

# Teaching Research Methods in an Internet-Based Blended-Learning Setting

## Vienna E-Lecturing (VEL)

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**Abstract.** This article gives a survey of a blended learning approach called Vienna E-Lecturing (VEL), implemented in the course Research Methods and Evaluation, which is required by the psychology program at the University of Vienna, Austria. VEL replaces a main lecture and has been designed to teach methodological issues more effectively as well as to strengthen students' learning competences in this field. The program's conceptualization is based on instructional and motivational findings yielding the program's two main teaching principles: (1) networking and (2) optimal instructions. The Internet-based course lasts two semesters and is composed of 10 online learning modules and 11 face-to-face meetings (including tutorials). The modules, which are available successively via a learning platform, systematically instruct students to learn more effectively by cooperating and fulfilling different tasks within small groups.

The current article describes the program's principles and theoretical background and outlines the 10 online modules. In addition, some module examples are given for illustration.

**Keywords:** teaching research methods, E-learning, blended learning, enhancing self-regulated learning

University classes teaching the principles of methodology in psychology, sociology, or educational science are, in comparison to courses dealing with more substantial academic themes, in a rather difficult position. While the methodological foundations are highly relevant for all students majoring in these subjects, both during college and later in professional life, the popularity and esteem for methodology courses are, in general, significantly lower than those for areas of more substantial content. Students enrolled as psychology majors demonstrate negative attitudes toward methodology courses at the start of their studies, whereby further interest suffers subsequent decline (Giesler, 1998). Moreover, no other subject demands a comparable number of examinations in the course of the study (Diehl, 1993).

This discrepancy between the relevance and acceptance of methodology courses inspired us to deliberate on possible alternative teaching models. We developed the Internet-supported teaching concept Vienna E-Lecturing (VEL), which should lead to increased commitment among the students by guiding them to grapple with the material at a deeper level. The teaching concept is founded on theories based in motivational and instructional psychology (Pintrich & Schunk, 1996). In addition to the factual content of methodology, VEL also imparts learning competence, teamwork, and e-competence—in other words, how to navigate and learn with an Internet platform.

Presently VEL is being implemented in the mandatory

two-part course Research Methods and Evaluation offered for psychology majors at the University of Vienna. The courses are traditionally offered as two 2-hour courses during the third year of undergraduate studies (following satisfactory completion of preliminary degree examinations) and extend over two consecutive semesters.

In the present article, the learning goals, didactic principles, and program structure of VEL will be outlined, beginning with an analysis of the problems currently experienced in teaching methodological concepts for university students majoring in psychology.

## Problems in Teaching Methodological Concepts

Students majoring in psychology are generally negative about having to attend obligatory courses in methodology and statistics (Gal & Ginsburg, 1994). For many of them, the confrontation with research methodology is a “nightmare” (Gruber & Renkl, 1996; Schutz, Drogosz, White, & Distefano, 1998). Merely one quarter of students maintain that they would still enroll in methodology and statistics courses were they not compulsory (Renkl, 1994). In the profile of subject interests for psychology majors, the area of methodology not only has the poorest “start value,” but

also suffers the greatest loss of attractiveness. The awareness of the purpose and practicality of statistics becomes increasingly negative (Giesler, 1998).

Methodology courses are not only unpopular, but are also associated with the highest levels of anxiety among students. One can assume that 70%–80% of these students experience uncomfortable statistics anxiety (Onwuegbuzie, 2004; Onwuegbuzie & Wilson, 2003; Zeidner, 1991). Statistics is one of the most anxiety-inducing courses in the students' programs of study (Blalock, 1987; Zeidner, 1991).

