e-DAUn

Estudo do Desenvolvimento Académico na Universidade

A Study of Academic Development in University

http://edaun.web.ua.pt/

Third International Seminar on Research on Questioning

'Critical inquiry and academic growth in Higher Education'

University of Aveiro (Portugal) - 19th June 2015

A study of academic development in universities through innovative approaches in teaching, assessment and feedback

M.Helena Pedrosa-de-Jesus[1], Aurora Moreira[2] , Betina Lopes[1], Cecília Guerra[1], Júlio Pedrosa[3], Ângela Cunha[4], Adelaide Almeida[4], Mike Watts[5]

[1] Research Centre "Didactics and Technology in Education of Trainers", University of Aveiro, Portugal
[2] Centre for Functional Ecology, University of Coimbra, Portugal
[3] CICECO, University of Aveiro
[4] Department of Biology and CESAM, University of Aveiro;
[5] Department of Education, Brunel University, UK

Summary

I. Introduction

II. The study

III. Theoretical framework

IV. Research methodology

V. Research outcomes
- Grow in own teaching
- Grow in SoTL
- University teachers' reflections

VI. Conclusions

I. Introduction

Many changes in **Higher Education** derived from Europe-wide initiatives (i.e. Bologna Process) have been given increasing attention to

- student-centred teaching approaches
- growth in university teachers' academic development (Clarke & Reid, 2013; HEA, 2011).

The successful **self-reflection of university teachers** should move beyond the personal perspective and focus on **dialogue with colleagues about the innovations** of teaching and learning in **their particular disciplines** (van Schalkwyk, Cilliers, Adendorff, Cattell, & Herman, 2013).

We believe that new understandings and altered perspectives on teaching practices may come as the inevitable product of the reflection of university teachers on their own performance.

II. The study

*"A study of academic development in universities through innovative approaches in teaching, assessment and feedback" (*PTDC/CPE-CED/117516/2010)

To develop this study, **a key factor** was the close **collaboration, over a period of 8 years,** between **researchers** (Department of Education) and **four university teachers** (Department of Biology) at the University of Aveiro, Portugal.

The primary purpose was
to explore effective ways to facilitate these university teachers' academic development, mainly through the promotion of critical reflection, using naturalistic contexts of collaborative research.

The main goals were

i. to work alongside university teachers in designing and adopting **novel practices** to meet new demands on their time and teaching;
ii. to evaluate such innovative **teaching, learning and assessment strategies** in action;
iii. to promote university **teachers' academic reflection** on issues of teaching and learning at this level.

Working with these academics, **since 2006**, has provided a strong understanding about

- the **dynamics of student-generated questioning** and inquiry-based learning (Pedrosa-de-Jesus, Lopes, Moreira & Watts, 2012);
- the **verbal interaction patterns** between student and teacher dialogue and its relation to students cognitive development (Pedrosa-de-Jesus, & Silva Lopes, 2011);
- the relevance of the **alignment between teaching, learning and innovative assessment strategies** (Pedrosa-de-Jesus & Moreira, 2009)
- the relationship **between teaching, learning conceptions, questioning practices** and **academic development** (Pedrosa-de-Jesus & Lopes, 2012; Guerra, Pedrosa-de-Jesus, Correia, Cunha, Almeida, & Watts, 2014).

III. Theoretical framework

Academic development
(OECD, 2009; Pedrosa-de-Jesus, Lopes, Moreira & Watts, 2014)

can be seen as the process that

promotes university teacher's professional knowledge related with teaching, learning, assessment and feedback practices

Scholarship of teaching and learning (SoTL)
(Hutchings, Huber & Ciccone ,2011)

- **teaching** should emphasize principles of **learning through inquiry, reflection and action into and about practices** for the improvement of teachers' academic growth.

