

Source	Number	Accurate use?	Comment
<u>'School inspection handbook'</u> , Ofsted, May 2019. <a href="#">↗</a>	1	match	
<u>'Principles behind Ofsted's research reviews and subject reports'</u> , Ofsted, March 2021. <a href="#">↗</a>	2	cited for further information	
<u>'Education inspection framework: overview of research'</u> , Ofsted, January 2019	3	cited for further information	
<u>Commentary on curriculum research – phase 3'</u> , Ofsted, December 2018.	3	cited for further information	
<u>'Mathematics performance (PISA)'</u> , OECD Publishing, 2018;	4	match	
<u>'Trends in maths and science study (TIMSS) 2019: national report for England'</u> , Department for Education and UCL Institute of Education, December 2020;	4	match	
J Sizmur, R Ager, J Bradshaw, R Classick, M Galvis, J Packer, D Thomas and R Wheeler, <u>'Achievement of 15 year old pupils in England: PISA 2018 national report'</u> , National Foundation for Educational Research, 2019.	4	match	
M Askew, J Hodgen, S Hossain and N Bretscher <u>'Values and variables: mathematics education in high-performing countries'</u> , Nuffield Foundation, June 2010;	4	match	
<u>'Provisional Entries for GCSE, AS and A level'</u> , Ofqual, June 2020.	5	match	

A Smith, <u>'Making mathematics count. The report of Professor Adrian Smith's inquiry into post-14 mathematics education'</u> , Department for Education and Skills, 2004.	6	match	
J Worth and J Brande, <u>'Teacher labour market in England: annual report 2019'</u> , National Foundation for Educational Research, February 2019	7	match	
L Sibieta, <u>'Teacher shortages in England: analysis and pay options'</u> , The Education Policy Institute, March 2020;	7	match	
<u>'Achievement of 15 year olds in England: PISA 2015 National Report'</u> , Department for Education and UCL Institute of Education, December 2016.	8	match	
B Burge and J Sizmur, 'Tackling low performance in maths', in 'PISA in practice: additional analysis of PISA 2012 in England', National Foundation for Educational Research, 2015, page 8;	8	match	
J Jerrim, N Perera and P Sellen, <u>'English education: world class in primary?'</u> , Education Policy Institute, December 2017;	8	match	
<u>'Trends in maths and science study (TIMSS) 2019: national report for England'</u> , Department for Education and UCL Institute of Education, December 2020.	9	match	
P Nye and D Thompson, <u>'Who's left 2019, part one: the disadvantage gap is bigger than we thought'</u> , FFT Data Education Lab, December 2019;	10	match	
R Wheeler, B Durbin, S McNamara and R Classick, <u>'Is mathematics education in England working for everyone? NFER analysis of the PISA performance of disadvantaged pupils'</u> , National Foundation for Educational Research, December 2016.	10	match	

S Velthuis, R Lupton, S Thomson and T Unwin, 'The characteristics and post-16 transitions of GCSE "low attainers"', University of Manchester, 2018;	10	match	
T Knowles, ' <u>Closing the attainment gap in maths: a study of good practice in early years and primary settings</u> ', Fair Education Alliance, February 2017.	11	partial match	It talks about being behind at 11 and generally but does not specifically mention being behind at KS1 or end of EYFS. p.5 "Children from socio-economic disadvantage are more likely to underachieve in maths throughout their school career than their more advantaged peers. In 2016 just over half of all children from disadvantaged families achieved the expected level in maths at age 11 (58%). This compared to their more advantaged peers where 76% achieved the expected level (DfE, 2016)."
<u>'The National Strategies 1997–2011: a brief summary of the effectiveness of the National Strategies'</u> , Department for Education, May 2011.	12	match	
M Boylan, B Maxwell, C Wolstenholme, T Jay and S Demack, 'The mathematics teacher exchange and "mastery" in England: the evidence for the efficacy of component practices', in 'Education Sciences', Volume 8, Issue 4, 2018, pages 1 to 31.	13	match	One of the authors felt that the evaluation report would have been a more appropriate source.
'Teaching for mastery: what is happening in primary maths and what is next?', National Centre for Excellence in the Teaching of Mathematics, 2019.	14	match	
J Jerrim, H Austerberry, C Crisan, A Ingold, C Morgan, D Pratt, C Smith and M Wiggins, ' <u>Mathematics mastery: secondary evaluation report</u> ', Education Endowment Foundation, 2015.	15	match	
FKS Leung, K Park, Y Shimizu and B Xu, 'Mathematics education in East Asia', in 'The Proceedings of the 12th International Congress on Mathematics Education', 2015	16	match	
M Askew, J Hodgen, S Hossain and N Bretscher, ' <u>Values and variables: mathematics education in high-</u>	16	match	

<u>performing countries</u> ', Nuffield Foundation, 2010.			
<u>'Maths results for 10 to 11 year olds</u> ', Department for Education, May 2020.	17	not a match	This statistic is not actually in the report, just in the linked spreadsheet but the numbers presented are wrong. It should say 93% v. 60% There is very little difference in the average scaled score for Chinese students with / without FSM. E.g. 110 v. 111; expected is 93% v. 94%; higher is 55% v 64%; White British was 101 v. 105; expected is 60% v 78%; higher is 11% v 25%
CE Finn, <u>'Those that live by the scores</u> ', Thomas Fordham Institute, August 2020;	18	match	
GH Sahlgren, <u>'Real Finnish lessons: the true story of an educational superpower</u> ', Centre for Policy Studies, April 2015.	18	match	
P Sahlberg, 'PISA in Finland: an educational miracle or an obstacle to change?', in 'Center for Educational Policy Studies Journal', Volume 3, Issue 1, 2011, pages 119 to 140;	18	not a match	The Finn and Sahlgren sources for footnote 18 match the point made but the Sahlberg source does not. Sahlberg gives an overview of Finland's performance that does not support the points made in the other two sources. i.e. The others claim that previous traditional schooling was responsible for Finland's good results but this overview of international comparisons show that they were just average previously (except in reading where they've been consistently high) and became top after the reforms.
J Jeffes, E Jones, M Wilson, E Lamont, S Straw, R Wheater and A Dawson, <u>'Research into the impact of Project Maths on student achievement, learning and motivation</u> ', National Foundation for Educational Research, November 2013.	19	match	
Y Ni, Q Li, X Li and J Zou, 'Influence of curriculum reform: an analysis of student mathematics achievement in China', in 'International Journal of Educational Research', Volume 50, Issue 2, 2011, pages 100 to 116;	19	not a match	It talks about other factors that influence outcomes but not historic approaches interfering with reform p.112 "However, the observed performance differences were considered to be in part related to the curricular differences

			<p>considering that the students had been receiving the different curricula throughout their entire elementary school education from grade one to grade six. "</p> <p>p.114 "The quality of the implemented curriculum in classrooms is then associated with various important variables, such as teacher knowledge, teachers' beliefs, teachers' experience with the new curriculum, quality of classroom instruction, among others."</p>
<u>'Education inspection framework: overview of research'</u> , Ofsted, January 2019.	20	match	There may have been a typo switching quality for quantity.
SR Turns and PN Meter, 'Applying knowledge from educational psychology and cognitive science to a first course in thermodynamics', American Society for Engineering Education, 2011.	21	match	The claim of disciplines plural is not supported by this document which only refers to a single engineering course.
JR Anderson, 'The architecture of cognition', Harvard University Press, 1983;	22	partial match	This model includes declarative and procedural but not conditional.
PS Rosenbloom, 'Combining procedural and declarative knowledge in a graphical architecture', in 'Proceedings of the 10th International Conference on Cognitive Modeling', 2010.	22	partial match	Focus on declarative and procedural memory but the conditional memory layer seems different to the description of conditional knowledge by Ofsted
'Handbook of suggestions for teachers', Board of Education, 1939.	23	match	
<u>'Mathematics programmes of study: key stages 1 and 2'</u> , Department for Education, September 2013.	24	match	
M Brown, M Askew and A Millett, 'How has the national numeracy strategy affected attainment and teaching in year 4?', in 'Proceedings of the British society for research into learning mathematics', edited by J Williams, Volume 23, Issue 2, 2003, pages 13 to 18.	25	not a match	Disputed by author This was not discussed. The terms declarative and conditional were not used and the word procedural was used once but in a different context.
AH Schoenfeld, 'Mathematical problem solving', New York Press, 1985.	26	not a match	Disputed by author Specifically, the citation that references my 1985 book

			<p>“Mathematical problem solving”, misconstrues “problem solving,” appearing to use the pre-1985 definition, “being able to solve exercises that resemble the tasks the students have been shown how to solve.” The definition of problem solving in my book is that problem solving strategies help people make progress on, and sometimes solve, problems that they do NOT have ready access to solution mechanisms for.</p>
<p>PA Alexander, ‘The development of expertise: the journey from acclimation to proficiency’, in ‘Educational Researcher’, Volume 32, Issue 8, 2003, pages 10 to 14;</p>	26	not a match	<p>greater focus on motivation and problem solving p.12 ‘...students must be encouraged to modify and combine strategies in ways that fit them and the problems at hand. Third, even though knowledge and strategies remain keys to expertise, my colleagues and I have found that individuals’ investment in their learning and development is equally critical. (e.g. Alexander &amp; Murphy, 1998). We have determined that interest, especially individual interest, is tied to students’ knowledge and strategic efforts. If the educational experience is too narrowly focused on the acquisition of domain-specific knowledge, without regard to motivational forces, we may be stressing one aspect of expertise to the detriment of others. Thus, schools can do much to nurture emerging competence by allowing students to pursue topics and tasks of interest and by immersing them in meaningful learning experiences that are fertile ground for the growth of enduring interest.’</p> <p>It does say that in acclimation students will need some explicit instruction. The article focused on four subjects but this did not include mathematics.</p>
<p>J Sweller, R Clark and PA Kirschner, ‘Teaching general problem-solving skills is not a substitute for, or a viable addition to, teaching mathematics’, in ‘Notices of the American Mathematical Society’, Volume 57, 2010, pages 1303 to 1304.</p>	27	partial match	<p>denies existence of generic problem solving skills, emphasises worked examples</p>
<p>J Bransford and others, ‘How people learn: brain, mind, experience and school’, National Academy Press, 2004,</p>	28	not a match	<p>This section is not about sequencing at all but about expert recognition of key features and patterns of novice.</p>

pages 32 to 36;			
J Woodward, 'Procedural knowledge in mathematics: the role of the curriculum', in 'Journal of Learning Disabilities', Volume 24, Issue 4, 1991.	28	match	
E Gallagher, 'Improving a mathematical key skill using precision teaching', in 'Irish Educational Studies', Volume 25, Issue 3, 2006, pages 303 to 319.	29	partial match	talks about importance of fluency but not really talking about problem solving or working memory
J Woodward, 'Procedural knowledge in mathematics: the role of the curriculum', in 'Journal of Learning Disabilities', Volume 24, Issue 4, 1991, pages 242 to 251;	29	partial match	does not discuss the examples given but does say that students need to know facts and procedures to solve problems
JB Rittle-Johnson and K Koedinger, 'Iterating between lessons on concepts and procedures can improve mathematics knowledge', in 'British Journal of Educational Psychology', Volume 79, Issue 3, 2009, pages 483 to 450.	30	partial match	yes but the article itself downplayed negative evidence
JB Rittle-Johnson, M Schneider and J Star, 'Not a one-way street: bidirectional relations between procedural and conceptual knowledge of mathematics', in 'Educational Psychology Review', Volume 27, Issue 4, 2015, pages 587 to 597;	30	partial match	Ofsted were definite where the article said it was possible
'Learning with understanding: 7eig principles', in 'Learning and understanding: improving advanced study of maths and science in U.S. high schools', National Research Council, 2002;	31	not a match	The paper does say prior knowledge is important but does not match the statement here. It specifically says disconnected facts are pointless.
T Hailikari, N Katajavuori and S Lindblom-Ylänne, 'The relevance of prior knowledge in learning and instructional design', in 'American Journal of Pharmaceutical Education', Volume 72, Issue 5, 2008, pages 1 to 8	31	partial match	This statement cannot really be drawn from this study. It did say that prior knowledge helped but emphasised that this was the knowing how, not just the knowing facts. They did take some number tests but number proficiency was not discussed. The main focus was on chemistry for these Finnish university students.
W Schmidt, HC Wang and C McKnight, 'Curriculum	31	not a match	There is discussion about the importance of considering the

