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Guest editorial

Students' perspectives on learning environments

1. Introduction

There is a widely shared belief that learning environments and instructional designs based on emerging paradigms of learning will lead to better learning results in terms of quality of knowledge and skills as well as in terms of equality of different learners (Bransford, Brown, & Cocking, 1999). The advocates of "new" learning environments often report positive results based on mere theoretical analyses or small-scale design experiments. Critical studies and research reviews, however, show that broader empirical evidence does not always support these results. New learning approaches and instructional arrangements often fail when applied in ecological settings, with larger student populations, or when critically examined by using rigorous experimental methods. This may be partly due to the difficulties of introducing new educational ideas in schools which are constrained in many respects by external pressure, limited time, lack of resources, and conservative beliefs about proper teaching. Moreover, there are reasons to argue that not only the external constraints but also an overly simplistic or overly optimistic interpretation of the basic assumptions of emerging learning environments, such as students active responsibility, self-directed learning, collaborative inquiry, and the use of relevant and open-ended tasks can bring about these failures (Aviram, 2000; Gerjets & Hesse, 2005; Mayer, 2004; Vauras, Salonen, Lehtinen, & Lepola, 2001; Winne, 2005).

Learning environments based on recent (socio-) constructivist evolutions in learning theories allow students to play an important role in both efficiency and effectiveness of so-called "powerful" learning environments (De Corte, Verschaffel, Entwistle, & van Merriënboer, 2003). In this issue, students' ideas and activities influencing their use of learning environments are explored. Although in educational psychology the central position of learners as agents of their learning processes is evident, this is not the case in instructional design. Instructional design until now mainly focused on the environment as an "objective" external factor influencing learning. It was expected that a given learning environment directly generates the intended learning outcomes. However, discrepant interpretations between instructional designers and learners about the functionalities of learning environments commonly lead to a mismatch and

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sub-optimal use of instructional interventions, as illustrated in studies on students' mediation (Winne, 1982). The sub-optimal use of instructional interventions by students has been demonstrated in traditional classroom learning (e.g., Salonen, Lehtinen, & Olkinuora, 1998) as well as in new technology based environments (e.g., Clarebout & Elen, in press; Gerjets & Hesse, 2005; Järvelä, Lehtinen, & Salonen, 2000). Indeed, instructional interventions are often neglected by students or used in ways that deviate from what is intended by designers (Perkins, 1985).

Instructional designers and learning environment developers typically overestimate the strength of the direct effect of instructional interventions provided by the environment. Even in didactical models, which are aimed at controlling stepwise students' behavior, students' attempts to cope with the situation and regulate their own activities might have a stronger influence than the features of the teaching procedure itself. Similarly, instructional design emphasizing students own construction processes may fail because students do not interpret the learning goals as expected and often regulate their learning in a mal-adaptive manner (see Winne, 2005).

It is evidenced that instructional interventions are effective only if learners carry out learning activities which correspond to the intentions of the instructional designer, and make suitable use of affordances in the learning environment. Taken from this perspective, students' interpretations and intentions are "mediating" between learning environments and learning outcomes (Elen & Lowyck, 2000), and influence the effect of learning environments. Consequently, all the chapters in this issue are situated in the so-called mediational paradigm. They indicate that a better understanding is needed of the mediating role of students' cognitive, motivational and behavioral processes and beliefs related to learning and instruction. There is a lot of research dealing with the issues which might be relevant for analyzing students' attributes as prerequisites for successful instructional design. These studies, however, often belong to different theoretical traditions and conceptualize students' activities in different terms. This is also the case in the chapters of this special issue. On the surface level, the different papers use very different terminology, but on a deeper level, there are many connections between them.

All the chapters present evidence of how students' cognitive and motivational processes and learning-related beliefs mediate between learning environments and learning outcomes. Some emphasize more general cognitive constraints and affordances typical for all students (Gerjets & Hesse, 2005; Winne, 2005), whereas others refer mainly to the inter-individual differences, and show how the same environments might appear very different to different students depending on students' idiosyncrasies (Entwistle & Peterson, 2005; Lowyck, Elen, & Clarebout, 2005). In addition, intra-individual differences as features of a learning environment can have different effects on one individuals learning processes in different situations. The papers also show that general conceptions of so-called constructivist theories are too coarse grained when the complex interactions between environmental features and student characteristics are analyzed. The authors of the chapters propose that more adequate terms may be based on a more detailed analysis of the nature of cognitive processes and limitations of human information processing (cognitive architecture) in terms of cognitive psychology (Gerjets & Hesse, 2005),

phenomenological analysis of student conceptions of learning and knowledge (Entwistle & Peterson, 2005), student ideas about instruction (Lowyck, Elen, & Clarebout, 2005), as well as students' differences in self-regulation and calibration of their situational interpretations (Winne, 2005).

