Decoding the disciplines – A pilot study at the University of Liège (Belgium)

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ABSTRACT: This paper reports on a first attempt to apply the two first stages of the "Decoding the disciplines" framework (Pace, 2017) at the University of Liège (Belgium). In this context, 7 professors volunteered to reflect, through a structured process, upon "bottlenecks" in their courses, with the help of IFRES' (Institute for Training and Research in Higher Education) pedagogical advisers. This pilot delivered contrasted observations: while participants granted value to their exposure to this approach, especially in terms of enhanced awareness of possible discrepancies between what experts and newcomers in the field might consider as obvious, none of them activated the possibility offered to tackle the identified bottlenecks, according to the systematic approach (stages 3-7) suggested by the framework. The paper presents the pedagogical setting, analyses the interviews of participants and the outcomes of the project, outlines explanations for its results, and shares some lessons learnt.

1   INTRODUCTION

Helping higher education professors to find ways to curb students' failure and drop-out (or, to say it positively, to extend the realm of intellectual integration of as many people as possible in the society) is a challenge for Teaching & Learning Centers.

In its constant research for new staff support methods, IFRES has probed the promising "Decoding the disciplines" approach (hereafter referred to as "DecoDisc") which promotes, amongst faculty, a systematic identification and treatment of the basic ways of thinking in their fields (e.g., Bernstein, 2012; Burkholder, 2011; Haney, n.d.; Schultz & Lovin, 2012; Sundt, 2010). It does so by drawing professors' attention on "bottlenecks" in courses, namely critical learning elements which naggingly present as problematic for a large number of students. DecoDisc assumes that part of these difficulties can be explained by instructors' deficient explicitation of the intellectual operations needed by students to overcome them. The starting point of the approach, and what sets it apart, are thus the "decoding interviews" (Stages 1 and 2 in Fig. 1), meant to uncover, or "decode", expert ways of thinking that are not obvious to novice students and which might be kept tacit in teaching practice (Tingerthal, 2013), either because the instructor takes them for granted on students' side or because these intellectual moves have been chunked by the teacher, due to its deep expertise, and not enough "unfolded" and trained (notion of "hidden curriculum").

In this pilot study, IFRES focused on bottlenecks elucidation (Stages 1-2 in Fig. 1), leaving temporarily aside Steps 3-7, which are more akin to regular instructional design processes. The study was sparked by the research question: what is the potential of raising professors' awareness of possible bottlenecks for their students? This potential was evaluated according to the "3P-effects checklist" (Verpoorten et al., 2017) which recommends teachers/pedagogical advisers to measure the impact of their interventions on 3 dimensions of their audience's learning experience: Participation, Perception, and Performance

2   METHODOLOGY

2.1 Schedule

All participants went through the following 5-step process which amounts for them to approximately 7-hour workload (generous estimate).

Step 1 - Project presentation

The pedagogical advisers met the volunteers individually and introduced them to DecoDisc. These conversations were conducted the same way, using similar language beacons and paper guidelines. At the end, professors were asked to give their opinion on the proposed process, based on the information
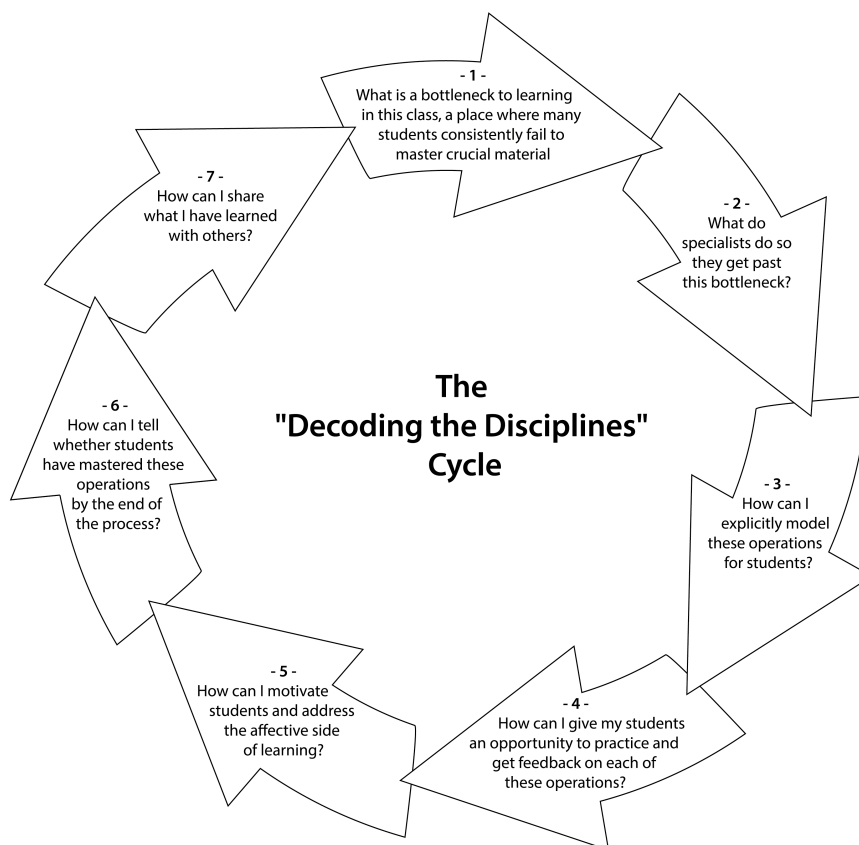
The
"Decoding the Disciplines"
Cycle