coherence: an examination of US mathematics and science content standards from an international perspective', in 'Journal of Curriculum Studies', Volume 37, Issue 5, 2005, pages 525 to 559.			order you present information but it does not match the statement given.
H Jung Kang, 'A cross-national comparative study of first- and fourth-grade math textbooks between Korea and the United States', in 'Curriculum and Teaching Dialogue', Volume 16, Issues 1 and 2, 2014, pages 91 to 108.	32	partial match	This is from the literature to which they refer to justify their study. It is unclear what is meant by 'more time'? This is not about UK textbooks but about 'reform-based textbooks' in the US, so the comparison is not relevant to UK.
Z Wang and D McDougall, 'Curriculum matters: what we teach and what students gain', in 'International Journal of Science and Mathematics Education', Volume 17, Issue 6, 2019, pages 1129 to 1149.	33	not a match	Nothing talks about 'core knowledge' being done early. The research suggests that doing fewer topics each year but in greater depth is good.
A Alajmi, 'How do elementary textbooks address fractions? A review of mathematics textbooks in the USA, Japan, and Kuwait', in 'Educational Studies in Mathematics', Volume 79, Issue 2, 2012, pages 239 to 261	34	not a match	Might refer to the fact that the US has a spiral curriculum so revisits topics.
W Schmidt, HC Wang and C McKnight, 'Curriculum coherence: an examination of US mathematics and science content standards from an international perspective', in 'Journal of Curriculum Studies', Volume 37, Issue 5, 2005, pages 525 to 559.	34	partial match	The statement after the footnote is supported.
Z Wang and D McDougall, 'Curriculum matters: what we teach and what students gain', in 'International Journal of Science and Mathematics Education', Volume 17, Issue 6, 2019, pages 1129 to 1149;	34	partial match	As above, the statement after the footnote is a better match.
J Cai and C Jiang, 'An analysis of problem-posing tasks in Chinese and US elementary mathematics textbooks', in 'International Journal of Science and Mathematics Education', Volume 15, Issue 8, 2017, pages 1521 to 1540;	35	not a match	This article reports 2 studies about problem posing. They are looking for coherence between the curriculum aims and textbooks with respect to problem posing but that is the only tenuous link to this statement.



W Schmidt and R Prawat, 'Curriculum coherence and national control of education: issue or non-issue?', in 'Journal of Curriculum Studies', Volume 38, Issue 6, 2006, pages 641 to 658.	35	partial match	It does talk about coherence but not the rest. p.527 "The concept of coherence is used in different ways. One term used to describe a particular type of coherence is alignment, by which is meant the degree to which various policy instruments available to the system, e.g. standards, textbooks, and assessments, accord with each other and with school practice (Smith and O'Day 1991, Fuhrman 1993, Consortium for Policy Research in Education 2000)."
W Schmidt, HC Wang and C McKnight, 'Curriculum coherence: an examination of US mathematics and science content standards from an international perspective', in 'Journal of Curriculum Studies', Volume 37, Issue 5, 2005, pages 525 to 559;	35	partial match	p.528 "We define content standards, in the aggregate, to be coherent if they are articulated over time as a sequence of topics and performances consistent with the logical and, if appropriate, hierarchical nature of the disciplinary content from which the subject-matter derives." They propose this definition and are not relating it to a successful curriculum or continually upgrading.
			N.B. None of the three sources for footnote 35 talks about rehearsal, instruction or 'mechanisms' or continually upgrading. The closest any come are discussions about coherence between curriculum and textbooks (and coverage of these).
T Oates, 'Why textbooks count', Cambridge Assessment, 2014.	36	partial match	It talks about textbooks but not lesson plans.
HW Stevenson and JW Stigler, 'The learning gap', Simon and Schuster, 1992, page 141.	37	match	
J Kraemer, 'Global perspectives: the public nature of teaching in Shanghai and the private practice of U.S. teachers', Center on International Educational Benchmarking, 2016;	37	partial match	one sentence - teachers in Shanghai have more time away from pupils than teachers in US
HW Stevenson and JW Stigler, 'The learning gap', Simon and Schuster, 1992, page 141.	38	match?	This is a logical conclusion but it's not actually stated on this page.
D Frye, AJ Baroody, M Burchinal, SM Carver, NC Jordan	39	partial	does not refer to disadvantaged novices but does recommend

and J McDowell, 'Teaching math to young children: a practice guide', Institute of Education Sciences, 2013;		match	daily maths lessons and informal approaches relating maths to everyday life
DJ Chard, KS Baker, B Clarke, K Jungjohann, K Davis and K Smolkowski, 'Preventing early mathematics difficulties: the feasibility of a rigorous kindergarten mathematics curriculum', in 'Learning Disability Quarterly', Volume 31, Issue 1, 2008, pages 11 to 20.	39	match	
J Hodgen. MJ Adkins, S Ainsworth and S Evans, 'Catch up® numeracy: evaluation report and executive summary', National Foundation for Educational Research, 2019;	39	not a match	Disputed by author This is an evaluation of an intervention programme. The study did not examine this point. While the intervention provided dedicated time for mathematics it was twice per week, rather than daily, and focused on a range of mathematical concepts, not simply rehearsal.
T Kim and S Axelrod, 'Direct instruction: an educators' guide and a plea for action', in 'Behavior Analyst Today', Volume 6, Issue 2, 2005, pages 111 to 120.	40	partial match	Kindergarten does not equate to reception. Also it is talking about commercially scripted lessons which is not what was being suggested above.
I Siraj-Blatchford, A Mayo, E Melhuish, B Taggart, P Sammons and K Sylva, ' <u>Performing against the odds: developmental trajectories of children in the EPPSE 3-16 study</u> ', Department for Education, June 2011	41	not a match	Disputed by 2 authors This article did not include any classroom data and does not support the point made.
P Sammons, J Hall, K Sylva, E Melhuish, I Siraj-Blatchford and B Taggart, 'Protecting the development of 5-11-year-olds from the impacts of early disadvantage: the role of primary school academic effectiveness', in 'School Effectiveness and School Improvement', Volume 24, Issue 2, 2013, pages 251 to 268;.	41	not a match	Disputed by 2 authors This article did not include any data on classroom processes and does not support the point made.
X Ma and J Xu, 'Determining the causal ordering between attitude toward mathematics and achievement in mathematics', in 'American Journal of Education', Volume 110, Issue 3, 2004, pages 256 to 280.	42	partial match	It found a causal relationship between achievement and attitude but it was more reciprocal in Grades 9 - 12. Also, it only looked at secondary pupils but the statements here imply all age groups so over-generalised.
BK Martens and JC Witt, 'Competence, persistence, and success: the positive psychology of behavioral skill	43	not a match	Awareness of own success was not discussed. This would have been a better match for footnote 42.

instruction', in 'Psychology in the Schools', Volume 41, Issue 1, 2004, pages 19 to 30;			
JPJ Van der Beek, SHG Van der Ven, EH Kroesbergen and PPM Leseman, 'Self-concept mediates the relation between achievement and emotions in mathematics', in 'British Journal of Educational Psychology', Volume 87, Issue 3, 2017, pages 478 to 495.	43	partial match	it was a relationship with self-concept rather than ability and they found self-concept and ability did not always match
L Bragg, 'Testing the effectiveness of mathematical games as a pedagogical tool for children's learning', in 'International Journal of Science and Mathematics Education', Volume 10, Issue 6, 2012, pages 1445 to 1467.	44	not a match	Disputed by author As a long time advocate of playing mathematical games to enhance learning and engagement, I feel that the statement attributed to my (PhD) research misrepresents my views and the intention of the paper. They have taken a specific example of one game-playing situation and generalising it all games. This ignores all the other research that has found a positive impact from game playing.
X Ma and J Xu, 'The causal ordering of mathematics anxiety and mathematics achievement: a longitudinal panel analysis', in 'Journal of Adolescence', Volume 27, Issue 2, 2004, pages 165 to 179.	45	not a match	This does not appear to match the statement. Achievement and failure to acquire knowledge are not equivalent. The article suggests that low attainment could be related to poor test taking. "For example, Tobias (1985) asserted that low mathematics achievement attributable to poor study habits and deficient test taking skills results in high mathematics anxiety."
G Ramirez, EA Gunderson, SC Levine and SL Beilock, 'Math anxiety, working memory and math achievement in elementary school', in 'Journal of Cognition and Development', Volume 14, Issue 2, 2013, pages 187 to 202.	46	partial match	Gr 1 & 2 in USA does not equate to 'start of academic journey' in UK
S Hansen, 'Children's errors in mathematics (teaching handbook series)', Learning Matters, 2011.	47	partial match	The book focuses on misconceptions and differentiates these from careless errors, which result from a long list of possibilities. It does not talk about anxiety (brief mention of some students feeling frustrated when they make mistakes). However, the focus is on learning from the misconceptions, not the careless errors.

C Aubrey, S Dahi and R Godfrey, 'Early mathematics development and later achievement: further evidence', in 'Mathematics Education Research Journal', Volume 18, Issue 1, 2006, pages 27 to 46.	48	not a match	This issue was not discussed in the article.
TW Watts, GJ Duncan, M Chen, A Claessens, PE Davis-Kean, K Duckworth, M Engel, R Siegler and MI Susperreguy, 'The role of mediators in the development of longitudinal mathematics achievement associations', in 'Child Development', Volume 86, Issue 6, 2015, pages 1892 to 1907;	48	not a match	This issue was not discussed in the article.
D Frye, AJ Baroody, M Burchinal, SM Carver, NC Jordan and J McDowell, 'Teaching math to young children: a practice guide', Institute of Education Sciences, 2013.	49	partial match	Reasonable match to first sentence but no support for following sentences. Also implies all children rather than some. p.7 "Children demonstrate an interest in math well before they enter school. They notice basic geometric shapes, construct and extend simple patterns, and learn to count."
DH Clements and J Sarama, 'Math, science, and technology in the early grades', in 'Future of Children', Volume 26, Issue 2, 2016, pages 75 to 79;	49	partial match	Suggests all rather than some "First, the authors show that young children possess a sophisticated informal knowledge of math, and that they frequently ask scientific questions, such as why questions. Preschoolers' free play involves substantial amounts of foundational math as they explore patterns, shapes, and spatial relations; compare magnitudes; and count objects."
M Engel, A Claessens and MA Finch, 'Teaching students what they already know? The (mis)alignment between mathematics instructional content and student knowledge in kindergarten', in 'Educational Evaluation and Policy Analysis', Volume 35, Issue 2, 2013, pages 157 to 178;	49	match	
BM Casey, CM Lombardi, D Thomson, HN Nguyen, M Paz, CA Theriault and E Dearing, 'Maternal support of children's early numerical concept learning predicts preschool and first-grade math achievement', in 'Child	50	match	

