Educational Technology Expertise Center  
Open University of the Netherlands

Research project proposal

This project falls in the following research topic(s):

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<th>Design</th>
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<td>Delivery</td>
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<td>Diagnosis</td>
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1 Project chair
Name: Dr. R. Martens  
Function: Educational technologist  
Department: Educational Technology Expertise Center  
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2 Project name
English: Overview of intake and evaluation in a competence based introduction to psychology  
Dutch: Overview van de intake en evaluatie van het competentie-gebaseerde kennismakingstraject psychologie

3 Place in organisation
This research project fits into the Delivery and Diagnosis themes of the OTEC research program

4 Synopsis of the research problem
English
The competence-based introduction to psychology (KMT 2000+) is an OUNL development project with a strong emphasis on educational innovation. It is supposed to serve as a way to formatively select those students that are well ‘suited’ for a psychology study at the Open University of the Netherlands (OUNL). This is done by means of an introduction course on psychology, an introduction on ICT, an introduction on the use of intake instruments, and so on. The complete study load is 240 hours. The KMT 2000+ is both a selection tool, as well as an appealing example of third generation distance education. Because of the high educational technology ambitions, research into the effects of KMT2000+ is required. First the validity and the reliability of the intake instruments and the selective/matching function must be researched. Second, student evaluation and the success rate must be researched thoroughly. Finally, the experiences of developers must be taken into account, since KMT 2000+ will serve as a major example for other introduction programs and educational innovation at the OUNL. All these research topics are strongly connected so there is a strong need for co-ordination and effective research instruments. This research project is designed to realise this.
Het KMT 2000+ is een innovatief (OTEC en Humaniora) toepassingsproject waarbij het kennismakingstraject psychologie ingrijpend wordt vernieuwd volgens de principes van ‘derde generatie afstandsonderwijs’. Het KMT 2000+ dient als een formatief selectiemiddel voor studenten met de intentie het WO psychologie te volgen. Hiertoe krijgen zij o.a. een introductiecursus psychologie, ICT en intake instrumenten met een totale studiebelasting van 240 uur. Behalve als een selectiemiddel dient het KMT 2000+ ook een wervende kracht te hebben door zijn aansprekende onderwijsvorm. Het KMT 2000+ heeft een belangrijke voorbeeldfunctie en werkt als een adviserend selectiemiddel. Daarom is grondig onderzoek vereist naar de validiteit en betrouwbaarheid van de selectieve werking, het rendement, de student-evaluatie en de evaluatie door ontwikkelaars. Omdat al deze research-topics sterke onderlinge samenhang vertonen en complex zijn is er behoefte aan een goede coördinatie van het onderzoek alsmede aan effectieve en efficiënte research-instrumenten. Dit project is daartoe opgezet.

<table>
<thead>
<tr>
<th>Research team</th>
<th>Name and titles</th>
<th>Expertise/function</th>
<th>Department</th>
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<tbody>
<tr>
<td>a Project chair</td>
<td>Dr. R. Martens</td>
<td>Educational technologist</td>
<td>Otec</td>
</tr>
<tr>
<td>b Project team</td>
<td>Dr. R. Martens</td>
<td>Educational technologist</td>
<td>Otec</td>
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<tr>
<td></td>
<td>To be specified from the KMT 2000+ Intake team (Derks, Bloemers, Kampermann, de Roode or Bos)</td>
<td>Domain experts</td>
<td>Otec/Humaniora</td>
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<td>c Other team members</td>
<td>To be determined</td>
<td>Technical programmer (TWOP)</td>
<td>Otec</td>
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<td>d Consultants</td>
<td>Dr. W. Verreck; Dr. D. de Haan; Dr. G. Moerkerke; Drs. van den Boom</td>
<td>Project chairs of related research or development projects</td>
<td>Otec</td>
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<td></td>
<td>To be specified</td>
<td>Members from the ‘national Intake consultations’</td>
<td>Otec</td>
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| Length of the project | Begin date: July 1 1999 | End date: July 1 2002 | Total length: 36 months |

