Experiences with flipped learning and video-vignettes for future mathematics teachers

Dr. Luis J. Rodríguez-Muñiz
Dr. Laura Muñiz-Rodríguez

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Universidad de Oviedo
Universidá d'Uviéu
University of Oviedo

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Muñiz Rodríguez, L., Alonso, P., Rodríguez-Muñiz, L. J., De Coninck, K., Vanderlinde, R., & Valcke, M. (2018). Exploring the effectiveness of video-vignettes to develop mathematics student teachers' feedback competence. *EURASIA Journal of Mathematics, Science and Technology Education, 14*(9).

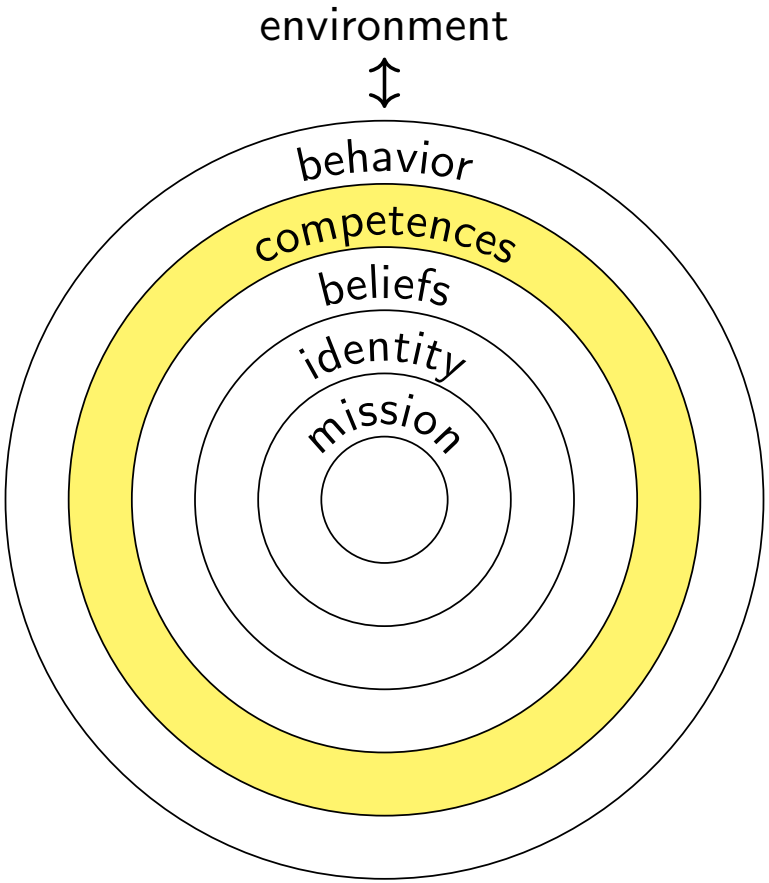
What teachers do... matters!

Contribution	*No.*	*Studies*	*People*	*Effects*	*d*	*SE*	*CLE*
Student	139	11,101	7,513,406	38,282	0.40	0.044	29%
Home	36	2,211	11,672,658	5,182	0.31	0.058	22%
School	101	4,150	4,416,898	13,348	0.23	0.072	16%
Teacher	31	2,225	402,325	5,559	0.49	0.049	35%
Curricula	144	7,102	6,899,428	29,220	0.45	0.076	32%
Teaching	365	25,860	52,128,719	55,143	0.42	0.071	30%
Average	816	52,649	83,033,433	146,626	0.40	0.062	28%

School	*No. metas*	*No. studies*	*No. people*	*No. effects*	*d*	*SE*	*CLE*	*Rank*
Teacher effects	1	18	—	18	0.32	0.020	23%	85
Teacher training	3	53	—	286	0.11	0.044	8%	124
Microteaching	4	402	—	439	0.88	—	62%	4
Teacher subject matter knowledge	2	92	—	424	0.09	0.016	6%	125
Quality of teaching	5	141	—	195	0.44	0.060	31%	56
Teacher-student relationships	1	229	355,325	1,450	0.72	0.011	51%	11
Professional development	5	537	47,000	1,884	0.62	0.034	44%	19
Expectations	8	674	—	784	0.43	0.081	31%	58
Not labeling students	1	79	—	79	0.61	—	43%	21
Teacher clarity	1	na	—	na	0.75	—	53%	8
Total	31	2,225	402,325	5,559	0.49	0.049	35%	—

Hattie, J. A. (2009). *Visible learning: A synthesis of 800+ meta-analyses on achievement*. Abingdon: Routledge.