Students' (intentional) activity can be seen as an integrating concept for all the papers in this issue. Students' learning results are determined by the more or less consciously executed activities of particular students in the learning environment. The papers of Entwistle and Peterson, and Lowyck, Elen, and Clarebout describe how students' perceptions and activities are influenced by the conceptions they have about learning and knowledge and about instructional principles as well. Because the concepts of learning and instruction are often contested, broad, fuzzy and experiential, it is difficult to identify a single meaning. Thus, it is obvious that an individual student can have a variety of learning-related conceptions and consequently focuses his or her activities differently in different learning and instruction situations.

There is a great deal of correlational evidence showing that conceptions of learning and instruction have an effect on students' learning activities. Different conceptions emphasize differently students' agency of their own learning and the roles and duties of teachers and students. Relying on different research traditions, all authors in this issue argue for the impact of these conceptions on concrete study orientation and behavior. Because of their conceptions of learning and instruction many students are not willing or able to carry out the activities presupposed in many learning environments based on constructivist principles, preferring instead to cope with learning situations using strategies suitable for more direct instruction and teacher control.

Activities can also be analyzed by using more fine-grained cognitive terms (Gerjets & Hesse, 2005; Winne, 2005). By using several empirical examples, the authors show that many general level assumptions guiding the design of a technology-based learning environment might be problematic if more detailed results of cognitive research are not taken into account. In these contributions, the obstacles of learning environments are caused not so much by conscious conceptions but by very fundamental characteristics of cognitive and perceptual processes.

The chapters in this issue describe different aspects of a complex relationship between learners and their learning environment with different methodologies, from various perspectives, in different settings, and at different levels. These complementary views are both interesting and challenging since they support the main idea of mediation and simultaneously confront the different approaches.

In research on students' mediating variables reported in the different chapters, the unit of analysis differs. In some cases, students are confronted with a very concrete learning task or a computer program and in other cases with much broader environments like innovative universities. Depending on the focus of research, a variety of techniques are used, including high-tech observational research-unobtrusive measures (SRL), phenomenographic research, information-processing analysis (experimental research), questionnaires and instructional design task analysis.

However, the issue not only illustrates the conceptual and methodological divergence, but also a convergent understanding of students' perspectives in powerful learning environments. All chapters conceive of the learner not only as a mere user of

instructional interventions, but equally as a critical, reflective and even unruly actor. Students' perspectives have been elaborated in different chapters that certainly lead to a better understanding of underlying communalities. The same applies to the concept of "powerful learning environments" that is critically scrutinized in different chapters and discussions.

From the educational point of view, it is important to investigate whether students' conceptions of learning and instruction can be developed in a way that results in positive changes in their study and learning processes. A learning environment can be regarded as powerful if it provides students with optimally supported possibilities for high-level learning, improving students' adequate self-regulation and facilitating the advancement of their conceptions of knowledge, learning, and instruction.

2. Structure of this special issue

In their chapter on *Conceptions of learning and knowledge in higher education: Relationships with study behaviour and influences of learning environments*, Entwistle and Peterson consider a series of interrelated concepts that have been shown to be associated with student learning in higher education, including conceptions of knowledge and learning, learning orientations, and students' perceptions of, and preferences for different kinds of learning environments. At a more specific level, differences in study behavior have been described in terms of approaches to learning, regulation, and processing strategies. Their chapter clarifies the meaning of the various concepts, highlights the inter-relationships between them, and considers the ways in which they may affect students' reactions to the learning environments they experience, whether powerful or not.

In the chapter on *Instructional conceptions: Analysis from an instructional design perspective*, Lowyck, Elen, and Clarebout start from the position of learners not as mere consumers of instructional designers' products, but as active actors in learning environments and in line with the mediating paradigm, students' instructional conceptions are analyzed. These conceptions act as cognitive filters that affect students' use of both instructional interventions and support in learning environments. To gain insight into the complexity of students' instructional conceptions, they first analyze the concept and its theoretical assumptions. Next, research findings regarding instructional conceptions are reviewed. Attention is paid to the nature and development of students' instructional conceptions and to the relationship with similar conceptions. In the discussion section, current limitations of both the conceptualization and instrumentation of instructional conceptions are described and perspectives are opened on further research.

Gerjets and Hesse, in their chapter *When are powerful learning environments effective? The role of learner activities and of students' conceptions of educational technology*, take a theoretical and empirical perspective on how learners' conceptions of educational technology might influence their learning activities and determine the power of computer-based learning environments. The concept of a powerful learning environment is analyzed, and recent developments in ICT are used for a technological

implementation of these environments. Based on a number of empirical studies, they argue for the power of computer-based learning environments to be largely dependent on highly detailed aspects of the learning activities that take place in these environments. In order to design environments that elicit effective learning activities, factors that determine learners' goals and their choices of processing strategies are described. This leads to learners' instructional conceptions with regard to educational technology. Since these particular types of instructional conceptions have hardly been studied, findings from neighboring fields, like epistemological beliefs, attitude research, human computer interaction, and cognitive modeling are reviewed.