The negative attitude toward methodology courses and in particular statistics anxiety result in the following consequences for competence development and academic progress: (a) postponing the enrollment in the obligatory methodology courses as long as possible, in some cases to the very last semesters—as long as it does not conflict with university curricular requirements (Onwuegbuzie, 2004; Onwuegbuzie & Wilson, 2003); and (b) poor performance in methodology courses (Onwuegbuzie, 2003; Roberts & Saxe, 1982). In addition, one can assume that the experiences of these students may cement their attitudes toward the field of methodology, and thus determine whether they become consumers of statistics in the future (Birenbaum & Eylath, 1994; Onwuegbuzie, 2000). Hence, one can assert that (c) following the conclusion of their studies, students will no longer engage in the topic of statistics and consider the participation in further methodology courses as irrelevant for forthcoming activities (Blalock, 1987). All in all, it is not surprising that methodology courses are identified as problem courses at several universities and are often a source of student annoyance (Diehl, 1993; Schulmeister, 1983; Schutz et al., 1998).

VEL originated in response to the problems described above, and has been developed, evaluated, and optimized over several phases (Spiel et al., 2004).

## Learning Goals of VEL

In order to reduce the problems in the teaching of the methodology concepts described, a change was made from imparting pure factual knowledge to teaching this knowledge with an orientation toward learning as an additional explicit objective. Moreover, the structure of the course was optimized according to principles developed in instructional and motivational psychology, and group work was instated as a fundamental element. Finally, the application of Internet-based learning seemed to incorporate another plausible element in the attempt to alter the negative image associated with traditional methodology courses. Thereby, competences other than those purely related to methodology became important. As e-learning holds a wide appeal for many students, VEL should contribute to the reduction of the reservations associated with specific subjects and motivational deficits. Concretely speaking, VEL pursues four learning goals concurrently: the mediation of (1) factual knowledge, (2) learning competence, (3) collaborative learning abilities, and (4) e-competence.

## Learning Goal 1: Factual Knowledge

Over the course of the 5-year program leading to a graduate degree in psychology at the University of Vienna, basic courses in statistics and psychometrics are given during the first 2 years of a student's education in methodology. VEL is applied to the 2-hour, two-semester course Research Methods and Evaluation, which is given in the third year and supplies students with knowledge and skills needed for the comprehension, planning, execution, and assessment of empirical studies. Students are offered an overview of the methods involved in empirical social and human research, whereby particular attention is given to the topic of evaluation, that is, the scientifically supported assessment of psychosocial measures (Bortz & Döring, 2003). The course is not expressly related to other courses, but it builds a network out of the somewhat scattered information acquired in the first 2 years of study and presents it as a unified whole. This course is the basis for further advanced courses required in methodology.

The material covered in VEL is presented through the utilization of both German- and English-language literature, whereby a central feature of VEL is that the students are to actively come to terms with the literature on their own (see didactic concepts below). It comprises secondary literature on methodology (i.e., textbooks, handbooks) as well as topical overviews, including texts derived from scientific journals. In order to smooth the transition into this style of learning and research, students work only with the German-language textbook *Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler* by Bortz and Döring (2003; the most current edition is always used) during the first part of the course (winter semester). Previous experiences have demonstrated that at the start of a course on methodology, consistency in style, level of difficulty, attention to detail, and terminology are very important. This specific textbook was chosen because it offers a comprehensive overview of the subject and will remain a useful reference through a student's course of studies.

In the second part of the course (summer semester), the students work—at least in part—with a second textbook, *Evaluation for Education and Psychology* by Fink (1995), which deals primarily with evaluation. Furthermore, the students are assigned a number of methodological and empirical articles published in scientific journals, whereby the latter also serve to illustrate the application of methods. In addition to the literature assignments, conceptual knowledge is brought forward through the teaching staff. This includes the presentation of authentic evaluation projects or the comparative assessment of various methodological approaches to the same investigative problem.

In the intention of imparting factual knowledge, VEL does not differ from any other method of teaching. However, differences may well be found with respect to the didactic approach it pursues. The approach to teaching and learning in VEL can be simplified with the following catch phrase: "In order to learn successfully, one must want to learn and be able to learn." The second learning goal of VEL is oriented to the "want to learn" and "be able to learn" aspects, through the systematic encouragement of learning competence.