What are the essential qualities of a good teacher?



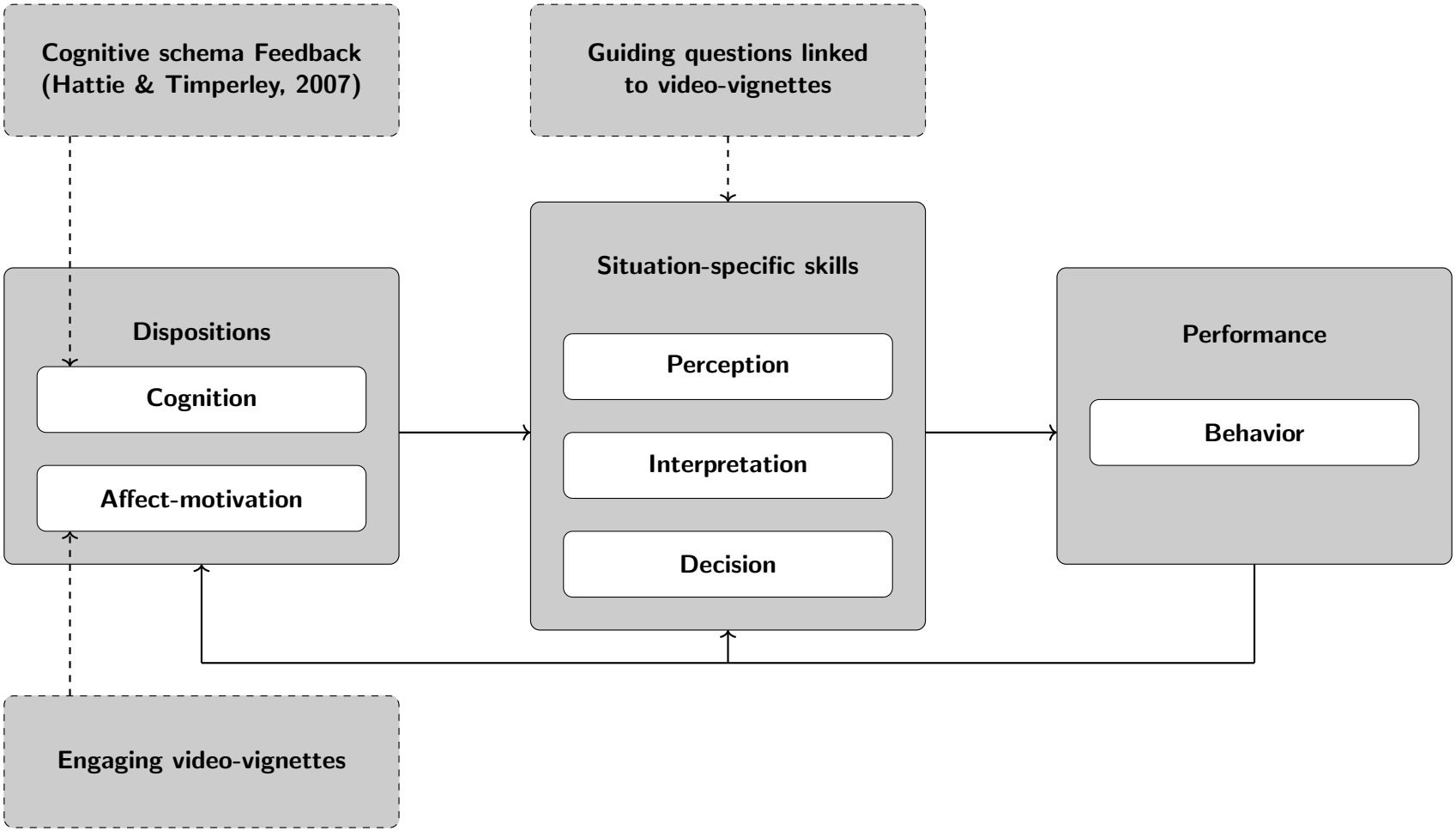
The onion model of Korthagen (2004)