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<tr>
<th>Intended output</th>
<th>a Publications and conference presentations</th>
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<tbody>
<tr>
<td></td>
<td>• 2 articles in ICO journals, plus 1 in a teaching methodology journal</td>
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<td>• 2 conference presentations.</td>
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<td>• There will be reports/articles on the intake, the study (student perspective) the construction (author perspective) and the final results of the first KMT 2000+ cycle.</td>
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<tr>
<th>Intended output</th>
<th>b Instruments and procedures</th>
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<td>Web based research instruments suitable for various formats (e.g. multiple choice questions, open ended questions). Included are procedures for automated settlement.</td>
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<th>Further elaboration</th>
<th>a Further elaboration of the problem and aims of the research project, including scientific framework</th>
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<td>General description KMT 2000+</td>
<td>The competence-based introduction to psychology (KMT 2000+) is an OUNL development project with a strong emphasis on educational innovation. For a detailed description is referred to Kampermann, Perrijn, Derks &amp; van den Boom (1999) which to date is still in concept version. KMT2000+ is supposed to serve as way to formatively select those students that are well ‘suited’ for a study psychology at the OUNL. This is done by means of an introduction course on psychology, ICT, the use of intake instruments, and so on. The complete study load is 240 hours. The KMT 2000+ is supposed to serve as selection tool, but also as an attractive example of third generation distance education. Two important problems this project seeks to tackle are:</td>
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1. A low success rate (moving on to psychology university education), which is in the current KMT about 15%.
2. A low 'appeal'. The new KMT 2000+ should be more attractive and should be based on the concept of 'third generation distance education' (Thorpe, 1998).

Also, the KMT 2000+ should be based on the starting point that the development of competencies is, or at least should be, a central issue in higher post-secondary education. Where behavioural objectives, knowledge, skills and attitudes have been the key factors in curriculum design for several decades, competencies and competence standards are now becoming the main focus. There is both a formal and a functional contradiction in the fact that many institutes define the concept competence as the starting point for rethinking their education while the concept itself is often a loose and poorly defined term. This means that a lot of research, development and thinking will have to be done with regard to this aspect of the KMT 2000+ (see Martens, 1999; Joosten en Poelmans, 1998). ICT will be used as an important tool to realise these goals (Kamperman, Perrijn, Derk & van den Boom, 1999; see also Boon & Joosten, 1998). In the next sections the basic research questions will be presented.

Intake instruments: linking to a current Ph. D. project.
At the Open University of the Netherlands more and more intake instruments are being used. These instruments serve to support students (on a voluntary, formative base) to make well-founded decisions about a study at the Open Universiteit Nederland. In Dutch speaking higher education there is a strong and increased research effort for this. Determinants of study careers, development of intake instruments, research into the causes of drop out, etceteras, are related to this (Prins, 1997; van der Huist & Janssen, 1999; Otting, Stuurwold & Zwaal, 1999; Beekhoven, de Jong & van Hout, 1999; Elsen, 1999; Schittekatte & Coetsier, 1999). At the Open University of the Netherlands more and more intake instruments are considered necessary because, alongside its advantages, distance education obviously has disadvantages as well. Some of the most important of these are the relative lack of support, guidance and interactivity, the fact that course material is often static and is not tailored to meet the needs of the users, and the lack of interim adjustments to take account of what students actually do. It can be argued that these are critical problems, which are at least partly to blame for the difficulties that students encounter in the process of self-study (Martens, 1998, a, b). Such problems may express themselves in the form of students' falling behind in their studies or dropping out. Distance education attempts to solve these problems by making use of embedded support devices in (written and electronic) course material (Rowntree, 1990; Martens & Valcke, 1995; Martens, Valcke, Poelmans & Daal, 1996). However, errors, incorrect assumptions, unrealistic planning and ineffective study methods are still hard to detect and correct.

A problem often encountered is that students tend to have unrealistic beliefs about their possibilities to study at a distance. This is in line with the before mentioned success rate of only 15%.

According to the view that assessment can be used as a tool for learning (e.g., Dochy & McDowell, 1997; Askham, 1997; Moerkerke & Dochy, 1998; Martens & Dochy, 1998), a way to solve these problems is to make students more aware of the required knowledge and skills, competences for studies (Taylor, 1998). The most important aspect of this is making students aware of their prior knowledge. This might lead to better-underpinned decisions about study plans at the OUNL. Many investigations have shown that prior knowledge state is one of the most determining factors and that it is an important predictor of subsequent study outcomes (e.g., House, 1995; Land & Hannafin, 1996). Vosniadou (1996, p. 102) states: 'In the context of cognitive psychology, the construct that seems capable of providing an explanation of phenomena such as inert knowledge and misconceptions is that of prior knowledge.' Research in the field of prior knowledge, often based on constructivism, supports the point of view that a detailed analysis of prior knowledge components provides an essential contribution to an effective diagnosis and support of students’ learning processes (Dochy, 1992; Dochy & Alexander, 1995; Dochy, Moerkerke & Martens, 1996).