- 1 -
What is a bottleneck to learning in this class, a place where many students consistently fail to master crucial material

- 2 -
What do specialists do so they get past this bottleneck?

- 3 -
How can I explicitly model these operations for students?

- 4 -
How can I give my students an opportunity to practice and get feedback on each of these operations?

- 5 -
How can I motivate students and address the affective side of learning?

- 6 -
How can I tell whether students have mastered these operations by the end of the process?

- 7 -
How can I share what I have learned with others?

Fig. 1. The pilot study targeted Stages 1 and 2 of the Middendorf and Pace cycle (2004)

they had just received. This was done with an online questionnaire. Optional readings on bottlenecks and/or threshold concepts were also provided to candidates.

Step 2 - Bottlenecks description

Volunteers provided the pedagogical advisers with a 10-line description of 2 or 3 bottlenecks they thought of for their courses.

Step 3 - Decoding interview

A pair of pedagogical advisers conducted a 45-minute video-recorded decoding interview with each teacher. The protocol was based on Pace recommendations (2017) and a list of relevant questions collated from different sources, among which examples of Decoding interviews, as given on DecoDisc website (http://decodingthedisciplines.org).

Step 4 - Cross-analysis

The video footage of the decoding interviews were uploaded on the Frame.io platform to make it available to teachers'… coding! On this tool, the teachers tagged each intellectual operation they detected in their own discourse. A pedagogical adviser performed the same analysis on the same material.

Step 5 - Debriefing

A final conversation was set up with each teacher. It had two parts: a) a "confrontation" between what teachers tagged and what the pedagogical adviser tagged (Table 1, columns 4/5) and, b) a systematic gathering of teachers' feedback on the whole process, topped with a last question: "would you like to go further with the DecoDisc cycle?".

2.2 Instruments

Data sources for Participation came from the plain observations of professor's engagement and persistence in the project. Data sources for Perception were twofold: the short questionnaires filled in at Step 1 and the feedback verbal reports on the whole project given at Step 5. As for Performance, the

data sources were the tagged decoding interviews videos. The qualitative data collected from the teachers (initial on-line questionnaire and debriefing) were partly processed with the protocol analysis software Nvivo.

3   RESULTS

3.1   Participation

Out of the 10 professors contacted (on the suggestion of the "Study Guidance Service" of the university), 2 declined, invoking a lack of time, and one entered the process but stopped at Step 3. Seven professors did complete the 5 steps. Altogether, they represent 5 disciplines: Geo-mechanics (Engineering), Chemistry, History, Social sciences, Electronics.

3.2   Performance

Out of the 28 bottlenecks written down "on paper" at Step 2, 16 were examined in the decoding interviews (Table 1, column 1) during a time period running between 4' and 42' ($M = 19'$, $SD = 10$). Short durations reflected usually – but not always – that one hit a snag: the assumed bottleneck turned out not to be one. Professors related a total of 62 mental operations to the bottlenecks while the pedagogical adviser identified 119 thereof.

Respondents	Decoding interviews (Step 3)			Cross-analysis (Step 4)	
	Bottlenecks considered	Bottlenecks confirmed	Bottlenecks discussion time	Intellectual moves tagged by professors	Intellectual moves tagged by the adviser
R. 1	V1	No	19'58	/	/
	V2	Yes	12'05	9	8
	V3	Y	15'14	5	5
R. 2	V1	N	4'05	/	/
	V2	Y	19'26	3	15
	V3	Y	11'07	1	4
	V4	Y	21'03	1	13
R. 3	V1	Y	22'01	4	10
	V2	N	12'05	/	/
	V3	New*	6'29	2	3
	V1	Y	24'15	8	14
R. 5	V1	Y	42'35	27	25
R. 6	V1	Y	29'	2	9
	V2	Y	28'	0	6
R. 7	V1	N	12'	/	/
	V2	Y	21'	0	7
New* = Bottleneck that emerged in the Decoding Interview (not described at Step 2)					

Table 1. Overview

3.3   Perceptions before exposure to DecoDisc approach

The analysis of the online questionnaires filled in by teachers, showed that, based on the information they received at Step 1, professors credited DecoDisc of potential benefits:

