

Appendices

Appendix A. The fraction tasks in the research questionnaire

Calculating with fractions

Solve the following tasks as well as you can without using a calculator. Show all the steps you use.

a) $\frac{2}{3} + \frac{2}{3} =$

b) $\frac{4}{5} + \frac{2}{3} =$

c) $\frac{3}{4} - \frac{1}{2} =$

d) $1 - \frac{2}{6} =$

e) $\frac{3}{4} \cdot \frac{2}{5} =$

f) $\frac{3}{4} / 3 =$

Appendix B. Categorization of errors and the number of participants giving correct answers and making different error types in the fraction tasks

	Addition		Subtraction		Multiplication	Division
	Denominators		Different Denominator	Whole Number		
	Common	Different				
Correct answer	42	37	47	27	22	22
Correct answer with mathematical steps	40	37	43	27	22	6
Used pictures	4		4	2		5
E1 Errors in presenting the answer						
Converted the answer to decimal	1	1	1	1	1	2
Not simplified the answer		1	4	29	6	1
Not converted to a mixed number	6	3				
Converted to a mixed number incorrectly		2				
Showed uncertainty when converting to a mixed number	4	3	1	1		
E2 Errors in mathematical writing						
Partial computation or missing solution steps	3	5	12	3		14
Illogical mathematical symbol writing	1	12	5	10	8	4
E3 Errors in mathematical facts						
E4 Left blank		2	3	1	10	10
E5 Errors in addition or in subtraction						
Added across the numerators and the denominators	9	2				
Found a common denominator without multiplying numerators		3	1			
Inverted the later fraction and then multiplied across		1				
Cross-added and then added the new inverted fraction		1				
Multiplied across		1				
Cross-multiplied		1				
Added the denominator of the other fraction with numerator and denominator in both original fractions and then added the fractions keeping the new like denominators		1				
Subtracted across numerators and denominators			2			
Used unnecessarily large common denominator		1	17			
Used unnecessarily long method				3		

Appendix B (continued)

	Addition		Subtraction	Multiplication	Division
	Denominators		Different Denominator	Whole Number	
	Common	Different			
E6 Errors in multiplication					
Cross-multiplied				11	
Used common denominators when unnecessary				7	
E7 Errors in division					
Converted the divisor to a fraction form including same denominators					8
Converted the divisor to a fraction form incorrectly					5
Divided the numerator or both the numerator and the denominator by the divisor					3
First multiplied the numerator and the denominator by the divisor and then divided the new fraction by the divisor					2
Divided across by a fraction form divisor					1
Cross-multiplied by the inverted divisor					1

Note. E1 – E4 refer to technical errors and E5 – E7 to procedural errors.