## Learning Goal 2: Learning Competence

In addition to the acquisition of factual competence, VEL aims to improve the learning skills of students. The students learn how to optimize their learning processes, thereby enabling them to better meet the demands of the subject at hand. Empirical studies have repeatedly demonstrated that learning programs should not just focus on the imparting of material content, but that attention should also be placed on the learning itself (Hattie, Biggs, & Purdie, 1996; Simpson, Hynd, Nist, & Burrell, 1997). Nevertheless, there are only a few learning programs in either the secondary or tertiary academic level that expressly pursue this goal.

VEL aims to successively instruct students in a systematic “guidance” of their own learning processes, which is based on the phase model of self-regulated learning developed by Zimmerman (2000). According to this model, in the process of learning one can differentiate among three phases: forethought, performance, and self-reflection. The first phase is occupied with the planning of a learning action, the second describes the specific execution or act of learning, and the third evaluates the learning actions. The skills of collaborative learning are closely tied to the competence of self-regulated learning and are a necessary expansion to the enrichment of many learning and vocational goals (see, e.g., Boekaerts, 2002; Konrad & Traub, 1999). Thus, the encouragement of collaborative learning is the third goal of VEL.

## Learning Goal 3: Collaborative Learning Competence

In the VEL program, collaborative learning is based on the self-determination theory developed by Deci and Ryan (1993). According to this theory, individuals work and learn driven by intrinsic motivation, when they experience success, when they are autonomous in their actions and when they are socially integrated. To incorporate this into VEL, the students are given a wide range of opportunities to structure their work, and they are systematically guided to work together in teams. At the start of the course, small groups of five students are formed, which remain over the entire VEL program. The students work on assignments within these groups on various tasks to which optimization feedback is given. This setting creates the frame for the experience of success.

## Learning Goal 4: E-Competence

The fourth learning goal of VEL deals with the imparting of e-competence. This is understood as including those skills necessary to participate in an electronically supported exchange of information, that is, working with an electronic platform, the delivery (posting) of texts, participation in discussion forums, and so on. This is significant, as new media are of increasing relevance (Fischer & Mandl, 2002) and will represent the learning environment of the future (see Weibel, 2003). Although schools and univer-

sities are well equipped with hardware, there is no broader use of these technologies, as the necessary personal competences are lacking (Sandbothe, 2003). Within VEL, working with the learning platform is unavoidable and the students are forced to participate in discussion forums. Because of this demand, imparting e-competences is an implicit learning goal of VEL. In tutorials, this aim becomes explicit by explaining and demonstrating the functions and potentials of e-learning platforms.

Based on the abovementioned four learning goals, we now offer a brief description of the didactic principles of VEL.

## Didactic Principles of VEL

VEL is centered on two didactic principles: (1) networking and (2) optimal instructions.

### Networking as a Didactic Principle

The principle of networking is concerned with (a) the application of a blended learning approach, (b) the interlocking mediation of various learning goals, (c) the application of explicit and implicit forms of mediation, and (d) the inclusion of various types of knowledge (Schober, 2002).

According to a so-called hybrid-learning or blended learning approach, VEL (see a) systematically combines learning modules (online) and presence units (face-to-face). The information learned in the online modules is interrelated with the content of the face-to-face units. While the online modules necessitate active debate with the literature and the solution of specific exercises, the face-to-face units offer the opportunity for discussion and the illustration of particular problems (see Program Structure).

Moreover, the four learning goals of VEL are not cultivated separately and independently of one another, but rather concurrently and are interlinked with one another (see b). For example, the capability to learn from texts (learning competence) is directly honed with texts relevant to the subject at hand (substantial competence). This pedagogical approach, that is, embedding the mediation of learning competence in the mediation of substantial competence, is known as the embedded approach (Simpson et al., 1997).

In the individual learning units (modules), a systematic combination of implicit and explicit mediation is applied (see c). For example, in the online modules the students are *explicitly* directed to delve into specific literature, to work out predetermined exercises, or to take a self-administered test (see Program Structure). *Implicit* learning takes place in the group work, which creates opportunities for discussions of the learning material (here the learning goals, substantial competence, and collaborative learning are intertwined; see above). In particular, in the acquisition of skills and knowledge in the field of methodology and statistics, such collaborative processes are counted among the most effective learning methods (Dolinski, 2001; Mvududu, 2003).

