
Acknowledgments	xiii
About the Authors	xv
1. Managing Your Classroom	1
1. Create your own support network as soon as you begin your first teaching job.	1
2. Before beginning a lesson, put an outline of what you are going to cover on the board.	3
3. Make realistic time estimates when planning your lessons.	8
4. Make classroom activities flow smoothly.	10
5. Have “eyes in the back of your head” so you notice misbehaviour at an early stage.	11
6. Help students develop self-control to enhance their thinking and independence, as well as to ease your own workload.	13
7. Do more than one thing at a time.	16
8. Work directly with individual students as often as possible.	17
9. Use classwide peer tutoring to help your students learn, whether or not they have learning disabilities.	19
10. Encourage students to be mentally active while reading their textbooks.	21
11. Avoid reacting emotionally when evaluating problematic situations in the classroom.	23
12. Carefully select problems for use in cooperative learning groups.	25
13. Encourage students to work cooperatively with other students.	27

14. Use group problem solving to stimulate students to apply mathematical thinking skills.	28
15. Use the Jigsaw Technique of cooperative learning as an interesting and effective way for students to learn.	30
2. Enhancing Teaching Techniques	35
16. Find out about your students' motivation regarding mathematics, and use that knowledge to refine your instruction.	35
17. When trying to determine how to motivate students' interest in mathematics, teachers should differentiate between personal and situational interest and use both forms to increase students' motivation to learn mathematics. Teachers also need to both stimulate and maintain their students' interest.	37
18. Treat students in ways that reflect the belief that you have high expectations for their performance.	39
19. Praise mistakes!	41
20. Call on students more frequently to promote their achievement.	44
21. Make sure to pause for at least four seconds after listening to a student's communication before responding.	46
22. Use questions for different and versatile functions in the classroom.	48
23. Teachers should be tactical in their use of questions.	51
24. Make a lesson more stimulating and interesting by varying the types of questions you ask students.	53
25. Use a variety of sequences to ask questions.	55
26. Use a variety of strategies to encourage students to ask questions about difficult assignments.	56
27. Use a Question-Asking Checklist and an Evaluation Notebook to help students become better learners.	60
28. Use school fundraising projects, such as students' selling chocolate, as the basis of mathematics lessons.	62
29. Don't give students feedback on their performance too early.	63
30. Use homework as a way of delving more deeply into important mathematical concepts and skills.	65
31. When doing inquiry lessons, give students clearly written materials to guide the inquiry process.	66

3. Facilitating Student Learning	69
32. Use inquiry-based learning in addition to problem-based learning.	69
33. To reduce maths anxiety, focus on both the thoughts and the emotions of the students.	72
34. Adolescents need extended support to acquire the ability to visualise.	74
35. Use graphic representations or illustrations to enhance students' memory while they are listening to you. Abstract representations such as flow charts are more effective than colourful pictures.	75
36. Teach students to ask themselves questions about the problems/tasks they are working on.	79
37. Teachers can help students learn to ask better questions.	81
38. Give students the kind of feedback that will most help them improve their future performance.	83
39. Help students understand their own thought processes and guide them in learning to think like mathematicians.	85
40. Playing makes understanding mathematics easier and more fun.	86
41. Select and carefully structure homework assignments so that they require the development of mathematical thinking and reasoning. Anticipate changes that might occur while students are working at home.	90
42. Use homework assignments as opportunities for students to get practice and feedback on applying their mathematical knowledge and skills.	92
43. Assign homework and other projects requiring students to write about connections between mathematics and other subjects.	94
44. Consider whether a student's learning weakness might involve a deficiency in auditory perception.	96
45. Complex exercises that give students freedom tend to fit the way older students learn.	97
46. Emphasise higher-level thinking objectives in regular mathematics classes so that all students incorporate the features of enriched academic and honours classes.	100
47. Use analogies to help students develop more valid conceptions.	102

4. Assessing Student Progress	105
48. Feedback on practice is essential for improving student performance.	105
49. Promptly give students information or feedback about their performance.	107
50. Make sure students pay attention to the feedback you give them.	108
51. Systematically incorporate review into your instructional plans, especially before beginning a new topic.	110
52. Provide all students, especially students lacking confidence, with “formative assessments” to allow them additional opportunities to succeed in mathematics.	112
53. Find out why students rate a mathematical task as difficult so you can increase the difficulty of exercises and tests more effectively.	114
54. Increase your understanding of factors that affect students’ attitudes before and after testing. You may be surprised!	116
55. Be aware of students’ different levels of test anxiety as it relates to different subject areas, and use a variety of techniques to help them overcome their test anxiety.	118
56. Do not assume that students accept responsibility for or agree with their bad marks on tests.	121
57. If students do not follow your instructions and/or if their achievements do not fulfill your expectations, the cause may not be students’ incompetence. It could be a result of your self-overestimation.	124
5. Teaching Problem Solving	127
58. Get students to “think out loud” when solving problems.	127
59. Have students study written model solutions to problems while learning and practising problem solving.	129
60. Encourage students to make mental pictures while applying rules to solve problems.	131
61. Provide hints or clues or ask leading questions when students need help solving problems instead of giving them the answers. Gradually phase out this support so as to foster independent problem solving.	134