Development', Volume 89, Issue 1, 2018, pages 156 to 173;			
I Siraj-Blatchford, 'Learning in the home and at school: how working class children "succeed against the odds"', in 'British Educational Research Journal', Volume 36, Issue 3, 2010, pages 463 to 482.	50	match	Ofsted have ignored that the paper also recommends pre-school, not just home input.
JB Rittle-Johnson, ER Fyfe, KG Hofer and DC Farran, 'Early math trajectories: low-income children's mathematics knowledge from ages 4 to 11', in 'Child Development', Volume 88, Issue 5, 2017, pages 1727 to 1742;	51	match	
TW Watts, GJ Duncan, M Chen, A Claessens, PE Davis-Kean, K Duckworth, M Engel, R Siegler and MI Susperreguy, 'The role of mediators in the development of longitudinal mathematics achievement associations', in 'Child Development', Volume 86, Issue 6, 2015, pages 1892 to 1907.	51	partial match	Some support from the article's literature review but not the actual study. "...our results suggest that factors beyond mathematical skill attainment play a role in the development of mathematics achievement. Even when controlling for fraction and division knowledge in fifth grade, which appears to be crucial for later mathematics, mathematics SCA and participation in gifted and talented programs were still strong predictors of later achievement. Thus, although earlier mathematical skills are critical for obtaining later ones, the influence of other factors, including motivation and school context, should not be overlooked."
D Sasanguie, B De Smedt, E Defever and B Reynvoet, 'Association between basic numerical abilities and mathematics achievement', in 'British Journal of Developmental Psychology', Volume 30, Issue 2, 2012, pages 344 to 357.	52	match	Note the children in the study are older than EYFS. Belgian kindergarten (mean age 5.6 years old), grade 1 (mean age 6.7), grade 2 (mean age 7.6) & grade 6 (mean age 11.6)
C Aubrey, S Dahi and R Godfrey, 'Early mathematics development and later achievement: further evidence', in 'Mathematics Education Research Journal', Volume 18, Issue 1, 2006, pages 27 to 46.	53	match	The article focused more on the positive: high entry knowledge more likely to do better later This article could have been used for footnote 43.
MMM Mazzocco and RE Thompson, 'Kindergarten	54	partial	The research was specifically about MLD - mathematics

<p>predictors of math learning disability', in 'Learning Disabilities Research &amp; Practice', Volume 20, Issue 3, 2005, pages 142 to 155.</p>		<p>match</p>	<p>learning disability.          "We administered measures of mathematics achievement, formal and informal mathematics ability, visual-spatial reasoning, and rapid automatized naming and examined which test scores and test items from kindergarten best predicted MLD at grades 2 and 3. Statistical models using standardized scores from the entire test battery correctly classified ~80–83 percent of the participants as having, or not having, MLD. Regression models using scores from only individual test items were less predictive than models containing the standard scores, except for models using a specific subset of test items that dealt with reading numerals, number constancy, magnitude judgments of one-digit numbers, or mental addition of one-digit numbers. These models were as accurate in predicting MLD as was the model including the entire set of standard scores from the battery of tests examined. Our findings indicate that it is possible to effectively predict which kindergartners are at risk for MLD, and thus the findings have implications for early screening of MLD."          So some aspects of mathematics predicted future diagnosis. Not all of these would come under the heading of 'acquisition of knowledge'</p>
<p>DB Crawford, 'Mastering maths facts: research and results', Otter Creek Institute, 2003.</p>	<p>55</p>	<p>partial match</p>	<p>It does not refer to 'working memory' or 'overload'.          "The development of automaticity is critical so students can concentrate on higher order thinking in math."          "For children to be fluent in computation and to be able to do math mentally requires that they become fluent in the basic arithmetic facts."          Interestingly the article starts with:          "Learning math facts proceeds through three stages: 1) procedural knowledge of figuring out facts; 2) strategies for remembering facts based on relationships; 3) automaticity in math facts - declarative knowledge"          This does not seem to match earlier sections in the Ofsted report suggesting that knowing number facts has to come first.</p>

JL Booth, C Barbieri, F Eyer and EJ Paré-Blagoev, 'Persistent and pernicious errors in algebraic problem solving', in 'Journal of Problem Solving', Volume 7, Issue 1, 2014, pages 10 to 23.	56	match	
J Woodward, 'Procedural knowledge in mathematics: the role of the curriculum', in 'Journal of Learning Disabilities', Volume 24, Issue 4, 1991, pages 242 to 251.	57	not a match	It does not discuss starting from an early age. Most of the assistance to pupils with SEN was about misconceptions.
DH Clements, J Sarama, ME Spitler, AA Lange and CB Wolfe, 'Mathematics learned by young children in an intervention based on learning trajectories: a large-scale cluster randomized trial', in 'Journal for Research in Mathematics Education', Volume 42, Issue 2, 2011, pages 127 to 166.	58	match	The match is only for the single sentence, not the earlier part of the paragraph.
DJ Chard, KS Baker, B Clarke, K Jungjohann, K Davis and K Smolkowski, 'Preventing early mathematics difficulties: the feasibility of a rigorous kindergarten mathematics curriculum', in 'Learning Disability Quarterly', Volume 31, Issue 1, 2008, pages 11 to 20, quote at page 13.	59	partial match	In the paper the quote is about the nature of number sense and from an example in the literature review and not a finding of the research. The quote is about basic arithmetic (and not problem solving in general) and gives the example of needing to know 15-8 and 11-8 to know that 15 is larger than 11 and much larger than 8 but knowledge of the number system can give you this, not just knowledge of these 'number facts'.
JB Rittle-Johnson, 'Promoting transfer: effects of self-explanation and direct instruction', in 'Child Development', Volume 77, Issue 1, 2006, pages 1 to 15.	60	not a match	The article did not talk about declarative knowledge or at-risk pupils; the focus of the research was on instructional techniques for conceptual and procedural knowledge
SP Miller and PJ Hudson, 'Using evidence-based practices to build mathematics competence related to conceptual, procedural, and declarative knowledge', in 'Learning Disabilities Research & Practice', Volume 22, Issue 1, 2007, pages 47 to 57;	60	partial match	the article does not privilege declarative knowledge
D Klein, 'High achievement in mathematics: lessons from 3 Los Angeles elementary schools', Brookings Institution, 2000;	61	match	The research base was 3 schools with "unusually successful" mathematics programmes. Both of these factors limit generalisability.

JD Ashbaker, 'The effects of fluency training on the acquisition and retention of secondary students' fraction skills', Brigham Young University Scholars Archive, 2017.	61	match	This research involved only 2 students, limiting generalisability.
JH Hunt, 'Effects of a supplemental intervention focused in equivalency concepts for students with varying abilities', in 'Remedial and Special Education', Volume 35, Issue 3, pages 135 to 144;	61	match	
M Chiesa and A Robertson, 'Precision teaching and fluency training: making maths easier for pupils and teachers', in 'Educational Psychology in Practice', Volume 16, Issue 3, 2000, pages 297 to 310;	61	match	
D Frye, AJ Baroody, M Burchinal, SM Carver, NC Jordan and J McDowell, 'Teaching math to young children: a practice guide', Institute of Education Sciences, 2013;	62	partial match	It says that children need to experience areas beyond number and operations but doesn't talk about the need for facts.
National Mathematics Advisory Panel, 'Foundations for success: the final report of the National Mathematics Advisory Panel', US Department of Education, 2008.	62	match	
KJ Wilkie, 'Learning to like algebra through looking', in 'Australian Primary Mathematics Classroom', Volume 19, Issue 4, 2014, pages 24 to 33.	63	not a match	The article focused on the children creating and exploring the patterns and then sharing their ways of explaining and representing them. The closest statement is: "As previously mentioned, research has found that students can struggle to move from finding recursive rules to finding explicit rules. Kuchemann (2010) recommended including tasks that focus on the structure of an individual item of a pattern—treating it as a prototype—to help shift students' recursive strategies (describing changes in each successive stage of a pattern) and to focus their attention on the correspondence between the two variables." This isn't about the teacher pointing out the patterns but of providing tasks that lead them to this. "During sharing times, the students were encouraged to compare each other's rules and to test them out to see if the



			different rules produced the same answer (total number of blocks). Discussions about the use of brackets and order of operations emerged naturally in this context. The daisy chain growing pattern, because of its complexity, also provided a great scenario in which students could grapple with how to express their explicit rules mathematically." perhaps confusion because of the terms 'explicit rule' and 'explicit generalisation'
B Cooper and M Dunne, 'Anyone for tennis? Social class differences in children's responses to national curriculum mathematics testing', in 'Sociological Review', Volume 46, Issue 1, 1998, pages 115 to 149.	64	partial match	This is tenuous. There is nothing about vocabulary. The misunderstanding of the activity was about bringing real life knowledge to it when that needed to be suspended.
TN Hopfenbeck, 'Classroom assessment, pedagogy and learning – twenty years after Black and Wiliam 1998', in 'Assessment in Education: Principles, Policy & Practice', Volume 25, Issue 6, 2018, pages 545 to 550;	64	not a match	The only part that talks about language is: "Thus, children from working class families, who are only familiar with the restricted code of their everyday language, may find it difficult to engage with the elaborated code that is required by the learning discourse of the classroom and which those from middle class families experience in their home lives." But this is not focused on mathematics vocabulary or understanding instructions
M Engel, A Claessens and MA Finch, 'Teaching students what they already know? The (mis)alignment between mathematics instructional content and student knowledge in kindergarten', in 'Educational Evaluation and Policy Analysis', Volume 35, Issue 2, 2013, pages 157 to 178.	65	match	
JD Ashbaker, 'The effects of fluency training on the acquisition and retention of secondary students' fraction skills', Brigham Young University Scholars Archive, 2017.	66	match	This research involved only 2 students, limiting generalisability.
JH Hunt, 'Effects of a supplemental intervention focused in equivalency concepts for students with varying	66	match	

abilities', in 'Remedial and Special Education', Volume 35, Issue 3, 2014, pages 135 to 144;			
S Kuzmak, 'What's missing in teaching probability and statistics: building cognitive schema for understanding random phenomena', in 'Statistics Education Research Journal', Volume 15, Issue 2, 2016, pages 179 to 196.	67	not a match	My reading of the Ofsted statement in the context of the previous sentences is that the children might not have played dice games. That's not what the article is saying.
C Barton, 'How I wish I'd taught maths', John Catt Limited, 2018, quote at page 144.	68	match	
J Cai, 'Developing algebraic thinking in the earlier grades: a case study of the Chinese elementary school system', in 'The Mathematics Educator', Volume 8, Issue 1, 2004, pages 107 to 130, quote at page 109.	69	match	However, this article just talks about China so the previous sentence talking about countries plural needs further evidence.
RM Welder, 'Improving algebra preparation: implications from research on student misconceptions and difficulties', in 'School Science and Mathematics', Volume 112, Issue 4, 2012, pages 255 to 264.	70	partial match	the general point is supported but not the specific example "In fact, Küchemann (1978, 1981) found that only a very small percentage of students, ages 13–15, were able to consider a letter as a generalized number. Even fewer were able to interpret a letter as a variable. The majority of the students in Küchemann's studies treated letters as concrete objects or just ignored them completely."
M Albayrak, 'An experimental study on preventing first graders from finger counting in basic calculations', in 'Electronic Journal of Research in Educational Psychology', Volume 8, Issue 3, 2010, pages 1131 to 1150.	71	not a match	71 is a small scale study (2 classrooms of 7 year olds) where children were given 'counting tools' (concrete representations of objects such as abacus, beads, marbles, beans) and encouraged to point or eye track when counting. They were provided with information about the tasks in advance to reduce anxiety and were discouraged from using fingers when calculating (focus was on numbers to 100). The intervention therefore gives the opposite message from Ofsted about manipulatives. The only thing it does show is that using fingers to count in ones is not a good addition strategy for larger numbers so some methods become less useful over time. Nothing there about learning number facts instead.
D Ball, 'Magical hopes: manipulatives and the reform of	72	partial	Discussed how to use representations to help (and avoiding