Furthermore, VEL promotes the acquisition of three types of knowledge: declarative, procedural, and conditional knowledge (see d). The application of factual knowledge (declarative knowledge) alone is rather useless if one does not know *when* (conditional knowledge) and *how* (procedural knowledge) it is to be applied (Hattie et al., 1996; Renkl, 1996). This is activated by VEL via tasks for which evaluative methods are first theoretically determined, then tested on concrete data sets, and finally subjected to discussion on their suitability under specific conditions.

## Optimal Instruction as a Didactic Principle

When the aim of teaching is to provide guidance to result in concrete actions, the question of optimal instruction is of central significance. Ideally, teachers should be able to rouse interest among their students, inspiring them to delve into the topic, encouraging them to discover sequences of thoughts and ideas and then to reflect and develop their own individual positions regarding this knowledge. In the field of instructional psychology several aspects have been identified that help to generate or facilitate this type of learning; they include *teaching functions* (Klauer, 1985) and *teaching-learning steps* (Gagné, 1985). An integration of these two approaches leads to seven teaching functions that are effective in the instruction of the VEL online modules (see Table 1). From a metaperspective, these seven teaching functions can also be classified to the three phases of the learning model developed by Zimmerman (2000; cf. Learning Goals of VEL).

Exemplarily, at this point the realization of two teaching functions should be examined more closely: training of learning material and active application (see Table 1, Learning Function e) as well as feedback (see Table 1, Learning Function f) regarding both procedures used as

well as the achievement levels attained by the learner. In VEL the learning material is systematically sharpened with specific exercises and then put to active operation in the group work. The results of the exercises completed in the group are consequently assessed. Here various types of feedback are put to use: (a) individual feedback (computer generated), (b) group-specific feedback (written comments from the teacher, verbal comments from the teacher, written comments from peers), and (c) general feedback (written comments from the teacher).

The individual feedback pertains to the learning progress of the individual student after the completion of a learning phase in the online modules and is presented through a computer-driven feedback system according to the achievement level attained.

The group-specific feedback informs each group about the quality of the work they are generating. This occurs either verbally, during face-to-face meetings with the teacher, or in written form via the online platform. In peer feedback, which is propagated as “peer-assisted learning” (PAL; Topping & Ehly, 1998) and is considered by most students to be helpful (Dunn, 1996), the individual groups assess one another. The general feedback is composed by the teachers in a written format and offers an overall assessment of all group work for each online module.

According to previous findings, feedback designed to encourage motivation should focus on potential effects on self-esteem as well as future effort levels. It should primarily supply information and should not be construed as evaluative or personal assessment (cf., e.g., Schober, 2002). All of the feedback supplied by the teachers in VEL is composed in a manner to encourage motivation. Strengths are highlighted, weaknesses are pointed out, and possibilities for improvement are brought up.

## Program Structure

VEL represents an Internet-based teaching concept, which utilizes a password-protected learning platform, accessible to all participating students via the Internet. VEL engages a blended learning approach, that is, a combination of online modules and on-site meetings with teachers (see Didactic Principles of VEL). It consists of 10 online modules and 11 face-to-face units (see Table 2).

The students work on the online modules on a learning platform. VEL was technically realized in the 2003/4 academic year on the learning platform ILIAS (Integriertes Lern-, Informations- und Arbeitskooperations System [Integrated Learning, Information, and Employment Cooperating System]); in the 2004/5 academic year the program moved to the WebCT Vista<sup>1</sup> learning platform. The online modules are closed, conceptual units derived from university curriculum guidelines. Modules are successively opened for access on dates scheduled in advance (see Table 2). Thus, premature access to not-yet-relevant topics is not possible; the examination of previously completed models is, in contrast, always permitted.