62. Teach students to ask themselves questions about what they already know about a problem or task they are working on.	136
63. Emphasise the general principles that underlie solving specific types of problems.	137
64. Examine your students' knowledge of mathematics and use this information to write challenging word problems that they will enjoy solving.	139
65. Structure teaching of mathematical concepts and skills around problems to be solved, using a problem-centred or problem-based approach to learning.	141
66. Help students learn without relying on teacher-centred approaches. Give them carefully chosen sequences of worked-out examples and problems to solve.	144
67. Students need time to practise planning their solutions to problems.	145
6. Considering Social Aspects in Teaching Mathematics	149
68. Make multicultural connections in mathematics.	149
69. Find out about your students' families and how their values and practices might affect students' attitudes and performance in mathematics.	151
70. Reach out to parents to form a partnership for educating primary and secondary school students.	153
71. Inform parents that they should not let media reports about studies of other children change their views of their own children's abilities to be successful in mathematics.	156
72. Some students do not think they have control over their academic successes and failures. Help these students recognise that they do have some control.	158
73. Teach students, especially girls, to believe that success in mathematics results from their efforts.	160
74. Give girls the same quantity and quality of teacher attention as boys.	162
75. Make special efforts to encourage girls to study mathematics.	164
76. Use different motivational strategies for girls and boys.	166
77. Take into consideration how students view successful teachers and how this differs for girls and boys.	167

78. Praise, encourage and help your older students.	170
79. Does skipping a year level hurt mathematically talented students socially and emotionally? Don't worry about accelerating talented students!	172
Resource. What the <i>Authors</i> Say: Enriching Instruction	175
Epilogue	179
Index	183

© Hawker Brownlow Education

Prologue

As a direct result of growing pressure on schools to continuously improve their instructional program and ensure that all students are being reached in the teaching process, teachers are being called on to meet professional standards and base their work on research-proven methods of teaching. Educational research, often conducted at universities or on educational sites by university researchers, is reported in educational journals and is most often read by other researchers. All too often the style in which research reports or articles on research findings are reported is not friendly or appealing to the classroom teacher. The very community – classroom teachers – that could benefit enormously from the findings of many of these educational initiatives rarely learns about these endeavors. It is the objective of this book to bring some of the more useful research findings to the classroom teacher. In our quest for the most salient research findings we were guided by the US National Council of Teachers of Mathematics (NCTM) standards. Rather than merely presenting the research findings that support the standards, we have attempted to convert them into useful classroom strategies, thus capturing the essence of the findings and at the same time putting them into a meaningful context for the practising mathematics teacher.

This book is to serve as a resource for mathematics teachers. It should provide a portal to access the many worthwhile findings resulting from educational, psychological and sociological research studies done in Europe and in the United States. Heretofore, teachers have had very few proper vehicles for getting this information, short of combing through the tomes of research reports in the various disciplines. This book is designed to provide an easy way for the classroom teacher to benefit from the many ideas embedded in these academic exercises.

The book is designed to be an easy and ready reference for the mathematics teacher. It consists of six chapters, each with a theme representing one aspect of the typical instructional program. Each chapter presents a collection of teaching strategies, concisely presented in a friendly format:

The Strategy



This is a simple and crisp statement of the teaching strategy we recommend.

What the Research Says



This offers a discussion of the research project that led to the strategy. This section should simply give the teacher some confidence in, and a deeper understanding of, the principle being discussed as a “teaching strategy”.

Teaching to the Highest Standards



Here we present ways to help educators raise the standards of their own teaching, facilitating the better perception and retention of mathematics principles in students.

Classroom Applications



This section tells the teacher how the teaching strategy can be used in the mathematics instructional program. Where appropriate, some illustrative examples of the teaching strategy in the mathematics classroom are provided.

Precautions and Pitfalls



This is the concluding section for each strategy and mentions some of the cautions that should be considered when using this teaching strategy so that the teacher can avoid common difficulties before they occur, thereby achieving a reasonably flawless implementation of the teaching strategy.

The Sources

These are provided so that the reader may refer to the complete research study to discover the process and findings in greater detail.

We see this book as a first step in bringing educational research findings to the practitioners: the classroom teachers. Perhaps teachers will see that there is much to be gained to enhance teaching by reviewing educational research with an eye toward implementing the findings in their instructional program. Furthermore, it would be highly desirable for researchers to make more of an effort to extend their publications/findings to the classroom teacher. To do otherwise would make the entire activity of educational research irrelevant.

As you read the many instructional suggestions offered in this book we hope you will continuously think of yourself as the teacher who might implement them. Remember, your personality plays a large role in mapping out an overall instructional strategy; nevertheless, the specific research-based tips and strategies offered here will help you focus on certain aspects of your teaching. Teachers who continuously self-evaluate their instructional performance will, undoubtedly, become master teachers.

© Hawker Brownlow Education