Editorial:

Evidence-based teaching – Examples from learning and teaching psychology

Stephan Dutke[1]

Helen E. Bakker[2]

Joulia Papageorgi[3]

Jacqui Taylor[4]

[1] University of Münster, Germany

[2] Utrecht University, The Netherlands

[3] University of Nicosia, Cyprus

[4] Bournemouth University, United Kingdom

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Psychological research has generated theoretically well-founded and empirically investigated principles of learning and teaching, for example, spaced learning, writing to learn, multi-modal learning, collaborative learning, practice testing, and many others. Recently, basic principles of effective teaching and learning have been summarized in several publications (e.g., Cranney, 2013; Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Dunn, Saville, Baker, & Marek, 2013; Graesser, Halpern, & Hakel, 2008; Pashler, Bottge, Koedinger, McDaniel, & Metcalf, 2007; Roediger & Pyc, 2012; Schwartz & Gurung, 2012). The basic idea is that teaching and learning can be improved in diverse applied settings when teachers consider the psychological evidence in designing learning opportunities and when learners recognise them as supporting their own learning processes (Dunn et al., 2013). The term *evidence-based teaching* summarizes this idea and refers to "learning and teaching strategies that have strong empirical evidence (derived from psychological research) for being effective in facilitating student learning" (Cranney, 2013, p. 2).

Evidence-based principles of learning and teaching emerged from research on the human cognitive system and thus are assumed to be generalizable to learning in different domains. Consistently, publications on evidence-based teaching address teachers and learners in diverse domains and in different academic disciplines. Nevertheless, applying abstract principles or rules requires adapting them to the demands and constraints of the specific learning situation and content. Spaced learning, practice testing, or collaborative learning, just to name a few, take different forms when applied, for example, in teaching foreign languages or in learning mathematics. Teachers and students of psychology should be in a privileged position to apply these principles of teaching and learning, because they emerged from psychological research, i.e. from their own academic discipline! Is this an over-optimistic

expectation? Do we apply our own research results to our own teaching? To what extent is the teaching of psychology evidence-based? These are the key questions that motivated us to propose this special issue. The goal was to collect evaluated examples of evidence-based teaching in psychology classrooms. So we invited contributions that demonstrate how principles which have been proven to be effective are applied to the teaching of psychology, including a discussion of the effects on student learning.

This special issue includes a review, two articles, and three reports. Schwieren, Barenberg, and Dutke focused on the testing effect which demonstrates that taking tests during the learning phase facilitates later retrieval of the tested material from long-term memory, compared to non-tested learning material. Although hundreds of studies have explored the validity, the critical conditions, and theoretical explanations of this effect (for a review see for example, Rowland, 2014), little is known about the application and effectiveness of practice testing in the teaching of psychology. After an extensive literature search, Schwieren et al. located 19 studies investigating the testing effect in psychology classes. Their meta-analysis yielded a significant positive mean effect size comparable to those found in meta-analyses which included studies from other learning domains. The authors concluded that practice testing supports learning also in psychology classrooms.

Koch and Spörer worked with teacher-training students for elementary school and prepared them for giving reading lessons. The university students learned about reciprocal teaching (Palincsar & Brown, 1984), a well-known and positively evaluated method for improving reading competences in elementary school (e.g., Rosenshine & Meister, 1994). The university students not only learned about reciprocal teaching at the theoretical level but practiced it in the same way as their prospective school students will do – but with text materials suitable for university students. Koch and Spörer found that the university students benefitted from reciprocal teaching in that their own text comprehension competences improved – not only their ability to apply this method in their later professional practice.

Blech and Gaschler used an approach based on the theory of active, generative learning (Wittrock, 2010), and the generative theory of drawing construction (van Meter & Garner, 2005; see also Leutner & Schmeck, 2014). They describe two experiments in which they focused on students' understanding of the relationship between group average curves and individual learning curves, and explored whether posing questions about the individual time course of learning can help psychology students to generate valid representations of the average time course of learning, using vignettes (Experiment 1) and a metaphor (Experiment 2) respectively.

Venza, Falgares, and Guarnaccia worked with graduate clinical psychology students and focused on the development of professional identity through experiential learning. Students were asked to write a short text starting from the prompt "becoming a psychologist…" before and after their participation in an experiential group, and their responses were subjected to text content analysis using specialized software. Their findings indicated that participation in group experiential learning allowed students to construct a more realistic and less stereotypical and idealized vision of their future profession, and at the same time helped them become more aware of the limits of their training program. The authors concluded that proposing and practicing experiential learning activities aiming at developing representations of the profession and professional identity enabled students to develop awareness and effective professional knowledge about the role of a psychologist.

Reflective journals have been shown to be an effective way to monitor and develop reflective practice in higher education and research has shown that the choice of their assessment can be an important factor in enhancing commitment to learning and reflection. Bruno and Dell'Aversana present a case study where reflective journals were used in a Master's Degree program, and explore the effects of journal writing and formative feedback on the quality of reflective practice. Unlike previous research, they evaluate the impact of feedback not only by measuring student perceptions of effectiveness and level of satisfaction,

but also by assessing the development of reflective practices. The article contributes to the current debate about the effectiveness of one-to-one writing tuition by providing evidence of formative feedback efficacy in developing the quality of reflective practice.

The report by Boser et al. describes the implementation of an innovative module for first-year undergraduate students enrolled at a University in Germany, based on the principles of social constructivism and problem-based learning. A detailed description of the teaching formats is provided with a focus on the evidence-based teaching techniques implemented, specifically feedback, testing effects and spaced learning. Evaluation data concerning the students' perceptions and objective assessments are presented; the results showed that students acquired significantly more knowledge during web-based training, but that the learning outcomes were independent of students' pre-test knowledge, suggesting that this teaching format may contribute to the reduction of heterogeneity among first-year students. Possible implications for future modifications of the module are discussed and general recommendations are offered to teachers of psychology.

We hope that these examples will inspire interest in evidence-based teaching, in utilizing the huge reservoir of general principles of instruction and learning for the teaching of psychology, and in evaluating its effectiveness in methodologically sound research designs. Publishing research on teaching psychology will further support the professionalization of psychology teaching and will provide our students with new opportunities to benefit from psychological learning research.

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