Table 1. Teaching principles for optimal instructions in VEL

| Phase model (Zimmerman, 2000) | Learning functions based on Klauer (1985) and Gagné (1985)   |
|-------------------------------|--|
| Forethought                   | (a) Gaining the learner's attention                          |
|                               | (b) Explicitly informing learner of learning goals           |
|                               | (c) Activating learner's prior knowledge                     |
|                               | (d) Emphasizing significance of learning material            |
| Performance                   | (e) Practicing and actively implementing learning material   |
| Self-reflection               | (f) Giving feedback on learner's progress and performance    |
|                               | (g) Enabling evaluation and modification of learning process |

<sup>1</sup> In the development of the online modules and their presentation on the platform, primarily HTML imports are applied. This means that the individual components of the modules are programmed in HTML and then, on the basis of the platform structure, are made available

Table 2. VEL composition—chronological sequence of the online modules and the face-to-face units

| Modules                | Online modules   | Face-to-face units   |
|------------------------|--|--|
| <i>Winter semester</i> |  |  |
|                        |  | Kickoff  |
|                        |  | Tutorial: Establishing groups                                      |
|                        |  | Tutorial: Using platforms  |
|                        |  | Meet the expert I: Evaluation as applied research                  |
| Module 1               | What is scientific research?                                     |  |
| Module 2               | What is evaluation?  |  |
| Module 3               | What would you like to investigate? How can this be measured?    | Meet the expert II: Evaluation projects—examples from the practice |
| Module 4               | How do you need to structure your study? Investigative design I  |  |
| Module 5               | How do you need to structure your study? Investigative design II | Meet the expert III: Project management in evaluation studies      |
| <i>Summer semester</i> |  |  |
|                        |  | Tutorial: Group reflection   |
|                        |  | Meet the expert IV: Data collection                                |
|                        |  | Tutorial: Project management                                       |
| Module 6               | How do you collect data?   |  |
| Module 7               | How do you evaluate the data found?                              |  |
| Module 8               | How do you report the results?                                   | Meet the expert V: Presenting research results                     |
| Module 9               | How do you release—or publish—your study?                        |  |
| Module 10              | What are the current trends in evaluation research?              | Meet the expert VI: Models and standards in evaluation research    |

The face-to-face units are composed of a kickoff event, six “meet the expert” units, and four tutorials (see Table 2). In the kickoff event, the students receive basic information regarding the organization and operating sequence of VEL. The meet the expert units are more or less comparable, in their practical execution, to a classical lecture class. However, their goals and presentation of material distinguish them from the classical lecture. Building on the knowledge acquired by the students (through assigned readings or group projects), specific topics of the learning material are discussed on a deeper level (e.g., advantages and disadvantages of various types of methodological approaches). Problem areas and how to cope effectively with them are also illustrated with the use of concrete (evaluation) studies. Furthermore, the students have opportunities to address direct questions to the teachers. Since the topics covered in all face-to-face units (see Table 2) are announced at the start of the semester, the students can prepare their questions in advance.

While the meet the expert units primarily serve to mediate and reflect on substantial factual knowledge (Learning Goal 1), the tutorials (see Table 2) focus on the other learning goals (see Learning Goals of VEL). In the first tutorial, the fundamentals of group work are discussed and the learning groups are built by self-selection. To encourage the development of a group identity, each group chooses a name for its group and places group photos on the platform. Under the motto “Fit for e-learning,” the second tutorial is composed as a seminar on the development

of basic e-skills; included here are how to navigate the network platform, post texts, and use the discussion forums. In the third tutorial, at the start of the summer semester, reflection is made on the group work completed up to this point. The last tutorial addresses the topic of project management. Here, skills relevant for the organization and execution of evaluations are made available (Patzak & Rattay, 1998).

## Composition of the Online Modules

In the following pages, the composition and execution of the online modules are described. In order to realize the learning goals (see Learning Goals of VEL) as well as the didactic principles (see Didactic Principles of VEL) with a specific example as an illustration, all points will be presented in relation to their appearance in Module 3. The integration of this module into the overall structure of the program can be derived from Table 2.

The 10 online modules composing VEL exhibit a uniform composition. Figure 1 shows the schema of how the modules are constructed, using the start site for Module 3. The navigation bar on the left demonstrates the structure that runs consistently through the program.