Research objective

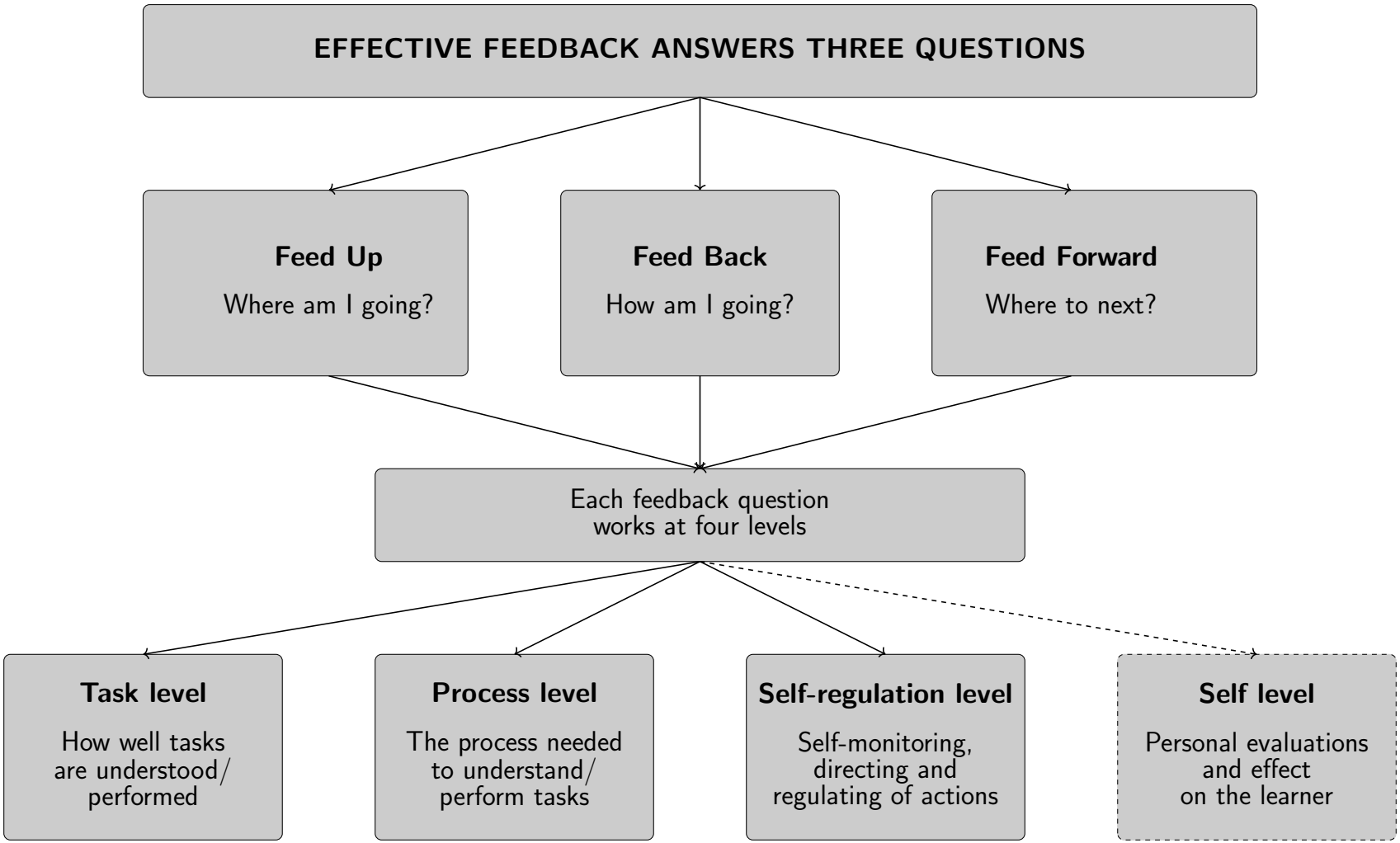
To design, implement and evaluate an intervention to enhance the development of a specific teaching competence.

Competence	Provide constructive, purposeful and timely feedback to students.
Methodology	Video-vignettes
Design	Pre-test/Post-test
Context	Secondary mathematics student teachers (n=14)

Conceptual and theoretical framework (Blömeke et al. 2015)



A model of feedback (Hattie & Timperley, 2007)