math education', in 'American Educator', Volume 16, Issue 2, 1992, pages 14 to 18, 46 to 47;		match	the pitfalls) but not about moving on from them. (could have been used for footnote 73)
DT Willingham, 'Ask the cognitive scientist: do manipulatives help students learn?', in 'American Educator', Volume 41, Issue 3, 2017, pages 1 to 18	72	match	(could have been used for footnote 73)
E Fyfe, NM McNeil, JY Son and RL Goldstone, 'Concreteness fading in mathematics and science instruction: a systematic review', in 'Educational Psychology Review', Volume 26, Issue 1, 2014, pages 9 to 25.	72	match	
MC Brown, NM McNeil and AM Glenburg, 'Using concreteness in education: real problems, potential solutions', in 'Child Development Perspectives', Volume 3, Issue 3, 2009, pages 160 to 164;;	72	partial match	It talks about linking the physical and the symbolic at the same time, not 'move on' to the latter
D Drews, 'Do resources matter in primary mathematics teaching and learning?', in 'Using resources to support mathematical thinking', Learning Matters, 2007;	73	match	
E Fyfe, NM McNeil, JY Son and RL Goldstone, 'Concreteness fading in mathematics and science instruction: a systematic review', in 'Educational Psychology Review', Volume 26, Issue 1, 2014, pages 9 to 25.	73	match	although Willingham (2017) and Ball (1992) would have been better matches
LA Petersen and NM McNeil, 'Effects of perceptually rich manipulatives on preschoolers' counting performance: established knowledge counts', in 'Child Development', Volume 84, Issue 3, 2013, pages 1020 to 1033	74	match	
MC Brown, NM McNeil and AM Glenburg, 'Using concreteness in education: real problems, potential solutions', in 'Child Development Perspectives', Volume 3, Issue 3, 2009, pages 160 to 164;	74	partial match	The distraction was about specific apparatus that was too representational, e.g. apple counters, pizza fractions, that could result in pupils thinking about non-mathematical aspects of the resource It was not a general point about manipulatives.

C Murphy, 'Comparing the use of the empty number line in England and the Netherlands', in 'British Educational Research Journal', Volume 37, Issue 1, 2011, pages 147 to 161.	75	match	
FKS Leung, 'A comparison of the intended mathematics curriculum in China, Hong Kong and England and the implementation in Beijing, Hong Kong and London', doctoral thesis, Institute of Education, University of London, 1992;	76	not a match	Estimation is presented as part of the curriculum but not discussed otherwise. There were only 2 examples of pupils guessing. This was not presented as a habit nor as a result of lacking core knowledge. No discussion of copying.
P Munn, 'Mathematics in Early Childhood – the Early Years Mathematics Curriculum in the UK and Children's Numerical Development', in 'International Journal of Early Childhood', Volume 38, Issue 1, 2006, pages 99 to 111.	76	partial match	They had been taught the core knowledge but had not been developmentally ready
D Barner, G Alvarez, J Sullivan, N Brooks, M Srinivasan and MC Frank, 'Learning mathematics in a visuospatial format: a randomized, controlled trial of mental abacus instruction', in 'Child Development', Volume 87, Issue 4, 2016, pages 1146 to 1158;	77	match	although the focus was on a mental abacus so really matches footnote 78 better
DT Willingham, 'Ask the cognitive scientist: do manipulatives help students learn?', in 'American Educator', Volume 41, Issue 3, 2017, pages 1 to 18.	77	match	for a small part of the statement (nothing about the soroban)
Z Zhou and ST Peverly, 'Teaching addition and subtraction to first graders: a Chinese perspective', in 'Psychology in the Schools', Volume 42, Issue 3, 2005, pages 259 to 272.	78	match	
JW Adams and GJ Hitch, 'Working memory and children's mental addition', in 'Journal of Experimental Child Psychology', Volume 67, Issue 1, 1997, page 21.	79	not a match	This study compared the mental addition of pupils using oral or visual presentation. It was noted that the use of recall or, for example, finger counting did not affect the results. The reference to working memory is not about the contents of LTM but how pupils dealt with oral or visual information.
J Anghileri, M Beishuizen and K Van Putten, 'From	80	not a match	It says the opposite. The formal algorithms result in many

informal strategies to structured procedures: mind the gap!', in 'Educational Studies in Mathematics', Volume 49, 2002, pages 149 to 170;			errors because they are applied mechanistically.
J Woodward, 'Procedural knowledge in mathematics: the role of the curriculum', in 'Journal of Learning Disabilities', Volume 24, Issue 4, 1991.	80	not a match	This was not discussed in the paper.
<u>Mathematics programmes of study: key stages 1 and 2'</u> , Department for Education, September 2013	81	match	the appendix does set out formal methods but does not claim they are most successful
A Clark and P Henderson, ' <u>Improving mathematics in the early years and key stage 1: guidance report</u> ', Education Endowment Foundation, January 2020	82	match	
R Griffiths, J Back and S Gifford, ' <u>Using manipulatives in the foundations of arithmetic: main report</u> ', Nuffield Foundation, February 2017	82	match but...	Use disputed by author - The statement is accurate but the following sentence then distorts it by saying that informal methods can cause problems. This was not supported by their research.
E Schollar, 'The primary mathematics research project: 2004–2012. An evidence-based programme of research into understanding and improving the outcomes of mathematical education in South African primary schools', thesis submitted to the Department of Sociology, University of Cape Town, 2015.	83	not a match	In this thesis 'informal' related to the teaching, not the methods. Most children were using tally marks / counting, which they had been taught to do. There wasn't a large range of informal methods. It wasn't inhibiting understanding later on but right now.
K Gravemeijer, G Bruin-Muurling, J-M Kraemer and I van Stiphout, 'Shortcomings of mathematics education reform in the Netherlands: a paradigm case?', in 'Mathematical Thinking and Learning', Volume 18, Issue 1, 2016, pages 25 to 44;	83	not a match	Disputed by author the warning is not against the informal methods but a lack of understanding on how to build on these
J Anghileri, 'A study of the impact of reform on students' written calculation methods after 5 years' implementation of the National Numeracy Strategy in England', in 'Oxford Review of Education', Volume 32, Issue 3, 2006, pages 363 to 380.	84	not a match	This was not about mixing and matching. The article is only about division 'informal' here is mostly referring to chunking, which is currently in the NC appendix as a formal written method of long division.

J Anghileri, M Beishuizen and K Van Putten, 'From informal strategies to structured procedures: mind the gap!', in 'Educational Studies in Mathematics', Volume 49, 2002, pages 149 to 170;	84	not a match	It does talk about confusing layouts but this was not due to a proliferation of methods. The key recommendation was a structured progression from informal to formal, rather than a replacement.
P Muthukrishnan, MS Kee and GK Sidhu, 'Addition error patterns among the preschool children', in 'International Journal of Instruction', Volume 12, Issue 2, 2019, pages 115 to 132;	84	not a match	nothing about informal methods discussed
JB Rittle-Johnson, M Schneider and J Star, 'Not a one-way street: bidirectional relations between procedural and conceptual knowledge of mathematics', in 'Educational Psychology Review', Volume 27, Issue 4, 2015, pages 587 to 597.	85	partial match	nothing related to the first sentence but it does say that procedural and conceptual knowledge reinforce each other
J-W Son and S Senk, 'How reform curricula in the USA and Korea present multiplication and division of fractions', in 'Educational Studies in Mathematics', Volume 74, Issue 2, 2010, pages 117 to 142.	86	not a match	informal methods not discussed; the focus was on conceptual and procedural understanding and the advantage of doing these together
J Hodgen, C Foster, R Marks and M Brown, ' <u>Evidence for review of mathematics teaching: improving mathematics in key stages 2 and 3: evidence review</u> ', Education Endowment Foundation, 2018.	87	partial match	Disputed by author recommends using representations but does not advocate using fewer
I Jones, C Gilmore and M Inglis, ' <u>Measuring conceptual understanding: the case of teaching with abstract and contextualised representations</u> ', The Nuffield Foundation, October 2016.	88	match	but this was specific for algebra; calculus had different results
MA Gani, KA Tengah and H Said, 'Bar model as intervention in solving word problems involving percentage', in 'International Journal on Emerging Mathematics Education', Volume 3, Issue 1, 2019, pages 69 to 76.	89	match	although it does not mention algebra
FKS Leung, 'A comparison of the intended mathematics curriculum in China, Hong Kong and England and the	90	match	

implementation in Beijing, Hong Kong and London', doctoral thesis, Institute of Education, University of London, 1992.			
T Hodnik Čadež and VM Kolar, 'Comparison of types of generalizations and problem-solving schemas used to solve a mathematical problem', in 'Educational Studies in Mathematics', Volume 89, Issue 2, 2015, pages 283 to 306.	91	match	
AH Schoenfield and DJ Herman, 'Problem perception and knowledge structure in expert and novice mathematical problem solvers', in 'Journal of Experimental Psychology Learning Memory and Cognition', Volume 8, Issue 5, 1982, pages 484 to 494.	92	match	
J Häggerström, 'Teaching systems of linear equations in Sweden and China: what is made possible to learn?', Göteborgs Universitet, 2008.	93	not a match	Not discussed
R Gersten, S Beckmann, B Clarke, A Foegen, L Marsh, JR Star and B Witzel, ' <u>Assisting students struggling with mathematics: response to intervention (RtI) for elementary and middle schools</u> ', Institute of Education Sciences, April 2009;	93	match	
V Simms, C McKeaveney, S Sloan and C Gilmore, ' <u>Interventions to improve mathematical achievement in primary school-aged children</u> ', Nuffield Foundation, June 2019;	93	match	
J Zhang, SK Cheung, C Wu and Y Meng, 'Cognitive and affective correlates of Chinese children's mathematical problem solving', in 'Frontiers in Psychology', Volume 9, Article 2357, 2018.	94	partial match	shows correlation between fluency and word problem solving but doesn't look at methods
National Mathematics Advisory Panel, 'Foundations for success: the final report of the National Mathematics	94	not a match	It did not say that fluency must come before problem solving