“Home” is the start site (see Figure 1), and is automatically opened upon entering the module. Here the topic of the module is named and associations to prior knowledge are stimulated. Module 3, for example, deals with the topic of operationalization and opens with the text line “During

to authorized users (students). In constructing the modules as HTML pages (through the application of Style Sheets and JavaScript) a wide range of opportunities are opened for the presentation of the module content. Simultaneously, VEL is also relatively independent of platform type, and can be activated in a wide variety of venues. Central here is that the activation of the didactic concepts has clear priority over the technology being used. In accordance with these premises, the layout used by the modules is Internet compatible, although with sparse graphics.

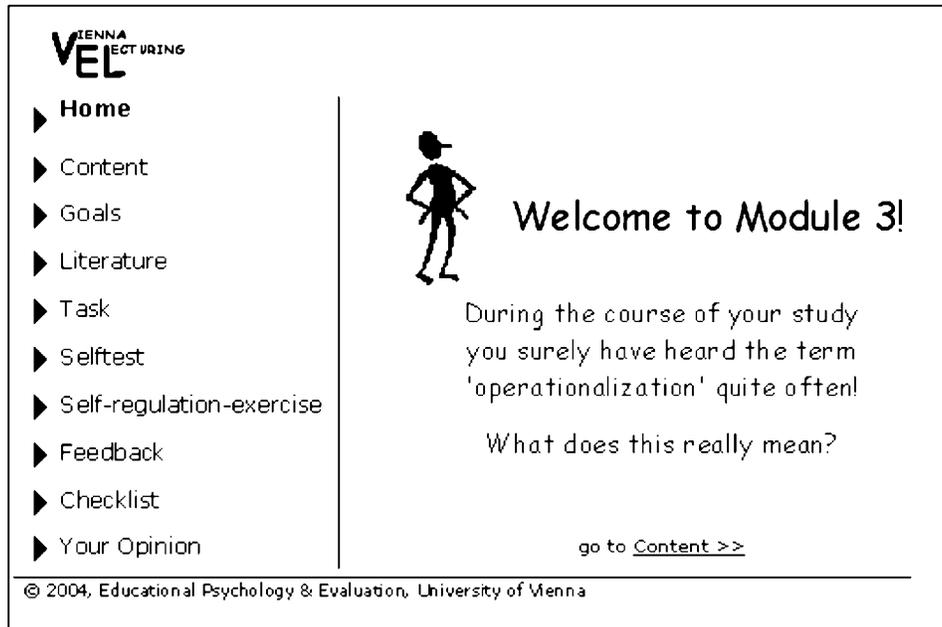


Figure 1. Module 3 “welcome page.”

the course of your study you surely have heard the term ‘operationalization’ quite often!” to draw a connection to previous experiences. This activation of prior knowledge is additionally supported through an introducing question: “What does this really mean?”

“Content” features the topic of the module and presents its practical relevance. For Module 3 this is formulated as follows: “The material presented here will enable you to make psychological variables measurable. You will need these concepts when you are planning an evaluation study.”

“Goals” specifies the learning goals of the module and informs the students as to what specifically they will be learning. The text on this point in Module 3 reads (with regard to the factual knowledge) as follows: “generating investigative goals” and “making relevant psychological variables measurable.” The goal pertaining to learning competence reads, “using feedback constructively.”

“Literature” is the first page that requires active participation. Here the student finds references to specific literature necessary to complete the demands of the module. In Module 3 the participants are asked to carefully read pages 112–132 of the textbook by Bortz and Döring (2003).

“Task” relates to the assigned literature and is to be completed in the group. How the group members arrange their collaborations (live or on the platform) is not predetermined, but is decided by the students themselves—this may vary from group to group and module to module.

The group tasks are subdivided into several steps. The group task for Module 3 consists of four steps. Step 1 calls for individual reading and reflection on the assigned text, whereby both are guided systematically. In order to loosen up the atmosphere for participants before starting Step 1, a cartoon is depicted, since it has been shown that the incorporation of humorous cartoon examples has a positive

effect on the attitudes of students (cf. Schacht & Stewart, 1990).