In his chapter on *Students' calibration of knowledge and learning processes: Implications for designing powerful software learning environment,* Winne concentrates on the concept of calibration. This concerns a judgment's deviation from fact, introducing notions of bias and accuracy, and metric issues regarding the validity of cues' contributions to judgments and the grain size of cues. Miscalibration hinders self-regulated learning (SRL). Considering calibration in the context of both the SRL and learning tasks model, he describes software-supported research on mining naturalistic data to explore calibration of study tactics and developing sensitive measures of individual differences in calibration. He suggests four research-based principles for enhancing SRL: delay meta-cognitive monitoring, summarize content, select seminal information for review, and provide more effective practice tests.

The comments of Säljö (discussion 1) and Lesgold (discussion 2) add value to the chapters in this issue, both offering interesting and critical perspectives on the topic.

Säljö in his comment *Learning and technologies, people and tools in co-ordinated activities*, focuses on understanding the rationalities and activities of learners making use of technological learning environments. Though he agrees with most authors of the different chapters who attempt to integrate into the discussion findings on learner's conceptions and approaches to learning, he opens a second line of reasoning. This implies a detailed examination of learner behaviors/activities that provides instructional designers and software developers with appropriate models of what learners do. Learners are not only "mediating" variables but also valuable information sources for building powerful learning environments.

Lesgold's comment *Contextual requirements for constructivist learning,* concentrates on requirements that need to be satisfied to overcome the contextual constraints of constructivist learning. He points to a number of important issues that need to be covered in order to make a learning environment powerful. The first one is the learner's prior knowledge state. What is relevant to learning is the learning situation as represented by the learner and as related to the learner's prior knowledge. Mental load is another one, and it is worth studying how cognitive load might be managed in powerful learning environments. It is described how this approach can contribute to deep-level learning and far transfer. A last issue pertains to students' ideas that are embedded in the cultures of which they are a part. Lesgold recognizes the necessity of the "why" and the "how to" of constructivist approaches that need to be enculturated into our society. Indeed, designing powerful learning environments demands a deep understanding of how constructivism is fostered and why it is important.

References

Aviram, A. (2000). Beyond constructivism: Autonomy-oriented education. *Studies in Philosophy and Education*, *19*, 465–489.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn*. Washington: National Academy Press.

Clarebout, G., & Elen, J. Tool use in computer-based learning environments. Towards a research framework. *Computers in Human Behavior*, in press.

De Corte, E., Verschaffel, L., Entwistle, N. J., & van Merriënboer, J. (Eds.). (2003). *Powerful learning environments: Unravelling basic components and dimensions*. Oxford: Elsevier Science.

Elen, J., & Lowyck, J. (2000). Instructional metacognitive knowledge: A qualitative study on conceptions of freshmen about instruction. *Journal of Curriculum Studies*, *32*, 421–444.

Entwistle, N., & Peterson, E. R. (2005). Conceptions of learning and knowledge in higher education: Relationships with study behaviour and influences of learning environments. *International Journal of Educational Research*, *41*, 407–428.

Gerjets, P. H., & Hesse, F. W. (2005). When are powerful learning environments effective? The role of learner activities and of students' conceptions of educational technology. *International Journal of Educational Research*, *41*, 445–465.

Järvelä, S., Lehtinen, E., & Salonen, P. (2000). Socioemotional orientation as a mediating variable in teaching learning interaction: Implications for instructional design. *Scandinavian Journal of Educational Research*, *44*, 293–306.

Lowyck, J., Elen, J., & Clarebout, G. (2005). Instructional conceptions: Analysis from an instructional design perspective. *International Journal of Educational Research*, *41*, 429–444.

Mayer, R. E. (2004). Should there be a three-strikes rule against pure discovery learning? *American Psychologist*, *59*, 14–19.

Perkins, D. N. (1985). The fingertip effect: How information-processing technology changes thinking. *Educational Researcher*, *14*(7), 11–17.

Salonen, P., Lehtinen, E., & Olkinuora, E. (1998). Expectations and beyond: The development of motivation and learning in a classroom context. In J. Brophy (Ed.), *Advances in research on teaching*, Vol. 7 (pp. 111–150). Greenwich, CONN: JAI Press.

Vauras, M., Salonen, P., Lehtinen, E., & Lepola, J. (2001). Long-term development of motivation and cognition in school context. In S. Volet, & S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp. 295–315). London: Pergamon Press.

Winne, P. H. (1982). Minimizing the black box problem to enhance the validity of theories about instructional effects. *Instructional Science*, *11*, 13–28.

Winne, P. H. (2005). Students' calibration of knowledge and learning processes: Implications for designing powerful software learning environments. *International Journal of Educational Research*, *41*, 466–488.

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