Advisory Panel', US Department of Education, 2008;			
SL Decker and AM Roberts, 'Specific cognitive predictors of early math problem solving', in 'Psychology in the Schools', Volume 52, Issue 5, 2015, pages 477 to 488;	94	partial match	basic calculation skills mentioned as a predictor but main study was about cognitive development
J Zhang, SK Cheung, C Wu and Y Meng, 'Cognitive and affective correlates of Chinese children's mathematical problem solving', in 'Frontiers in Psychology', Volume 9, Article 2357, 2018.	95	match	
LS Fuchs, RO Zumeta, R Finelli Schumacher, SR Powell, PM Seethaler, CL Hamlett and D Fuchs, 'The effects of schema-broadening instruction on second graders' word-problem performance and their ability to represent word problems with algebraic equations: a randomized control study', in 'Elementary School Journal', Volume 110, Issue 4, 2010, pages 440 to 463;.	96	match	
Y Bakman, 'Robust understanding of word problems with extraneous information', Tel Aviv University, 2007	96	partial match	Tenuous - this is about creating a computer program to convert word problems into a computer equation
AM Persky and JD Robinson, 'Moving from novice to expertise and its implications for instruction', in 'American Journal of Pharmaceutical Education', Volume 81, Issue 9, 2017, pages 72 to 80.	97	match	The article does say this but only through referencing someone else. They have no evidence of their own.
T Nunes, P Bryant, D Evans, L Gottardis and M-E Terlektsi, 'Teaching mathematical reasoning: probability and problem solving in primary school', University of Oxford, 2015.	98	match	overgeneralised because this was just about teaching probability which was a topic that was not being taught in the primary school
LE Sakshaug and KA Wohlhuter, 'Journey toward teaching mathematics through problem solving', in 'School Science and Mathematics', Volume 110, Issue 8, 2010, pages 397 to 409.	99	not a match	The article is about a CPD course on using problem solving to teach mathematics. It doesn't talk about transferring to different topics although it does say you can have problems related to different topics.
A Zohar and S Aharon-Kravetsky, 'Exploring the effects of cognitive conflict and direct teaching for students of	100	not a match	the article is about two teaching approaches: cognitive conflict and direct instruction; it's not about problem solving



different academic levels', in 'Journal of Research in Science Teaching', Volume 42, Issue 7, 2005, pages 829 to 855;			
J Samuelsson, 'The impact of different teaching methods on students' arithmetic and self-regulated learning skills', in 'Educational Psychology in Practice', Volume 24, Issue 3, 2008, pages 237 to 250.	100	not a match	this was not discussed
A Zohar and S Aharon-Kravetsky, 'Exploring the effects of cognitive conflict and direct teaching for students of different academic levels', in 'Journal of Research in Science Teaching', Volume 42, Issue 7, 2005, pages 829 to 855	101	not a match	this is not discussed; it does talk about low attaining pupils benefiting from direct teaching
J Carson, 'A problem with problem solving: teaching thinking without teaching knowledge', in 'Mathematics Educator', Volume 17, Issue 2, 2007, pages 7 to 14	101	match	Based on what other people have written, no direct evidence
D Rohrer, RF Detric and K Burgess, 'The benefits of interleaved mathematics practice is not limited to superficially similar kinds of problems', in 'Psychonomic Bulletin and Review', Volume 21, Issue 5, 2014, pages 1323 to 1330.	102	match	
National Mathematics Advisory Panel, 'Foundations for success: the final report of the National Mathematics Advisory Panel', US Department of Education, 2008	102	partial match	conceptual and procedural reinforce each other but not 'classes of problems'
J Cai, M Ding and T Wang, 'How do exemplary Chinese and U.S. mathematics teachers view instructional coherence?', in 'Educational Studies in Mathematics', Volume 85, Issue 2, 2014, pages 265 to 280.	103	match	
X Chen and Y Li, 'Instructional coherence in Chinese mathematics classroom – a case study of lessons on fraction division', in 'International Journal of Science and Mathematics Education', Volume 8, Issue 4, 2010, page 711 to 735	103	match	

X Yang, 'What constitutes good mathematics teaching in mainland China: perspectives from 9 junior middle school teachers', in 'Journal of Mathematics Education', Volume 5, Issue 1, 2012, pages 77 to 96.	103	match	
X Li, L Chi, M DeBey and AJ Baroody, 'A study of early childhood mathematics teaching in the United States and China', in 'Early Education and Development', Volume 26, Issue 3, 2015, pages 450 to 478.	104	partial match	description of practice in successful countries is not a cause and effect towards becoming proficient
BK Martens and JC Witt, 'Competence, persistence, and success: the positive psychology of behavioral skill instruction', in 'Psychology in the Schools', Volume 41, Issue 1, 2004, pages 19 to 30.	105	not a match	nothing about choices for future progression/later chances of success; rejects discovery-based learning rather than own progression through curriculum
JL Booth, KN Begolli and N McCann, 'The effect of worked examples on student learning and error anticipation in algebra', in 'Conference Papers – Psychology of Mathematics and Education of North America', 2016, pages 551 to 556.	106	match	
T Gog, L Kester, K Dirx, V Hoogerheide, J Boerboom and PPJL Verkoeijen, 'Testing after worked example study does not enhance delayed problem-solving performance compared to restudy', in 'Educational Psychology Review', Volume 27, Issue 2, 2015, pages 265 to 289;	106	match	This could have been used to discuss retrieval.
D Rohrer, RF Dedrick and K Burgess, 'The benefits of interleaved mathematics practice is not limited to superficially similar kinds of problems', in 'Psychonomic Bulletin and Review', Volume 21, Issue 5, 2014, pages 1323 to 1330.	107	match	
'The trends in international mathematics and science study – instructional time spent on mathematics', International Association for the Evaluation of Educational Achievement, 2015.	108	not a match	the top countries did not have the highest instruction times
AJ Fuligni and H Stevenson, 'Time use and mathematics	108	match	to the final sentence only

achievement among American, Chinese, and Japanese high school students', in 'Child Development', Volume 66, Issue 3, 1995, pages 830 to 884;			
FKS Leung, 'A comparison of the intended mathematics curriculum in China, Hong Kong and England and the implementation in Beijing, Hong Kong and London', doctoral thesis, Institute of Education, University of London, 1992;	108	not a match	"off-task" was mostly about the teacher being late or doing things other than teaching maths, like taking the register; not related to core knowledge etc.
'GCSE (full Course) results summer 2019', Joint Council for Qualifications, August 2019.	109	not a match	Couldn't find any information about resits in the table.
M Boylan, B Maxwell, C Wolstenholme, T Jay and S Demack, 'The mathematics teacher exchange and "mastery" in England: the evidence for the efficacy of component practices', in 'Education Sciences', Volume 8, Issue 4, 2018, pages 1 to 31.	110	partial match	Disputed by author They pointed out that there is intervention.
IVS Mullis, MO Martin, P Foy, DL Kelly and B Fishbein, ' <u>TIMSS 2019 international results in mathematics</u> ', TIMSS and PIRLS International Study Center, 2020.	111	match	for Grade 8 (which was not specified) - the Grade 4 results were improved for England
C Binder and C L Watkins, 'Precision teaching and direct instruction: measurably superior instructional technology in schools', in 'Performance Improvement Quarterly', Volume 26, Issue 2, 2013, pages 73 to 115; reprinted from Performance Improvement Quarterly, 3(4), 1990, pp. 74-96. doi: 10.1111/j.1937-8327.1990.tb00478.x	112	not a match	This is not about methods of teaching in Singapore, who do not use the specific methods of PT or DI described in the paper.
X Chen and Y Li, 'Instructional coherence in Chinese mathematics classroom – a case study of lessons on fraction division', in 'International Journal of Science and Mathematics Education', Volume 8, Issue 4, 2010, page 711 to 735	112	partial match	Overgeneralised because 1 teacher in China does not demonstrate the success of East Asia generally; the placement of the sentence makes it appear that the reference relates to Singapore but Singapore has a different approach to China; also it talks about practice but not intelligent practice
SP Miller and PJ Hudson, 'Using evidence-based	113	partial	The article emphasises conceptual knowledge must be

practices to build mathematics competence related to conceptual, procedural, and declarative knowledge', in 'Learning Disabilities Research & Practice', Volume 22, Issue 1, 2007, pages 47 to 57		match	developed alongside declarative & procedural knowledge.
JB Hale, CA Fiorello, R Dumont, JO Willis, C Rackley and C Elliott, 'Differential ability scales – second edition (neuro)psychological predictors of math performance for typical children and children with math Disabilities', in 'Psychology in the Schools', Volume 45, Issue 9, 2008, pages 838 to 858	113	partial match	test result analysis shows a variety of cognitive skills link with achievement, so students with MLD have remedial needs in a variety of predictable areas, not that they particularly benefit from explicit instruction and rehearsal
R Gersten, S Beckmann, B Clarke, A Foegen, L Marsh, JR Star and B Witzel, ' <u>Assisting students struggling with mathematics: response to intervention (RtI) for elementary and middle schools</u> ', Institute of Education Sciences, April 2009.	113	match	pupils with SEND not mentioned specifically but the whole report was in the context of interventions
P Peng and RA Kievet, 'The development of academic achievement and cognitive abilities: a bidirectional perspective', in 'Child Development Perspectives', Volume 14, Issue 1, 2020, pages 15 to 20	114	match	but weaker for pupils with SEND (and this is a section on SEND)
C Binder and C L Watkins, 'Precision teaching and direct instruction: measurably superior instructional technology in schools', in 'Performance Improvement Quarterly', Volume 26, Issue 2, 2013, pages 73 to 115. reprinted from Performance Improvement Quarterly, 3(4), 1990, pp. 74–96. doi: 10.1111/j.1937-8327.1990.tb00478.x	115	partial match	The Binder and Watkins paper is about two highly formulated teaching programmes: Precision Teaching and Direct Instruction (as defined by Englemann & Carnine) so cannot be used to generalise about systematic teaching and rehearsal without their other ingredients. However, this paper could be used as evidence that <b>some systematic methods</b> can help pupils learn planned content.
DC Geary, MK Hoard, J Byrd-Craven, L Nugent and C Numtee, 'Cognitive mechanisms underlying achievement deficits in children with mathematical learning disability', in 'Child Development', Volume 78, Issue 4, 2007, pages 1343 to 1359.	116	not a match	no discussion about teaching approaches at all
DT Kenny, 'Direct instruction: an overview of theory and practice', in 'Journal of the Association of Special	117	match	

Education Teachers (Special)', 1980, Volume 15, pages 1 to 6.			
M Santos, A Breda and A Almeida, 'Design approach of mathematics learning activities in a digital environment for children with autism spectrum disorders', in 'Educational Technology Research and Development', Volume 65, Issue 5, 2017, pages 1305 to 1323.	118	match	
M Ullman and M Pullman, ' <u>Powerful memory system may compensate for autism's deficits</u> ', Spectrum, March 2015.	119	match	but does not mention mathematics
T Iuculano, M Rosenberg-Lee, K Supekar, CJ Lynch, A Khouzam, J Phillips, LQ Uddin and V Menon, 'Brain organization underlying superior mathematical abilities in children with autism', in 'Biological Psychiatry', Volume 75, Issue 3, 2014, pages 223 to 230;	119	match	
CT Cross, TA Woods and H Schweingruber, 'Mathematics learning in early childhood: paths toward excellence and equity', The National Academies Press, 2009.	120	partial match	The report recommends a <i>mixture</i> of integrated learning through play, games, exploration, stories, creative activities together with planned & sequenced teaching and practice of number, spatial and measurement concepts and skills. It does not say 'daily' formal teaching.
A Presser, M Clements, H Ginsburg and B Ertle, 'Effects of a preschool and kindergarten mathematics curriculum: big math for little kids', Centre for Children and Technology, 2012, page 402.	121	partial match	The planned approach they used to reach this conclusion was designed to help teachers use 'play-based, developmentally appropriate mathematics instruction'. The Ofsted review does not mention the integrated and play-based nature of the work referred to in the citations 120, 121.
T Kim and S Axelrod, 'Direct instruction: an educators' guide and a plea for action', in 'Behavior Analyst Today', Volume 6, Issue 2, 2005, pages 111 to 120.	122	match	recommends Direct Instruction with scripted lessons to close the gap
DH Clements and J Sarama, 'Experimental evaluation of the effects of a research-based preschool mathematics	122	partial match	Disputed by author The statement superficially matches their work BUT they

curriculum', in 'American Educational Research Journal', Volume 45, Issue 2, 2008, pages 443 to 494;			worry that the report is equating their 'systematic' with a Direct Instruction approach. The author's concern is supported by the use of the other source in 122 promoting DI.
C Binder and CL Watkins, 'Precision teaching and direct instruction: measurably superior instructional technology in schools', in 'Performance Improvement Quarterly', Volume 26, Issue 2, 2013, pages 73 to 115. reprinted from Performance Improvement Quarterly, 3(4), 1990, pp. 74–96. doi: 10.1111/j.1937-8327.1990.tb00478.x	123	partial match	Over-generalisation The paper only draws on the specific details of programmes: PT and DI (as described by Englemann & Carnine) rather than explicit and systematic teaching in general. There is no reference to self-esteem; increased self-concept is an outcome of DI. PT provides regular measures of 'feeling good' but no implication that this is better than other pedagogies.
A Kullberg, U Runesson Kempe and F Marton, 'What is made possible to learn when using the variation theory of learning in teaching mathematics?', in 'ZDM', Volume 49, Issue 4, 2017, pages 559 to 569;	124	partial match	Paper is about different aspects of learning <i>concepts</i>
J Woodward, 'Procedural knowledge in mathematics: the role of the curriculum', in 'Journal of Learning Disabilities', Volume 24, Issue 4, 1991, pages 242 to 251 .	124	partial match	The article talks about the importance of having varied examples so that misconceptions are not created. e.g. fractions have to be less than 1 because all fractions shown as less than 1 (supports first two bullet points) but it doesn't really discuss 'connections between varying problems' (3 <sup>rd</sup> bullet point)
X Sun, "'Variation problems" and their roles in the topic of fraction division in Chinese mathematics textbook examples', in 'Educational Studies in Mathematics', Volume 76, Issue 1, 2011, pages 65 to 85;	124	partial match	The paper refers to the conceptual presentation in Chinese textbooks.
CS Lim, 'Characteristics of mathematics teaching in Shanghai, China: through the lens of a Malaysian', in 'Mathematics Education Research Journal', Volume 19, Issue 1, 2007, pages 77 to 88.	125	match	
CS Lim, 'Characteristics of mathematics teaching in Shanghai, China: through the lens of a Malaysian', in 'Mathematics Education Research Journal', Volume 19, Issue 1, 2007, pages 77 to 88;	126	match	