Step 2 instructs the students to use the group meeting to discuss what the term *operationalization* means, and why it is essential for the planning of an evaluation study. The terminological definition derived in the group is to be fixed in writing.

Step 3 embraces the task of evaluating a newly developed method for learning text passages. The group is requested to (a) come up with three operationalizations of the dependent variables at hand (text comprehension), (b) formulate specific hypotheses for the evaluation, and (c) consider what types of data-collection methods would be appropriate. All work is to be composed in written form.

In Step 4 the group is to decide upon one of the suggested operationalizations, and to substantiate it on the basis of the following five questions: What are the independent and dependent variables? What sorts of moderator variables could play a role here? Which types of samples would be well suited for this investigation? What would be the most appropriate method for investigation? How and what type of data would be collected?

By posting the written answers to Steps 2 through 4 on the platform, the members of the group would have fulfilled the requirements of Module 3 concerning the factual knowledge. A deadline is given in every case, marking the temporal end of the module. The students are usually given two weeks to complete a module.

In “Self-Test,” the students are able to individually assess their declarative knowledge on the content of the module. This test consists of 8–10 items in a multiple-choice format. The test is administered online; in other words, the questions are both read and answered directly on a computer monitor. The “evaluate” function found at the end of the test supplies the participant with the number of ques-

tions answered correctly as well as a list of the items that were answered correctly and incorrectly. In addition, the participant receives individual feedback pertaining to the results of this test. As mentioned above, the feedback function (see Table 1) plays a meaningful role in the administration of the online modules. The basic foundation for the self-test feedback can be derived from the attributional retrainings performed by Ziegler and Schober (1997) and the results found by Dresel (2004). In these works the significance of encouraging self-esteem and effort for specified achievement are particularly emphasized. In order to avoid the development of adaptation effects across the modules, variations were integrated into how the feedback was expressed. The motivational relevance of such feedback has been confirmed in works based on attributional theory (e.g., Dresel, 2004; Ziegler & Schober, 1997). Examples of feedback to the self-test in Module 3 can be found in Table 3.

“Self-Regulation Exercise” requires—similarly to “Task”—an active participation in the group and is focused on the learning processes of the students. This is a realization of the second learning goal of VEL, the mediation of learning competence. Simultaneously, the first learning goal (mediation of factual competence) and the second learning goal are intertwined in that the self-regulation exercise should serve to support the content-based learning process. For example, students performing the self-regulation exercise in Module 3 are made aware of the difficulties in adequately dealing with critical feedback. Specifically, the exercise reads:

Discuss in your group how you have previously dealt with critical feedback (regarding your task performance) and whether you would like to make changes here. Compose a list of five slogans which would be helpful to you in dealing with feedback—also on work which did not come over well—in the future. These slogans should be short and concise, so that you can hang them over your workplace. Sort out the slogans so that the one you find to be best is on top, the second one in second place and so on.

Under “Feedback” the students receive feedback to their performance in completing the exercises assigned to them (“Task”). As previously mentioned in Didactic Principles of VEL, we distinguish here between group-related feedback (written from the teacher, verbal from the teacher, written from peers) and general feedback (written from the teacher). At the start of VEL the students receive primarily group-related feedback from the teacher. This offers more opportunities for orientation than general or peer feedback. General feedback and peer feedback are used increasingly in the second part of VEL (summer semester).

Under “Checklist” the students have access to a comprehensive list of all assignments to be completed in a module, along with their corresponding deadlines. These can be checked off with a mouse click, so that the individual can create an overview of what has already been completed. This list, in conjunction with a short questionnaire on subjective advances made regarding competence, enable a reflection on both the working and learning processes.

“Your Opinion” serves both to complement the individual reflection process and the continuing evaluation that accompanies the program. Here the participants are asked to fill out an online questionnaire detailing how helpful they found the individual aspects of the module to be and how much time they invested in completing the module requirements. Furthermore, the students have the opportunity to submit their own comments.