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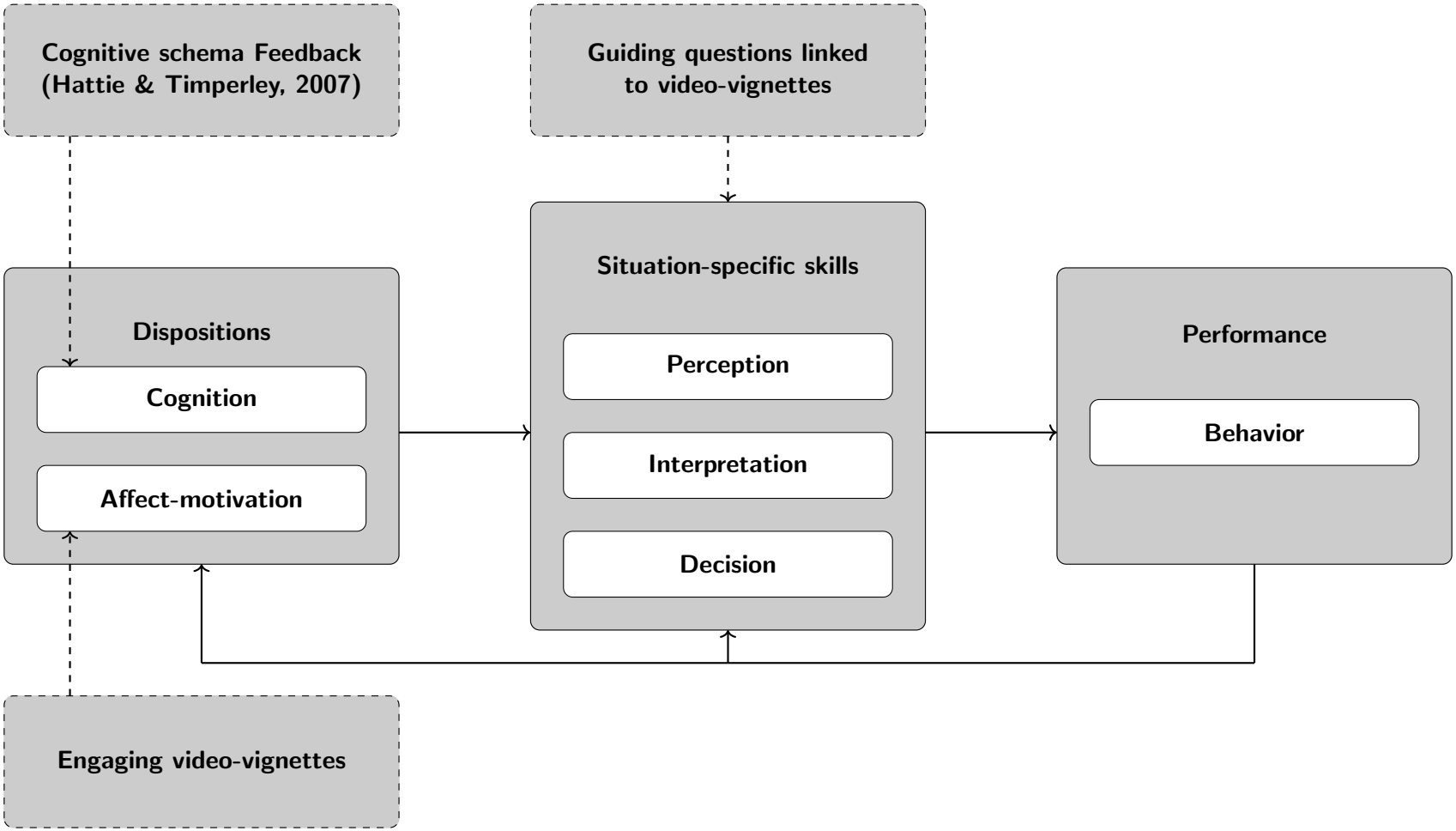
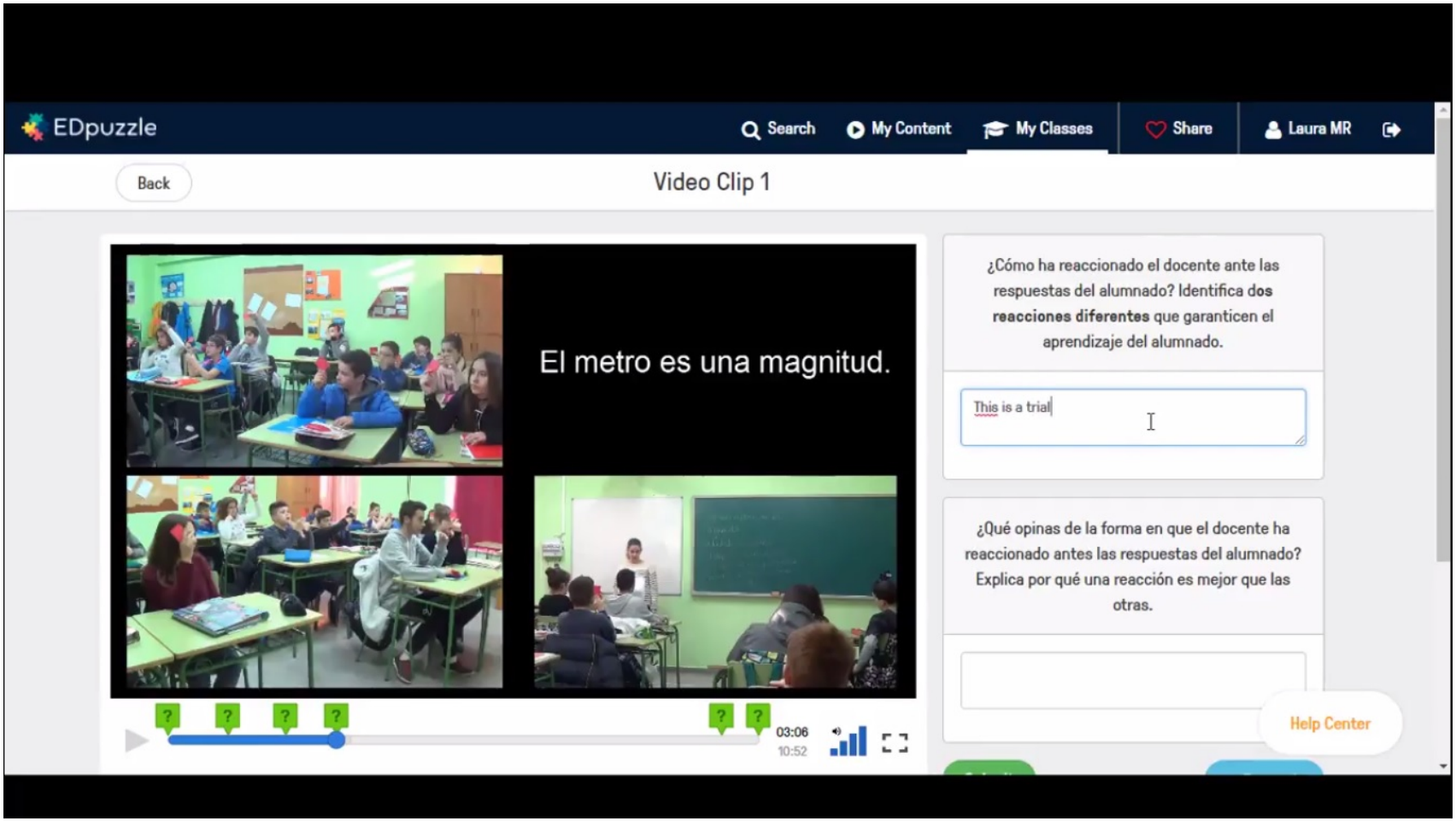