J Häggerström, 'Teaching systems of linear equations in Sweden and China: what is made possible to learn?', Göteborgs Universitet, 2008	126	match	
B Burge, J Lenkeit and J Sizmur, ' <u>PISA in practice: cognitive activation in maths</u> ', National Foundation for Educational Research, September 2015.	127	match	The statement is quite vague
Q Cheng, 'Quality mathematics instructional practices contributing to student achievements in 5 high-achieving Asian education systems: an analysis using TIMSS 2011 data', in 'Frontiers of Education in China', Volume 9, Issue 4, 2014, pages 493 to 518;	127	match	The statement is quite vague
B Burge, J Lenkeit and J Sizmur, ' <u>PISA in practice: cognitive activation in maths</u> ', National Foundation for Educational Research, September 2015.	128	not a match	the PISA paper points to correlation between cognitive activation* (such as posing non-routine problems for which no solution is obvious) and higher achievement and that it should be a component of mathematics teaching along with other components <i>*corrected from 'acceleration' in version sent to Ofsted</i>
JS Cain, 'An evaluation of the connected mathematics project', in 'Journal of Educational Research', Volume 95, Issue 4, 2002, pages 224 to 233.	129	partial match	in many CMP tasks problems are closed, i.e. there is a final correct answer.
J Jeffes, E Jones, M Wilson, E Lamont, S Straw, R Wheater and A Dawson, 'Research into the impact of Project Maths on student achievement, learning and motivation', National Foundation for Educational Research, 2013	130	not a match	It says students are not being given enough open-ended problems.
RE Slavin and C Lake, 'Effective programs in elementary mathematics: a best-evidence synthesis', in 'Review of Educational Research', Volume 78, Issue 3, 2018, pages 427 to 515.	130	match	
Y Ni, Q Li, X Li and J Zou, 'Influence of curriculum reform: an analysis of student mathematics achievement in China', in 'International Journal of Educational	130	not a match	This research study found open-ended problem solving did lead to good results. p.112 "Also, the reform group students kept their initial

Research', Volume 50, Issue 2, 2011, pages 100 to 116			advantage in solving open-ended problems as they performed better than the non-reform group on the first assessment and the growth rates for the two groups were similar. " p.113 "There was no evidence to support the claim that the new curriculum is weakening the students' proficiency in the basic mathematics skills and not benefiting their competence in solving mathematics problems, particularly non-routine problems."
C Lloyd, T Edovald, S Morris, Z Kiss, A Skipp and S Haywood, 'Durham shared maths project evaluation report and executive summary', NatCen Social Research and Education Endowment Foundation, July 2015.	131	match	
J Wittwer and A Renkl, 'How effective are instructional explanations in example-based learning? A meta-analytic review', in 'Educational Psychology Review', Volume 22, Issue 4, 2010, pages 393 to 409;	132	partial match:	Self-explaining emerges as an effective component compared to teacher explanations. More teacher explanation did not result in better learning.
JL Booth, KN Begolli and N McCann, 'The effect of worked examples on student learning and error anticipation in algebra', in 'Conference Papers – Psychology of Mathematics and Education of North America', 2016, pages 551 to 556;	132	partial match	their study is about studying worked examples with self-explanation prompts.
JR Star, P Caronongan, AM Foegen, J Furgeson, B Keating, MR Larson, J Lyskawa, WG McCallum, J Porath and RM Zbiek, 'Teaching strategies for improving algebra knowledge in middle and high school students', National Centre for Educational Evaluation and Regional Assistance, April 2015.	132	partial match	This is one of three recommendations. Why select this one only?
E Ziegler, PA Edelsbrunner and E Stern, 'The relative merits of explicit and implicit learning of contrasted algebra principles', in 'Educational Psychology Review', Volume 30, Issue 2, 2018, pages 531 to 558.	133	not a match	Possible contradiction if this is interpreted to mean 'teacher explanation'. The papers in footnote 132 all find that self-explanation is an important component of learning with worked examples. This paper is about the advantages of 'explicit', i.e. learners verbalising their understanding of contrasting examples and the different advantages of



			'implicit', i.e. not verbalising explicitly but instead generating their own examples.
M Shahrill, 'Review of effective teacher questioning in mathematics classrooms', in 'International Journal of Humanities and Social Science', Volume 3, Issue 17, 2013, pages 224 to 231.	134	match	
J Woodward, S Beckmann, M Driscoll, M Franke, P Herzig, A Jitendra, KR Koedinger and P Ogbuehi, ' <u>Improving mathematical problem solving in grades 4 through 8</u> ', Institute of Education Sciences, October 2018;	135	match	
R Gersten, S Beckmann, B Clarke, A Foegen, L Marsh, JR Star and B Witzel, ' <u>Assisting students struggling with mathematics: response to intervention (RtI) for elementary and middle schools</u> ', Institute of Education Sciences, April 2009.	135	match	
V Simms, C McKeaveney, S Sloan and C Gilmore, ' <u>Interventions to improve mathematical achievement in primary school-aged children</u> ', Nuffield Foundation, June 2019;	135	partial match	promotes visual representations but doesn't talk about converting to symbolic equations
CS Lim, 'Characteristics of mathematics teaching in Shanghai, China: through the lens of a Malaysian', in 'Mathematics Education Research Journal', Volume 19, Issue 1, 2007, pages 77 to 88	136	not a match	Classroom behaviour is described but there is no causal link made between teaching methods, success and learning behaviour. Though it is unclear whether "learning behaviour" refers to engagement, effort, compliance with classroom expectations, cognitive performance or...
E Gallagher, R Bones and J Lombe, 'Precision teaching and education: is fluency the missing link between success and failure?', in 'Irish Educational Studies', Volume 25, Issue 1, 2006, pages 93 to 105	136	match	but the link is to fluency per se rather than 'systematic instruction'. Note that the paper is about PT which is a very specific form of teaching.
P Peng and RA Kievet, 'The development of academic achievement and cognitive abilities: a bidirectional perspective', in 'Child Development Perspectives',	136	match	On the assumption that executive function is being used synonymously with learning behaviours

Volume 14, Issue 1, 2020, pages 15 to 20.			
S Groves, 'Developing mathematical proficiency', in 'Journal of Science and Mathematics Education in Southeast Asia', Volume 35, Issue 2, 2012, pages 119 to 145.	137	partial match	She does indeed say this but it is in the context of the five strands of proficiency described in Kilpatrick et al 'Adding it up'. These five strands are not discussed in the Ofsted Review.
C Binder, 'Behavioural fluency: evolution of a new paradigm', in 'The Behaviour Analyst', Volume 19, Issue 2, 1993, pages 163 to 197.	138	match	worded differently but emphasise the importance of practice for fluency
DB Crawford, 'Mastering maths facts: research and results', Otter Creek Institute, 2003;	139	not a match	it didn't discuss time taken to learn relating to age or ability; the focus was on learning a few facts at a time using their scheme
MK Burns, J Ysseldyke, PM Nelson and R Kanive, 'Number of repetitions required to retain single-digit multiplication math facts for elementary students', in 'School Psychology Quarterly', Volume 30, Issue 3, 2015, pages 398 to 405.	139	match	Note that they warn against assuming their large sample results apply to smaller subgroups.
C Binder and CL Watkins, 'Precision teaching and direct instruction: measurably superior instructional technology in schools', in 'Performance Improvement Quarterly', Volume 26, Issue 2, 2013, pages 73 to 115.	140	not a match	This paper mentions practice twice and says nothing about failure of recall. They say "Precision Teachers do not hesitate to experiment with a variety of different teaching methods and practice strategies." There seems to be a misunderstanding about what the term Direct Instruction implies.
S Maughan, J Smith, T Mitchell, N Horrocks and A Taylor, ' <u>Improving level 2 English and maths outcomes for 16 to 18 year olds</u> ', Education Endowment Foundation, July 2016	140	not a match	This paper addresses multiple ways of teaching at Level 2, i.e. vocational context, resit strategies etc. and doesn't mention recall or practice.
S Rutt, C Easton and O Stacey, 'Catch up numeracy: evaluation report and executive summary', National Foundation for Educational Research, 2014	140	not a match	If anything, the evaluation shows that one-to-one tuition can help pupils 'catch up'. Recall and practice are not mentioned, nor suggested as a form of catch up teaching.
R Siegler, T Carpenter, F Fennell, D Geary, J Lewis, Y Okamoto, L Thompson and J Wray, ' <u>Developing effective</u>	141	not a match	Could not find anything about pupils needing more practice rather than repeated teaching. There are many suggestions