In order to once again clarify the relationship between the construction of the online modules and the didactic principles of the program, Table 4 presents a comparative view of the individual module components, the seven instructional events (Gagné, 1985; Klauer, 1985), and the three learning phases proposed by Zimmerman (2000; cf. Table 1).

## Future Work and Outlook

By utilizing a systematic orientation on theories developed in instructional and motivational psychology and a module approach in a solid structural basis, VEL is able to deliver a basal didactic framework. The specific content (relevant literature, exercises) remains dynamic; in other words, it can be adapted and optimized (e.g., adapted to current literature). VEL supplies a structure founded in learning theory with a high degree of content flexibility.

With the realization of the courses composing Research Methods and Evaluation, VEL has been integrated into regular curricular operation and is being simultaneously subjected to a comprehensive evaluation within the framework of a research project. In the 2004/5 academic year, 50 students took part in the VEL administration of Research Methods and Evaluation; they were divided into 10 groups of 5 students each. To realize the extensive learning program, including feedback procedures and tutorials, two tutors were employed for 20 hours per week. It must be emphasized that at the moment VEL is being developed and employed as a pilot program with extensive accompanying research. So the question of cost-effectiveness that comes up in this context is deemed not currently relevant in this phase. It must be answered when VEL is implemented in

Table 3. Feedback given to self-test in Module 3

|  |  |
|--|--|
| Examples of feedback to success (all items correct)                        | You really learned a lot on the topic of investigative classes!<br>Very well done—it pays to invest time in working thoroughly!  |
| Examples of feedback to failure (less than one third of the items correct) | You need to be a bit more precise here! With more effort you will be able to come up with more correct answers.<br>These problems aren't very easy. Think this through more carefully! |

Table 4. Framework of instructional events underlying the module structure (components)

| Module components        | Instructional events according to the phases            |   |   |
|--------------------------|---|---|---|
|                          | (1) Forethought   | (2) Performance                                   | (3) Self-reflection                         |
| Home                     | (a) Gaining attention<br>(c) Activating prior knowledge |   |   |
| Content                  | (d) Emphasizing significance                            |   |   |
| Goals                    | (b) Making goals explicit                               |   |   |
| Literature               |   | (e) Exercise and active implementation of content |   |
| Task                     |   | (e) Exercise and active implementation of content |   |
| Self-Test                |   | (e) Exercise and active implementation of content | (f) Feedback on progress and achievement    |
| Self-Regulation Exercise |   | (e) Exercise and active implementation of content |   |
| Feedback                 |   |   | (f) Feedback on progress and achievement    |
| Checklist                |   |   | (g) Evaluation and modification of learning |
| Your Opinion             |   |   | (g) Evaluation and modification of learning |

the routine of teaching without any goal of further improvement or additional research.

The evaluation of VEL (see also Wagner, Schober, Reimann, Atria, & Spiel, in press) is organized in a treatment-control-group design and has three levels: (1) data collection integrated into the modules (amongst others, in the rubric “Your Opinion”), which is to deliver the foundation for the optimization of the modules as well as their individual building blocks (see above); (2) an effectiveness analysis through comprehensive collection of subject-related and motivational personality characteristics among the participants at three measuring points (start of winter semester, end of winter semester, and end of summer semester)—here the primary focus is on the collection of data pertaining to actual factual competences and changes in these variables as well as on motivational variables and self-estimations of subjective perceptions regarding acquisition of knowledge and competence; and (3) qualitative interviews with all group members, permitting insights into the operation and quality of collaborative work processes, since the request of cooperative work efforts does not guarantee that true cooperation will take place (cf. Renkl, Gruber, & Mandl, 1996).

On the basis of the deficits in the teaching of methodological concepts depicted initially, VEL is currently being implemented in a course of studies in methodology. However, we maintain that the basic didactic concept can be applied to other domains. The realization of the concept as a general teaching model independent from a specific subject is a future goal of the VEL project. So VEL should be developed to a well-documented concept that helps to improve teaching on the basis of central principles of instruc-

tional and motivational psychology, even if the teachers are not experts in these fields. The VEL program makes clear that reflection on teaching and a willingness to adapt one’s own work are necessary.

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