Reflection & feedback

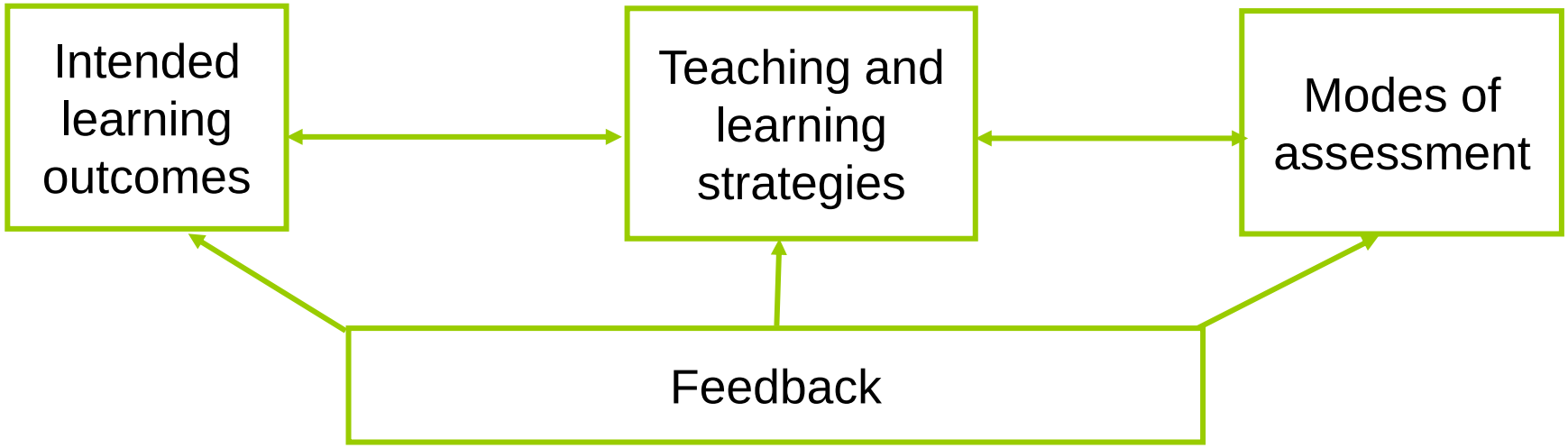

Figure 1 - An adaptation of Biggs's (1999) constructive alignment

Reflection & feedback

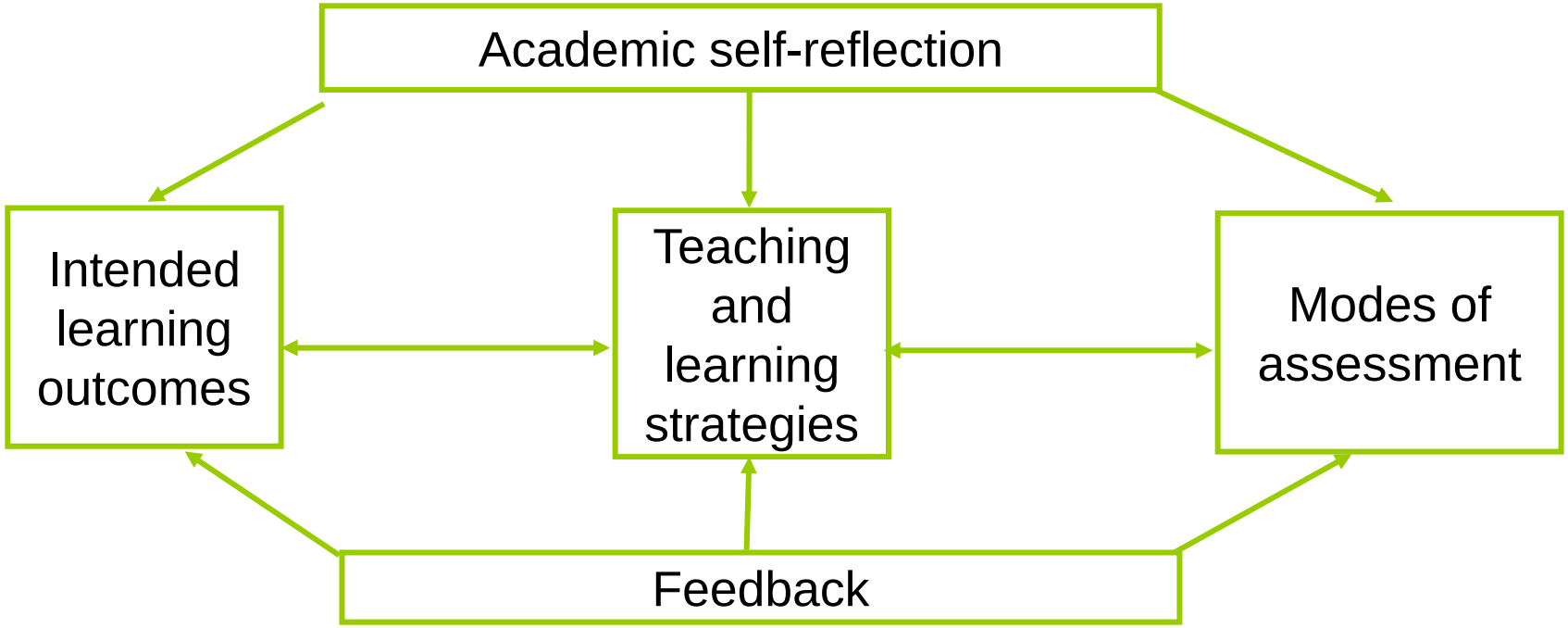

Figure 2 - The role of feedback on academic grow of university teachers

Academic grow

'Scholarship of teaching and learning'

Phase One: Growth in own teaching	*Phase Two: Dialogue with colleagues about teaching and learning*	*Phase Three: Growth in scholarship of teaching*
Develop personal knowledge about their own teaching and their students' learning	Develop and exchange knowledge about teaching and learning in their discipline	Develop scholarly knowledge about teaching and learning that has significance and impact for the institution and the field

Figure 3 - Continuum of growth toward the scholarship of teaching (Weston and McAlpine's, 2001)

IV. Research methodology - Research approach

Critical social paradigm

assuming principles of …

action-research methodology

(Cohen, Manion, & Morrison, 2007)

Instructional coaching approach
(Schrum, English & Galizio ,2012)

• to provide *differentiated support* to university teachers' academic development

Co-researcher model
(Macaro & Mutton ,2002)

•to undertake research in *natural settings* and each participant to benefit from the enterprise

Research stages

From 2012 to 2014:

Stage 1 - analysis of the materials (i.e. teaching content) and strategies (i.e. type of assessment) implemented in 4 curricular units (Microbiology, Genetics, Evolution, Microbiology and Pharmacology);