<u>fractions instruction for kindergarten through 8th grade: review of recommendations</u> , September 2010.			for addressing misconceptions but these all involve teaching not practice.
IVS Mullis, MO Martin, P Foy and M Hooper, ' <u>TIMSS 2015 international results in mathematics</u> ', TIMSS and PIRLS International Study Center, 2015.	142	not a match	Japan and Korea were some of the lowest for homework, slightly above England which was bottom
HW Stevenson and JW Stigler, 'The learning gap', Simon and Schuster, 1992, page 141.	143	match	
' <u>Achievement of 15 year olds in England: PISA 2015 National Report</u> ', Department for Education and UCL Institute of Education, December 2016.	144	match	
IVS Mullis, MO Martin, P Foy and M Hooper, ' <u>TIMSS 2015 international results in mathematics</u> ', TIMSS and PIRLS International Study Center, 2015;	144	not a match	England is at the bottom of the homework list so does do less than the high performers BUT also does less than the lower performers. The percentages given for England are nearly identical to Japan's (a high performer).
KH Mayfield and PN Chase, 'The effects of cumulative practice on mathematics problem solving', in 'Journal of Applied Behaviour Analysis', Volume 35, Issue 2, 2002, pages 105 to 123.	145	not a match	In the study those who had 50 cumulative practice questions in algebra outperformed those who had 50 similar questions and also those who had 50 extra similar questions on novel problems. Cumulative means that students get a mixture of different questions that relate to a conceptual progression. This is not about automaticity at all. (It also assumes too much about uniformity of activities during the numeracy hour.)
National Mathematics Advisory Panel, 'Foundations for success: the final report of the National Mathematics Advisory Panel', US Department of Education, 2008;	145	match	
M Brown, M Askew and A Millett, 'How has the national numeracy strategy affected attainment and teaching in year 4?', in 'Proceedings of the British society for research into learning mathematics', edited by J Williams, Volume 23, Issue 2, 2003, pages 13 to 19.	146	not a match	The differences of teaching observed were an increase in eliciting pupils' explanations of methods, plus using three-part lessons, plus provision of Professional Development. (n.b. the lesson plans provided did not specify practice)
S Meadows, D Herrick and M Witt, 'Improvement in	146	partial	There was small significant improvement in attainment but

national test arithmetic scores at key stage 1: grade inflation or better achievement?', in 'British Educational Research Journal', Volume 34, Issue 4, 2008, pages 491 to 503;		match	there is no evidence that this was due to 'extra rehearsal' rather than other features of the Numeracy Strategy, e.g. more dedicated maths time, more teacher-led sessions etc.
T Szalontai, 'Some facts and tendencies in Hungarian mathematics teaching', Institute of Mathematics and Informatics, 2000.	147	match	This is an opinion piece assuming that cuts in class time have led to reduced attainment. Typical components of mathematics teaching that are therefore all cut are: 'report, reasoning, debating, feedback, self-correction, clear mathematical language, frequent mental calculation ...' and several others.
J-W Son and S Senk, 'How reform curricula in the USA and Korea present multiplication and division of fractions', in 'Educational Studies in Mathematics', Volume 74, Issue 2, 2010, pages 117 to 142.	148	match	
C Binder and CL Watkins, 'Precision teaching and direct instruction: measurably superior instructional technology in schools', in 'Performance Improvement Quarterly', Volume 26, Issue 2, 2013, pages 73 to 115; reprinted from Performance Improvement Quarterly, 3(4), 1990, pp. 74–96. doi: 10.1111/j.1937-8327.1990.tb00478.x	149	not a match	The evidence in this paper does not point to this, but instead points to teaching targeted to particular pupils who need particular extra or different input. It does not mention overlearning.
C Binder, 'Behavioural fluency: evolution of a new paradigm', in 'The Behaviour Analyst', Volume 19, Issue 2, 1993, pages 163 to 197.	149	match	Readers may need a definition of 'overlearning' which is practice beyond mastery.
BK Martens and JC Witt, 'Competence, persistence, and success: the positive psychology of behavioral skill instruction', in 'Psychology in the Schools', Volume 41, Issue 1, 2004, pages 19 to 30.	150	match	although overlearning not really discussed
M Brown and M Askew, 'Is the national numeracy strategy research-based?', in 'British Journal of Educational Studies', Volume 46, Issue 4, 1998, page 362–385, quote at page 368.	151	not a match	Disputed by author This is misleading because the statement was not from Brown et al but from Bierhoff (1996). Brown et al went on to say at the end of the paragraph that Beirhoff's argument was not

Baker, Denvir & Millett missing from list of authors			convincing.
BR Bryant, D Pedrotty Bryant, C Kethley, SA Kim, C Pool and Y-J Seo, 'Preventing mathematics difficulties in the primary grades: the critical features of instruction in textbooks as part of the equation', in 'Learning Disability Quarterly', Volume 31, Issue 1, 2008, pages 21 to 35.	152	partial match	it talked about the importance of textbooks in influencing teaching approaches and that children with maths learning disabilities needed particular approaches
T Oates, 'Why textbooks count', Cambridge Assessment, 2014.	153	match	This is based on a survey in 2011 but has the situation changed since the introduction (and funding) of DfE approved mathematics textbooks based on East Asian textbooks?
B Kaur, 'Mathematics homework: a study of 3 grade 8 classrooms in Singapore', in 'International Journal of Science and Mathematics Education', Volume 9, Issue 1, 2011, pages 187 to 206.	154	not a match	It only talks about textbooks in terms of setting homework tasks.
D Hong and K Choi, 'A comparison of Korean and American secondary school textbooks: the case of quadratic equations', in 'Educational Studies in Mathematics', Volume 85, Issue 2, 2014, pages 241 to 263;	154	partial match	Tenuous. The article was comparing Korea and USA but didn't find differences that would account for different TIMSS / PISA results.
K Bellens, W Van den Noortgate and J Van Damme, 'The informed choice: mathematics textbook assessment in light of educational freedom, effectiveness, and improvement in primary education', in 'School Effectiveness and School Improvement', Volume 31, Issue 2, 2020, pages 192 to 211.	155	not a match	It was evaluating textbooks and found that different textbooks had different impact on low attaining students.
B Kaur, 'Mathematics homework: a study of 3 grade 8 classrooms in Singapore', in 'International Journal of Science and Mathematics Education', Volume 9, Issue 1, 2011, pages 187 to 206;	156	partial match	not related to needing to concentrate to complete the homework
M Boylan, B Maxwell, C Wolstenholme, T Jay and S Demack, 'The mathematics teacher exchange and "mastery" in England: the evidence for the efficacy of component practices', in 'Education Sciences', Volume	156	not a match	Disputed by author - only one mention of homework and it didn't match this

8, Issue 4, 2018, pages 1 to 31.			
LJ Matić and DG Gracin, 'The mathematics textbook in the hands of lower secondary students: how, when and why they use it', in 'Croatian Journal Educational/Hrvatski Casopis za Odgoj I Obrazovanje', Volume 22, Issue 1, 2020, pages 9 to 40.	157	not a match	The article did not talk about checking progress.
D Frye, AJ Baroody, M Burchinal, SM Carver, NC Jordan and J McDowell, 'Teaching math to young children: a practice guide', Institute of Education Sciences, 2013	158	match	
J Van Herwegen and C Donlan, ' <u>Improving preschoolers' number foundations</u> ', Nuffield Foundation, May 2018;	158	match	for games
S Turgut and ÖD Temur, 'The effect of game-assisted mathematics education on academic achievement in Turkey: a meta-analysis study', in 'International Electronic Journal of Elementary Education', Volume 10, Issue 2, 2017, pages 195 to 206.	158	match	for games use only
J Worth, J Sizmur, R Ager and B Styles, ' <u>Improving numeracy and literacy: evaluation report and executive summary</u> ', National Foundation for Educational Research, June 2015, page 13;	159	match	computer games used for practice
ST Stacy, M Cartwright, Z Arwood, JP Canfield and H Kloos, 'Addressing the math-practice gap in elementary school: are tablets a feasible tool for informal math practice?', in 'Frontiers in Psychology', Volume 8, Article 179, 2017, pages 1 to 12.	159	match	
S Vandercruyssen, J ter Vrugte, T de Jong, P Wouters, H van Oostendorp, L Verschaffel and J Elen, 'Content integration as a factor in math-game effectiveness', in 'Educational Technology Research and Development', Volume 65, Issue 5, 2017, pages 1345 to 1368.	160	match	

MK Burns, R Kanive and M DeGrande, 'Effect of a computer-delivered math fact intervention as a supplemental intervention for math in third and fourth grades', in 'Remedial and Special Education', Volume 33, Issue 3, 2012, pages 184 to 191;	161	match	
TS Hasselbring, LI Goin and JD Bransford, 'Developing math automaticity in learning handicapped children: the role of computerized drill and practice', in 'Focus on Exceptional Children', Volume 20, Issue 6, 1988, pages 1 to 7.	161	match	But it only worked once pupils had declarative knowledge rather than counting strategies for addition facts It is strange to use a source that is from 1988 for a point about computer use give the rapid changes in technology.
BH See, R Morris, S Gorard and N Siddiqui, 'Evaluation of the impact of Maths Counts delivered by teaching assistants on primary school pupils' attainment in maths', in 'Educational Research and Evaluation', Volume 25, Issues 3 and 4, 2019, pages 203 to 224.	162	not a match	Children did not use computers in this intervention.
T Nunes, L-E Malmberg, D Evans, D Sanders-Ellis, S Baker, R Barros, P Bryant and M Evangelou, ' <u>Onebillion: evaluation report</u> ', University of Oxford and Education Endowment Foundation, July 2019;	162	match	
C Calderón-Tena and L Caterino, 'Mathematics learning development: the role of long-term retrieval', in 'International Journal of Science and Mathematics Education', Volume 14, Issue 7, 2016, pages 1377 to 1385.	163	partial match	It was talking about interventions for students with learning difficulties not whole class lessons
J Hodgen, MJ Adkins, S Ainsworth and S Evans, 'Catch up <sup>®</sup> numeracy: evaluation report and executive summary', National Foundation for Educational Research, 2019;	164	not a match	Disputed by author The evaluation did not examine whether learners should plan or make choices. However, the EEF review (Hodgen et al., 2019) did find that there is some evidence to indicate that, in algebra making choices is beneficial: "Choosing, comparing and evaluating different strategies can develop learners' procedural fluency and conceptual understanding' (p.121).
MC Brown, NM McNeil and AM Glenburg, 'Using concreteness in education: real problems, potential	164	partial match	It warns that this can happen but much of the article was about how to avoid this.

solutions', in 'Child Development Perspectives', Volume 3, Issue 3, 2009, pages 160 to 164.			
KHM Lee and EN Wassel, 'How can we make one step forward in curing a sick giant elephant – the current elementary mathematics education in the United States?', in 'National Teacher Education Journal', Volume 5, Issue 4, 2012, pages 5 to 8.	165	match	Not sure why this comparison is relevant for UK rather than using split attention theory and theories about familiarity, such as are referred to in footnote 178 which would be relevant.
D Gilbertson, G Duhon, JC Witt and B Dufrene, 'Effects of academic response rates on time-on-task in the classroom for students at academic and behavioral risk', in 'Education and Treatment of Children', Volume 31, Issue 2, 2008, pages 153 to 165.	166	partial match	The children were more off-task with questions that had been established already as 'frustration' level. Also, it is inappropriate to generalise from a study of 4 children.
P Peng and RA Kievet, 'The development of academic achievement and cognitive abilities: a bidirectional perspective', in 'Child Development Perspectives', Volume 14, Issue 1, 2020, pages 15 to 20.	167	not a match	This was not discussed.
M Chiesa and A Robertson, 'Precision teaching and fluency training: making maths easier for pupils and teachers', in 'Educational Psychology in Practice', Volume 16, Issue 3, 2000, pages 297 to 310;	168	partial match	It talks about component parts and that the first step is analysis of these. "Component/Composite Analysis Virtually every task we undertake requires the performance of several different behaviours at once. Thus, any task can be described as a composite and broken down into its prerequisite series of components. ... In an effort to strengthen a composite skill through fluency training, an analysis of its prerequisites (its components) is a crucial first step." Doesn't talk about conditions of use.
M Wong and D Evans, 'Improving basic multiplication fact recall for primary school students', in 'Mathematics Education Research Journal', Volume 19, Issue 1, 2007, pages 89 to 106.	168	not a match	Research shows practising times tables results in better times table test results, not that the components contribute to the composite
JP Makonye and K Luneta, 'Mathematical errors in differential calculus tasks in the Senior School Certificate	169	match	



