# Supplementary Material

Item Examples and Translations

Fig.1 Example Item for CK scale of the professional knowledge test.

Begründen Sie auf dem Niveau der 6. Jahrgangsstufe, warum $0,3\* 0,4 = 0,12$ ist!

Nutzen Sie nicht die übliche Rechenregel zur Multiplikation von Dezimalbrüchen!

(Translation: Explain on the level of 6th graders, why $0.3 \* 0.4 = 0.12$. Do not use the common rule for multiplying decimal fractions.)

Description: This item covers conceptual mathematical content knowledge of the multiplication of decimals. The participants are asked to argue, *why* the result of this multiplication is correct. The hint that they should not use the common rule for multiplying decimal fractions, aims to trigger an answer which relies on a correct mathematical proof.

Fig.2 Example Item for PCK scale of the professional knowledge test.

Betrachten Sie die Divisionsaufgabe $4,8 : 2,2$.

Geben Sie einen typischen falschen Lösungsweg (mit falschem Ergebnis) für diese Aufgabe an, der auf mangelndes Verständnis zu Dezimalbrüchen hinweist.

(Translation: Have a look at the division of 4.8 by 2.2. Give a typical incorrect student solution for this calculation (leading to a wrong result), which is based on a lack of understanding of decimal fractions.)

Description: This item covers conceptual mathematical pedagogical content knowledge. The participants are asked to provide a typical incorrect student solution, which would reflect students’ misunderstanding of decimal fractions.

Detailed item statistics

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| **Table 1.1** Detailed item statistics. |
|  |  | CK | PCK | PK |
| *Whole sample**(N = 357)* | # of items, whole test | 24 | 16 | 11 |
| EAP Reliability | 0.60 | 0.58 | 0.55 |
| *Outfit-MNSQ* |  |  |  |
|  max | 1.16 | 1.30 | 1.09 |
|  min | 0.81 | 0.84 | 0.97 |
| *Infit-MNSQ* |  |  |  |
|  max | 1.10 | 1.16 | 1.03 |
|  min | 0.93 | 0.90 | 0.95 |
| *Cor* |  |  |  |
|  CK |  | 0.41 | 0.22 |
|  PCK |  |  | 0.37 |
|  PK |  |  |  |
|  |  |  |  |  |
| *Whole sample* *(N = 357)* | *Item-parameters* |  |  |  |
|  # of items, this study | 12 | 8 | 11 |
|  M | 1.07 | 0.66 | 0.90 |
|  SD | 1.06 | 0.88 | 0.83 |
|  max | 2.76 | 1.63 | 2.61 |
|  min | -1.02 | -0.97 | -0.15 |
|  |  |  |  |  |
| *Scaling sample**(N = 292)* | *Person-parameters* |  |  |  |
|  M | 0.30 | 0.14 | -0.03 |
|  SD | 1.05 | 1.28 | 1.12 |
|  max | 2.47 | 3.26 | 2.43 |
|  min | -2.95 | -2.78 | -2.49 |
|  |  |  |  |  |
| *Sample of current study* *(N = 65)* | *Person-parameters* |  |  |  |
|  M | 0.98 | 0.88 | 0.08 |
|  SD | 1.02 | 0.91 | 0.87 |
|  max | 3.50 | 2.51 | 1.91 |
|  min | -1.42 | -2.58 | -2.49 |
|  |  |  |  |  |
| *Note*. Item-parameters are only given for items included in the current study. |