Stage 2 - design of innovative teaching, learning, assessment and feedback strategies that encourage students' competences (i.e. learning autonomy);

Stage 3 - evaluation of these strategies in terms of effectiveness in practice.

Teachers*	Institutional Position	Years of professional exp.
Teacher A	Full professor	+/- 25
Teacher B	Assistant Professor	+/-26
Teacher C	Associate Professor with habilitation for Full Professor	+/-19
Teacher D	Assistant Professor	+/-18

Figure 4 - Personal profiles of the teachers

* Teachers A and B teaching **Microbiology** and **Genetics**,
Teacher C teaching **Evolution**
Teacher D teaching **Microbiology** and **Pharmacology**

	Microbiology	**Genetics**	**Evolution**	**Microbiology and Pharmacology**
Semester	1st	2nd		
Teachers	Teacher A Teacher B		Teacher C	Teacher D
Students	+/-100			+/-40
Courses	Biology (1st year) Biology and Geology (1st year)			Nursing (1st year)
Classes	Lectures (2 h week) Lab sessions (2 h week)	Lectures (2 h week) Lab sessions (2 h week)	Lectures (2 h week)	Lectures (2 h week) Lab sessions (2 h week)

Figure 5 - Organization of the curricular units (2012/13 and 2013/14)

Data collection

- **Non-participant observation** of classes in naturalistic contexts;
- '**Low-participant classroom observation**' during informal contacts with the university teachers (before or after classes);
- **Participant observation** during the regular meetings with the research group (also with an external consultant);
- **Semi-structured interviews** conducted with both teachers and 16 students at different points in the project (end of 2012/2013 and 2013/2014).