Examinations in South Africa', in 'Education as Change', Volume 18, Issue 1, 2014, pages 119 to 136.			
K Stacey and M MacGregor, 'Learning the algebraic method of solving problems', in 'The Journal of Mathematical Behavior', Volume 18, Issue 2, 1999, pages 149 to 167.	170	match	Use disputed by author The actual statement matches but the wider context does not.
JP Makonye and K Luneta, 'Mathematical errors in differential calculus tasks in the Senior School Certificate Examinations in South Africa', in 'Education as Change', Volume 18, Issue 1, 2014, pages 119 to 136.	171	match	
CS Lim, 'Characteristics of mathematics teaching in Shanghai, China: through the lens of a Malaysian', in 'Mathematics Education Research Journal', Volume 19, Issue 1, 2007, pages 77 to 88.	172	match	
KL Anderson, 'Voicing concern about noisy classrooms', in 'Educational Leadership', Volume 58, Issue 7, 2001, pages 77 to 79.	173	match	The main focus of this article is not about controlling chitchat but pleading for better acoustic control in the design of educational buildings to prevent external noises, such as airplanes, disrupting classes
JE Dockrell and BM Shield, 'Acoustical barriers in classrooms: the impact of noise on performance in the classroom', in 'British Educational Research Journal', Volume 32, Issue 3, 2006, pages 509 to 525;	174	not a match	for most conditions the babble + environment condition had the highest scores
SD Sparks, 'In class, soft noises found to distract', in 'Education Week', Volume 34, Issue 15, 2015, pages 1 to 16.	174	not a match	discussed a range of studies that showed there isn't a simple answer
B Kramarski and ZR Mevarech, 'Enhancing mathematical reasoning in the classroom: the effects of cooperative learning and metacognitive training', in 'American Educational Research Journal', Volume 40, Issue 1, 2003, pages 281 to 310.	175	partial match	Group work can help with explanations when supported by metacognitive training - not by being tightly managed
R Slavin, M Sheard, P Hanley, L Elliott and B Chambers,	176	match	although report states that outcome is surprising and cites

'Effects of cooperative learning and embedded multimedia on mathematics learning in key stage 2: final report', University of York, 2013.			research that conflicts
KJ Carbonneau, SC Marley and JP Selig, 'A meta-analysis of the efficacy of teaching mathematics with concrete manipulatives', in 'Journal of Educational Psychology', Volume 105, Issue 2, 2013, pages 380 to 400.	177	partial match	nothing is said in the meta-analysis about how the manipulatives were used, only that in the vast majority of RCT studies use of manipulatives improved performance, retention and transfer and, according to this paper, the use of manipulatives does far more than 'reveal useful information', e.g. use of manipulatives enhances learning through dual-processing verbal and visual impacts. Nothing is said in this paper about outsourcing memory.
L Moscardini, 'Tools or crutches: apparatus as a sense-making aid in mathematics teaching with children with moderate learning difficulties', in 'Support for Learning', Volume 24, Issue 1, 2009, pages 35 to 41;	178	match	Reliance on them can inhibit progression but not if they are used to make sense of the mathematics and attention is paid to the symbolic representations that are the goal of the endeavour.
LA Petersen and NM McNeil, 'Effects of perceptually rich manipulatives on preschoolers' counting performance: established knowledge counts', in 'Child Development', Volume 84, Issue 3, 2013, pages 1020 to 1033.	178	not a match	Manipulatives were found to aid understanding. Some which were too 'perceptually rich' were found to be distracting in some cases.
C Calderón-Tena and L Caterino, 'Mathematics learning development: the role of long-term retrieval', in 'International Journal of Science and Mathematics Education', Volume 14, Issue 7, 2016, pages 1377 to 1385.	179	not a match	The paper recommends interventions including focusing on commutativity, associativity, distributivity and derivation of facts will improve LTM for facts and problem solving procedures, and other characteristics also come into play when solving applied problems.
AP Lawson, A Mirinjian and JY Son, 'Can preventing calculations help students learn math?', in 'Journal of Cognitive Education and Psychology', Volume 18, Issue 2, 2018, pages 178 to 197.	180	not a match	This paper is about the advantages of preventing calculation by using symbols so that pupils engage with the structure of the problem rather than rush to calculate, perhaps choosing the wrong calculation.
SR Powell, LS Fuchs, PT Cirino, D Fuchs, DL Compton and PC Changas, 'Effects of a multitier support system on calculation, word problem, and prealgebraic performance among at-risk learners', in 'Exceptional Children', Volume 81, Issue 4, 2015, pages 443 to 470;	180	not a match	Even the abstract indicates it is not a match "Multilevel modelling indicated that calculation RTI improved calculation but not word problem outcomes, word problem RTI enhanced proximal word problem outcomes as well as performance on some calculation outcomes, and word

			problem RTI provided a stronger route than calculation RTI to pre-algebraic knowledge.” In other words, extra tutoring in calculations does not enhance word problem outcomes.
J-W Son and S Senk, ‘How reform curricula in the USA and Korea present multiplication and division of fractions’, in ‘Educational Studies in Mathematics’, Volume 74, Issue 2, 2010, pages 117 to 142.	181	match	
‘Student assessment: putting the learner at the centre’, in ‘Synergies for better learning: an international perspective on evaluation and assessment’, OECD Publishing, 2013.	182	match	
A Noyes and P Sealey, ‘Managing learning trajectories: the case of 14–19 mathematics’, in ‘Educational Review’, Volume 63, Issue 2, 2011, pages 179 to 193.	183	partial match	some of the heads of maths interviewed acted as if they believed it, i.e. used exam grades as preparation and passport onto A-level courses Note - this is before the current post-16 pathways.
J Higton, R Archer, D Dalby, S Robinson, G Birkin, A Stutz, R Smith and V Duckworth, <u>‘Effective practice in the delivery and teaching of English and mathematics to 16–18 year olds’</u> , Department for Education, November 2017.	184	match	
B Cooper and M Dunne, ‘Anyone for tennis? Social class differences in children’s responses to national curriculum mathematics testing’, in ‘Sociological Review’, Volume 46, Issue 1, 1998, pages 115 to 149.	185	not a match	it is not about language and not about a lack of proficiency
M Chiesa and A Robertson, ‘Precision teaching and fluency training: making maths easier for pupils and teachers’, in ‘Educational Psychology in Practice’, Volume 16, Issue 3, 2000, pages 297 to 310.	186	not a match	overgeneralisation - They are equating ‘tests’ with ‘time probes’. Also overgeneralising because basing the statement on 5 children.
JL Plass, PA O’Keefe, BD Homer, J Case, EO Hayward, M Stein and K Perlin, ‘The impact of individual, competitive, and collaborative mathematics game play on learning, performance, and motivation’, in ‘Journal of	187	not a match	competitive games improved post-test game results but non-game maths fluency was not improved (“learning and retention” are surely not about improving game results)

Educational Psychology', Volume 105, Issue 4, 2013, pages 1050 to 1066.			
RB King, DM Mcinerney and D Watkins, 'Competitiveness is not that bad... at least in the East: testing the hierarchical model of achievement motivation in the Asian setting', in 'Internal Journal of Intercultural Relations', Volume 36, 2011, pages 446 to 457.	188	not a match	there was no measure of attainment
V Scherrer, F Preckel, I Schmidt and AJ Elliot, 'Development of achievement goals and their relation to academic interest and achievement in adolescence: a review of the literature and 2 longitudinal studies', in 'Developmental Psychology', Volume 56, Issue 4, 2020, pages 795 to 814;	188	partial match	There is a relationship between mastery goals and attainment but I'm not sure how well this fits into this paragraph.
Y-T Chiang and SSJ Lin, 'The measurement structure, stability and mediating effects of achievement goals in math with middle-school student data', in 'Scandinavian Journal of Educational Research', Volume 58, Issue 5, 2014, pages 513 to 527;	188	match	although describing mastery-approach goals as "achieve personal best" and performance-approach goals as "doing well compared to the average" is questionable
N Péladeau, J Forget and F Gagné, 'Effect of paced and unpaced practice on skill application and retention: how much is enough?', in 'American Educational Research Journal', Volume 40, Issue 3, 2003, pages 769 to 801.	189	partial match	It was about practice rather than testing. Also benchmarks were not shared.
M Chiesa and A Robertson, 'Precision teaching and fluency training: making maths easier for pupils and teachers', in 'Educational Psychology in Practice', Volume 16, Issue 3, 2000, pages 297 to 310.	190	not a match	overgeneralisation - They are equating 'tests' with 'time probes'. Also overgeneralising because basing the statement on 5 children.
K Rakoczy, P Pinger, J Hochweber, E Klieme, B Schütze and M Besser, 'Formative assessment in mathematics: mediated by feedback's perceived usefulness and students' self-efficacy', in 'Learning and Instruction', Volume 60, 2019, pages 154 to 165.	191	match	although the term 'honest feedback' for formative feedback is odd

DB Crawford, 'Mastering maths facts: research and results', Otter Creek Institute, 2003	192	match	
MK Burns, J Ysseldyke, PM Nelson and R Kanive, 'Number of repetitions required to retain single-digit multiplication math facts for elementary students', in 'School Psychology Quarterly', Volume 30, Issue 3, 2015, pages 398 to 405	192	partial match	the computer program did have a benchmark but nothing related to the rest of the sentence
YS Lee, Y Park and D Taylan, 'A cognitive diagnostic modeling of attribute mastery in Massachusetts, Minnesota, and the U.S. national sample using the TIMSS 2007', in 'International Journal of Testing', Volume 11, Issue 2, 2011, pages 144 to 177.	192	not a match	This was very complex mathematical modelling to determine mastery in different domains of the TIMSS questions. The terms "benchmark" and "guessing" were used but not in the same context.
S Maughan and L Cooper, ' <u>Policy and developments in mathematics assessment in England</u> ', National Foundation for Educational Research, August 2010.	193	partial match	talks about current tests skewing what is taught
S Winheller, J Hattie and G Brown, 'Factors influencing early adolescents' mathematics achievement: high-quality teaching rather than relationships', in 'Learning Environments Research', Volume 16, Issue 1, 2013, pages 49 to 69.	194	match	
' <u>Building great teachers? Initial teacher education curriculum research: phase 2</u> ', Ofsted, January 2020.	195	match	although the report recognised that the vast majority was good or better
C Foster, T Francome, D Hewitt and C Shore, ' <u>Principles for the design of a fully resourced, coherent, research-informed school mathematics curriculum</u> ', in 'Journal of Curriculum Studies', 2021.	196	not a match	It's all about designing a new curriculum. The only aspect about supporting teachers is that they wouldn't have to curate resources themselves but it was not particularly aimed at novices.
T Oates, 'Why textbooks count', Cambridge Assessment, 2014.	197	partial match	it does recommend coherence between curriculum and textbooks but does not talk about this being particularly relevant to novice teachers
T Miyakawa and C Winsløw, 'Paradidactic infrastructure for sharing and documenting mathematics teacher	198	partial match	paper refers to lesson study but this is actually about a different form of para-didactic research, showing how

knowledge: a case study of “practice research” in Japan’, in ‘Journal of Mathematics Teacher Education’, Volume 22, Issue 3, 2019, pages 281 to 303.			teachers expect to theorise in Japan
P Dudley, H Xu, JD Vermunt and J Lang, ‘Empirical evidence of the impact of lesson study on students’ achievement, teachers’ professional learning and on institutional and system evolution’, in ‘European Journal of Education’, Volume 54, Issue 2, 2019, pages 202 to 217.	199	match	
E Jacobson and A Izsák, ‘Knowledge and motivation as mediators in mathematics teaching practice: the case of drawn models for fraction arithmetic’, in ‘Journal of Mathematics Teacher Education’, Volume 18, Issue 5, 2015, pages 467 to 488; L Ma, ‘Knowing and teaching elementary mathematics’, Routledge, 2010.	200	partial match	The article is about developing knowledge (in this case drawing models to teach multiplication and division of fractions) and motivation to use these models. They are promoting teacher development. They don't focus on foundational concepts.
E Knuth, A Stephens, M Blanton and A Gardiner, ‘Build an early foundation for algebra success’, in ‘Phi Delta Kappan’, Volume 97, Issue 6, 2016, pages 65 to 68.	201	not a match <i>Author has moved to partial match</i>	Disputed by author The paper cited is about children’s learning gains, not teacher gains, and asks for earlier algebra, not later algebra <i>The author has contacted us again to say that if foundational means ‘foundational early algebra principles’ then she would accept it as a partial match.</i>