Video-vignettes to develop the feedback competence



Intervention design

Progress	Embedded question	Taxonomical level
Start	1. Imagine you have to teach (*content*) at (*grade*). How would you start the lesson?	Understanding
	2. How did the teacher start the lesson?	Remembering
	3. How would you respond to students' work?	Understanding
	4. How did the teacher respond to students' work?	Remembering
	5. How would you conclude the lesson?	Understanding
End	6. How did the teacher conclude the lesson?	Remembering

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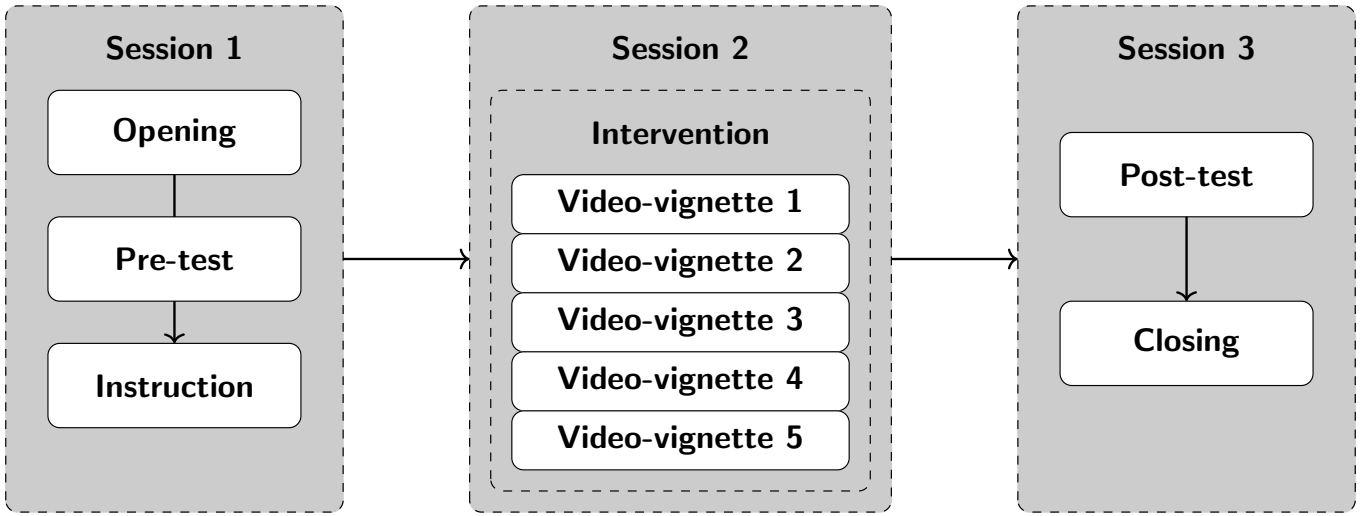

Data collection and analysis

Research instrument

- Student teachers' answers to the questions embedded in the pre-test and post-test video-vignettes
- Student teachers' self-efficacy to provide feedback to students

Data analysis

- Coding matrix

The following questions are designed to help us gain a better understanding of your competence to provide and seek feedback to/from students. Please rate your degree of confidence in doing the tasks described below, using the following scale:

1	2	3	4	5	6	7	8	9	10
Cannot do at all				Moderately can do					Highly certain can do

	1	2	3	4	5	6	7	8	9	10
Establish specific learning goals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Indicate whether students work is correct or incorrect	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Identify what students understand	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Detect when students make errors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Detect when students have misconceptions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Provide praise, rewards, and punishment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Provide information about what is or what is not understood	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Indicate that more information is needed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Results

	Pre-test				Post-test			
	R	**U**	**R+U**	**SE - M (SD)**	**R**	**U**	**R+U**	**SE - M (SD)**
Feed-up	4	-	4	7.47 (2.17)	8	8	16	7.79 (1.42)
Feed-back	10	8	18	7.23 (1.96)	13	12	25	8.07 (1.76)
Feed-forward	-	13	13	7.07 (1.84)	13	13	26	8.07 (1.68)
FB perspective total	14	21	35		34	33	67	
Task	2	3	5	8.17 (1.95)	9	10	19	8.11 (1.71)
Process	13	12	25	8.53 (1.41)	12	12	24	8.21 (1.37)
Self-regulation	3	4	7	7.86 (1.46)	2	5	7	8.07 (1.39)
Self	5	8	13	7.40 (1.81)	1	7	8	8.07 (1.94)
FB level total	23	27	50		24	34	58	

Note: R=Remembering. U=Understanding. SE=Self-efficacy. M=Mean. SD=Standard Deviation.

Feedback perspectives

- High number of indicators related to feed-up, feed-back, feed-forward.

Feedback levels

- High number of indicators related to feedback at the task and process level.
- Decreased emphasis related to feedback at the self level.
- Low amount of reactions related to feedback at the self-regulation level.

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Changes in the nature of student teachers' reactions

Pre-test

"The teacher starts the lesson making questions." (General)

"I would congratulate the students who answered correctly. I would reward the students who answer correctly with symbolic prizes that reinforce their learning." (Redundant)

"If all the students answer correctly, I would be happy." (Irrelevant)

"The way the teacher starts the lesson is very appropriate." (Personal opinion)

Post-test

"I would start the lesson contextualizing and recalling the learning goals, evoking students' thinking, in order to know what they remember."

"I would respond to students' work enhancing their confidence about their response (self-regulation level), using questions to check how they came up with the answer and what they should have done (process level), identifying what is the correct answer (task level) and making some comment about their personal work (self level, the least effective), all through questions, suggestions and directions, not directly."

Impact of the intervention

Effectiveness of video-vignettes on the development of secondary mathematics student teachers' feedback competence during initial teacher education.

Additional findings

- Increase in student teachers' motivation.
- Foster the link between theory and practice in initial teacher education.

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