Data analysis

Academic grow ***'Scholarship of teaching and learning'***

Phase One: Growth in own teaching	*Phase Two: Dialogue with colleagues about teaching and learning*	*Phase Three: Growth in scholarship of teaching*
Develop personal knowledge about their own teaching and their students' learning	Develop and exchange knowledge about teaching and learning in their discipline	Develop scholarly knowledge about teaching and learning that has significance and impact for the institution and the field

Figure 6 - The adapted Weston and McAlpine's (2001)' continuum of growth

V. Research outcomes

Phase One (Growth in own teaching**)**

An **Maintenance/Adaption/Innovation model** was developed in order to identify academic grow in each university teachers' practices:

- **Maintenance** – sustaining a strategy, without researcher's collaboration;
- **Adaptation** - adapt a strategy, which was previously developed with this research team (between 2006 and 2010);
- **Innovation** – design a "new" strategy with the purpose of delivering benefit(s) for student's learning.

Phase One (Grow in own teaching)

Classes	Strategies	Description	Teacher	Academic years	
				2012/13	2013/14
Lectures (2h/ week)	Microtalk	*Conducting 4 lectures by researchers in Microbiology, and filmed by Educast system*	Teacher A	x	x
	Organizational study questions	*Designing 80 questions in Microbiology with the intention of guiding students in their autonomous learning*		x	x
Tutorial (1h/ week)	Teacher's oral feedback	*Conducting a face-to-face session in order to give oral feedback to students' questions and doubts*		x	x
	Teacher's written feedback	*Sending a written feedback (through Moodle) to students' questions and doubts*			x
Lab sessions (2h/ week)	Online questionnaire	*Designing an online questionnaire with a presentation of a practical problem in Microbiology. The aim was to stimulate students' questioning, submitting questions for its resolution*	Teacher B	x	
	Rubric assessment questionnaire	*Drawing a rubric with assessment criteria for the students' responses of the online questionnaire*		x	
	Mini –Questionnaires	*Designing 5 short questionnaires in order to promote students' involvement in the preparation of laboratory classes of Microbiology*			x

Figure 7 - Results emerged for Practical domain (**Microbiology**)

Legend of the "**Maintenance/Adaption/Innovation model**": Maintenance Adaption Innovation

Phase One (Grow in own teaching)

Classes	Strategies	Description	Teacher involved	Academic years	
				2012/13	2013/14
Lectures (2h/ week)	Scitable	*Exploring an online tool with scientific contents in Genetics (Nature Publishing Group)*	Teacher A	x	
	Organizational study questions	*Designing 80 questions in Genetics in order to guide the students in their autonomous learning*		x	
	Questions Online	*Designing a online questionnaire, which requested students' questions about Genetics*		x	
Lab sessions (2h/ week)	*Mini – Questionnaires*	*Designing 5 short questionnaires in order to promote students' involvement in the preparation of laboratory classes of Genetics*	Teacher B	x	x

Figure 8 - Results emerged for Practical domain (**Genetics**)

Legend of the "**Maintenance/Adaption/Innovation model**": Maintenance Adaption Innovation

Phase One (Grow in own teaching)

Classes	Strategies	Description	Teacher	Academic year	
				2012/13	2013/14
Lectures (1 h week)	Critical analyses	*Producing a critical analyses of a selected press note related to the topic of evolution (i.e., the advent of genetic diseases) – Group work*	Teacher C	x	x
	Teacher's written feedback	*Sending written formative feedback of critical analysis(through e-mail) to 21 groups of students*		x	
	Students' written feedback	*Sending written formative feedback of critical analysis(through a excel document and e-mail)to 21 groups of students*			x

Figure 9 - Results emerged for Practical domain (**Evolution**)

Legend of the "**Maintenance/Adaption/Innovation model**": Maintenance Adaption Innovation

Phase One (Grow in own teaching)

Classes	Strategies	Description	Teacher	Academic year	
				2012/13	2013/14
Lectures (1 h week)	Questions online	*Designing a online questionnaire, which requested students' questions about Microbiology*	Teacher D	x	x
	Teacher's oral feedback	*Oral feedback (through Moodle) to Questions in Microbiology online*			x
	Teacher's written feedback	*Written feedback (through Moodle) to Questions in Microbiology online*		x	x
Lab sessions (2 h week)	*Mini – Questionnaires*	*Designing 5 short questionnaires in order to promote students' involvement in the preparation of laboratory classes of Microbiology*			x