- Identify student needs;
- Understand the subject matter to be taught;
- Identify what can be problematic;
- Fostering reflective practice;
- Improve their teaching;
- Increase student success;
- Explain the implicit;

- Nurture a personal reflection on professors' attitude;
- Directly resolve specific problems;
- Weave both didactic and pedagogical approach of topics;

Beforehand, the approach also aroused some professors' reticence due to:

- the time entailed by the participation to the process;
- the lack of knowledge about threshold concepts and bottlenecks;
- the fact that the approach is based only on their own experience
- impressions that, to be effective, DecoDisc must be linked with higher-level teaching/learning issues like Leclercq's triangle (Castaigne, Petit, & Verpoorten, 2007) or Bigg's constructive alignment (2014).

3.4 Perceptions after having been exposed to DecoDisc approach

The ratio workload/benefit was considered positive by all teachers.

Three teachers spontaneously expressed that Step 2 (bottlenecks identification) was easy and enlightening because it allowed "to notice buried things" (R.3), "to "help taking a step back" and "obliged to take the time for an enriched reflection" (R.1).

With regard to the decoding interview (Step 3) and its review on Frame.io (Step 4), opinions were more diverse. Two teachers (R.2, R7) indicated that the type of questions raised by interviewers (in a nutshell: "what do I do as an expert when I face this problem") was already present to their mind when they developed the instructional scripts of their courses. Another teacher told that he felt ill-at-ease with this introspection process because "that's not easy to analyze one's own practice with one's glasses" (R1). For one teacher, this discomfort was close to anxiety because the process could reveal "my limits as an expert". This teacher (R.5) nevertheless maintained its interest for the approach because it helped "changing the look on practice and focusing on what is not clearly stated". Two professors reported being pleased with the process which, for one (R.3): "brought a different view on a course that I have been giving for 10 years and that I have depleted in terms of pedagogical reflection and action", and for the other: "allowed me to realize that some teaching/learning elements seemed to me, wrongly, very obvious and basic" (R.6).

As for the review and the tagging of the video-recorded interview, 6 teachers mentioned that it was not pleasant to see themselves on the screen and that they eventually listened rather than watched this interview to carry out their analysis. A teacher, however, specified that the analysis allowed him to re-listen to what he had said on the spot and that he found this second round interesting (R.3). To a last one, seeing himself talking was revealing of the extent to which certain intellectual operations seemed to him seamless (R.6).

The final debriefing was also valued by most teachers because "it enabled me to realize that aspects of disciplinary know-how are not easy for his students (R.6), "it yielded ideas for further interventions in my course" (R.3, who, interestingly, set up tests in order to confront some reflections on bottlenecks to his students' performance), and "it's always a pleasure to get to know new proposals in pedagogy that can inspire ways to do better or differently" (R. 4).

4 DISCUSSION AND FURTHER WORK

Upon completion of this pilot, meant to ascertain the potential of DecoDisc in a Belgian university, the following observations can be made.

Going through the two first stages of the process obviously prompts professors to make aspects of teaching and learning (here: bottlenecks) an *object of attention, reflection, and conversation*. Does this support them to make bottlenecks an *object of action* is an issue of a different nature, and a critical one. Indeed, the scope of the project did not include the action-oriented Stages 3-7 (Fig. 1). However, when asked whether they felt like going further in the Cycle, based on what they had experienced in the project, most teachers expressed that they were satisfied with what they had received, mainly described in terms of new or renewed awareness. Some teachers stated that this sharpened attention might have an effect on the way they would cover the material next time and one teacher put forward a clear-cut intention to tackle an identified bottleneck with a specific intervention.

Yet, the pedagogical advisers had hoped that, not all, but more teachers would volunteer for moving forward in the cycle, based on what they had found in the two first stages. Several explanations can be given for this this half-disappointment: a) the whole cycle should have been presented, right from the start, as a "take or leave" option, b) the teachers were already aware of the bottlenecks which were not enough "striking" to impulse a treatment, c) the bottlenecks were too "big" to be dealt with, possibly due to a lack of training of the interviewers to manage the conversation at the "right level", d) hard-pressed teachers rightly considered that they had spent efforts on the approach and had no time left for a follow-up, e) the following idea was maybe in some heads: "despite years of student support, despite all efforts I have been doing, the average success/failure rate remains desperately even, so why would this approach make a difference?".

On their side, the pedagogical advisers remain strongly convinced by the DecoDisc approach because its Cycle addresses a core concern of the teaching practice (obstacles to learning) and, doing so, can help concentrating disciplinary/pedagogical efforts on the courses themselves, and then possibly prevent remedial schooling. However, the pedagogical advisers have also to admit that they hit upon their own bottleneck in this pilot: the transition to Stage 3.

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