Figure 10 - Results emerged for Practical domain (**<u>Microbiology</u> and Pharmacology**)

Legend of the "**Maintenance/Adaption/Innovation model**": Maintenance Adaption Innovation

Some teachers' reflections

Microbiology

Microtalks were explored by **Teacher A** in order to allow the interaction between teaching and research. He identified three teaching' strengths:

> *- First, is to bring authentic research to the classrooms, which is related to my own research group... Second, is to show some diversity of topics in microbiology in a concrete way. Third, it shows that research is an activity that people can do. Can be a profession, does it not? Because students have the opportunity to see real researchers and could question them, could discuss.* [Teacher A – second interview].

Genetics

Teacher B demonstrated the potential positive use of "**Scitable**" in Genetics, stating that:

- *Scitable is a very interesting tool. Obviously it has some inaccuracies, but it is a good base to have as a starting point of information… and then it leaves an open door for those [students] who are more interested in certain topics and want to explore it more* [Teacher B – first interview].

Evolution

Teacher C considered that "**Critical analysis**" allowed him to develop students' competences, such as the selection and evaluation of scientific information, and the group work collaboration:

> – *Well, I think that this activity promoted students' critical reflection. On the other hand, it also promoted the collaborative group work, since, as you know, the groups could go up to five elements. And therefore only for that it was worth it.* [Teacher C – first interview].

Microbiology and Pharmacology

Teacher D recognized that the strategy "**Questions Online**" was not very successful, since only three students submitted their answers through this online learning tool. She corrected the answers and submitted them to Moodle.

She also designed the ‘correct’ answers of "**Organizational study questions**", posting them on the Moodle online forum, also sending it to the students e-mail list (about a week before the final exam)

Phase Two (Dialogue with colleagues about teaching and learning)

			Number of meetings	
			2012/2013	**2013/2014**
Team meetings			2	1
Team meetings with the consultant			2	0
Individual meetings	Teachers A and B	Microbiology	2	2
		Genetics	2	2
	Teacher C	Evolution	5	5
	Teacher D	Microbiology and Pharmacology	2	2
Individual interviews	Teacher A		1	1
	Teacher B		1	1
	Teacher C		1	1
	Teacher D		1	1
		Total	19	16

Figure 11 – The Instructional coaching meetings

Phase Two (Dialogue with colleagues about teaching and learning)

Academic development has occurred when something discussed during the '**instructional coaching meetings**' has generated **personal change in university teachers' initial knowledge, beliefs and attitudes**, in their teaching practices, or in their reflections about the salient outcomes of their practices.

Phase Two (Dialogue with colleagues about teaching and learning)

Teacher A was aware that meetings were consonant with a broader drive for change within the university:

> *The fact is that an external push exists ... a kind of audit. Well I don't think it is exactly an audit, but there is a need to change every year with reflection on what is being done and, therefore, this [the meeting] has been very important [**Teacher A – first interview**].*

Phase Three (Grow in SoTL)

Indicators	Outcomes
Reflection about the solutions designed for educational problems	**Reports** from meetings with staff and external consultant – Group **Semi structured inter**views – Individual
Drawing on literature and research on teaching to inform practices	**SWOT report** of Microbiology performance; **Feedback document** (issues about teaching)
Publishing and making presentations about teaching (which may or may not be based on research)	***…*** ***A strategy for promoting students' involvement in the preparation of laboratory classes of Microbiology***. Poster communication presented at Teaching Day - Inovação Pedagógica, Aveiro, 27 November 2013; **…**
Applying for funding for research on teaching	***MicroTEMAS – a strategy for promoting Microbiology students' autonomous learning.*** Public call for projects funding related with Didactic innovations in Higher Education

Figure 12 – Outcomes that emerged in the Consequence domain

VI. Conclusions

These university teachers

- ✓enact upon their teaching and how their critical thinking generated changes in the domain of practice and domain of consequence;
- ✓ interpreted their academic experiences concerning the design of some innovative strategies.

Also,

There is evidence of the '**transference' nature** of the changing process as academic development grows (changes that occur in one domain lead to changes in another).

✓**Academic development** can successfully explore the 'external', 'personal', 'practice' and 'consequence' domains of the university teacher activity;

✓ The **close collaboration** with, and external stimulus of, the co-researchers have clearly influenced their academic practices as teachers;

✓Results demonstrate the importance of supporting/coaching university teachers in the design and implementation of innovative, diverse, and efficient teaching strategies.

From this, it is important to …

have a better understanding of the transfer process

from the external domain ⟷ into teachers' personal world

(in order to)

↓

design adequate support systems for their academic grow.

Acknowledgements

We would like to thank Professor António Correia, Professor Ângela Cunha, Professor Adelaide Almeida and Professor Fernando Gonçalves from the Department of Biology of the University of Aveiro, Portugal, and all the students involved in this research.

Funding

This research was financed by European Founds “FEDER através do Programa Operacional Factores de Competitividade – COMPETE” and by National Founds through “FCT – Fundação para a Ciência e a Tecnologia” project «PTDC/CPE-CED/117516/2010»

Thank you for your attention.

hpedrosa@ua.pt
aurora.moreira@uc.pt
blopes@ua.pt
cguerra@ua.pt
julio.pedrosa@ua.pt
acunha@ua.pt
aalmeida@ua.pt
mike.watts@brunel.ac.uk

de universidade de aveiro departamento de educação
cidtff centro de investigação Didática e Tecnologia na Formação de Formadores
FCT Fundação para a Ciência e a Tecnologia MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA
COMPETE
UNIÃO EUROPEIA Fundo Europeu de Desenvolvimento Regional
QREN QUADRO DE REFERÊNCIA ESTRATÉGICO NACIONAL

Some References

Biggs, J. (1999). What the Student Does: teaching for enhanced learning, *Higher Education Research & Development*, 18(1), 57-75.

Clarke, C. & Reid, J. (2013). Foundational academic development: building collegiality across divides? *International Journal for Academic Development*, 18:4, 318-330, DOI: 10.1080/1360144X.2012.728529.

Clarke, D.J. & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education*, 18(8), 947-967.

Cohen, L; Manion, L. & Morrison, K. (2007). *Research Methods in Education* (6th edition), London, Routledge.

European Commission (2013). *Report to the European Commission on Improving the quality of teaching and learning in Europe's higher education institutions*. Luxembourg: Publications Office of the European Union.

Higher Education Academy (2011). The UK professional standards framework for teaching and supporting learning in higher education. Retrieved November 28, 2013, from http://www.heacademy.ac.uk/assets/documents/ukpsf/ukpsf.pdf

Hutchings, P., Huber, M., & Ciccone, A. (2011). *The Scholarship of Teaching and Learning Reconsidered: Institutional Integration and Impact*. San Francisco: Jossey-Bass.

Kennedy, A. (2005). Models of Continuing Professional Development: a framework for analysis. *Journal of In-Service Education*, 31(2), 235-250. doi: 10.1080/13674580500200277

Knight, J. (2004). Instructional coaches make progress through partnership. *Journal of Staff Development*, 25(2), 32-37.

Macaro, E. & Mutton, T. (2002). Developing language teachers through a co-researcher model. *Language Learning Journal*, 25 (1), 27-39.

Pedrosa de Jesus, H. & Silva Lopes, B. (2011). The relationship between teaching and learning conceptions, preferred teaching approaches and questioning practices. Research Papers in Education, Vol. 26(2), p.223-243.

Pedrosa-de-Jesus, M.H. & Silva Lopes, B. (2012). Exploring the relationship between teaching and learning conceptions and questioning practices, towards academic development, Higher Education Research Network Journal (HERN-J), 5, 37-52

Pedrosa-de-Jesus, H. Moreira, A., Lopes, B. & Watts, D.M. (2014). So much more than just a list: exploring the nature of critical questioning in undergraduate sciences. *Research in Science & Technological Education*, 32 (2), 115-134. DOI: 10.1080/02635143.2014.902811.