The definition of prior knowledge is not an easy job. Researchers reporting about prior knowledge often avoid it (Dochy, Moerkerke & Martens, 1996). Prior knowledge can be defined
as: a knowledge state at a certain time, that encompasses both declarative and procedural knowledge, that is present before execution of a learning task, that is directly available or can be retrieved, that is relevant for the objectives of the learning task, that is hierarchically structured, and that is applicable to other learning tasks (inside and outside of the knowledge domain), that has a dynamic nature (c.f. Dochy, 1992; Dochy & Alexander, 1995). In line with this definition we consider prior knowledge as more than factual knowledge, but a complex of knowledge, skills and competences.

For more information about the intake instruments that were already developed on the WWW such as presented by the Open University of the Netherlands we refer to Hermans & Martens, 1999. In this research it was found that students highly appreciate formative web based intake instruments and use them relatively often. Some follow-up research amongst new students is required for this research, which will be described later on.

An important input to the intake instruments of the KMT 2000+ will come from by a Ph.D. project (Bloemers, van der Molen, Brug & Hofstee, 1999). In this project a diagnostic advice instrument will be constructed, aiming at starting students. As with the intake tools developed by Hermans & Martens (1999) these tools will have to be Web based, for efficiency reasons.

As predictors for study success four clusters are distinguished:

• General intelligence
• Personality (‘big five’)
• Specific to study related concepts such as learning style and prior knowledge
• Biographical features (such as age and gender)

This Ph. D. project will be linked to the current KMT and the future KMT 2000+. This linking will have to be done in such a way that the mutual dependence is not total. The project will have to be treated as a formally independent project, organisationally placed in the Humaniora directorate. Below we will discuss the practical research structure and the simultaneous processes/developments (such as instrument development, exchange of data) that will have to be foreseen. In general we seek answers to the questions: what is the use, effectiveness, validity and reliability of the intake instruments? Before coming to that question first we will have to determine what intake instruments can and will be employed.

**Evaluation of third generation distance education**

The next item to be researched is the student evaluation of the concept of third generation distance education. Too often educational innovation is based on developers’ intuition, political or strategic arguments and not on real data or facts. Foreseen is the use of questionnaires measuring various aspects of the educational concept, the contents, the way information is presented, the communication possibilities, learning access level rating, and so on. As far as possible, already existing questionnaires (e.g., Martens, 1998, a; Martens, Valcke & Portier, 1998) will be used in order to be able to make comparisons with other educational innovations. Besides the questionnaires, in depth structured interviews will be set up with a restricted sample of students.

This research is set up to give a clear answer to the question: how do students evaluate working in a third generation distance context?

Note that this research question is not merely aimed at the evaluation of the KMT 2000+. On the first place it is placed on the educational concepts behind this. Previous experiences showed that it is possible to distinguish these two aspects in questionnaires and that students understand this distinction (Martens, Valcke & Portier, 1997). This distinction is important to reach to generally applicable conclusions (Martens, 1998, a).

**The developers’ perspective**

A final research question is related to the developer’s perspective: How do developers (e.g., authors, educational technologists) perceive the construction of third generation distance education? This central question will be disentangled into questions such as how much time did it cost, how did the communication with students take place, how do authors (and other actors) evaluate the KMT 2000+ and the construction process, how do they think about the development tools provided, et cetera. Partly, this part of the research can be based on a study by Brok & Martens (1998). In that research the author/developer perspective was investigated
with regard to the development environment Mercator.

Summarising the research
Because of the high educational technological ambitions, research into the effects of the KMT2000+ is required. First the validity and the reliability of the intake instruments must be researched. Also student evaluation and the success rate must be researched thoroughly, and finally the experiences of developers must be taken into account, since KMT 2000+ will serve as an example for the other introduction programs. All these research topics are strongly connected so there is a strong need for co-ordination and for effective research instruments. This research project is designed to realise this.

The research will be based upon electronic questionnaires that can be filled in by means of the Internet. Previous experiences with this (Hermans & Martens, 1999) showed the high effectiveness of this research approach, allowing almost completely automated data collection and processing. Also structured interviews will be used.

b Importance for the Open University of the Netherlands and the place of the research in the Otec Research Program
The relevance of the research topic is obvious for the Open Universiteit Nederland. Third generation distance education and competence based education belong to the core business of the Open University of the Netherlands (see Instellingsplan). They are also central in the Otec research program (see below). The effort that is being put in this is in sharp contrast with the actual data such as student evaluations, reliable tools for intake, development evaluation, etcetera. This research project tries to take away this lack of actual data. It also tries to deliver coherent data and not isolated research findings.

Next to this, the research project will contribute to reliable and valid intake instruments and to the development of innovative evaluation procedures.

c Design & Methods
Five basic phases can be discerned.

1. Gearing of activities and co-ordination
The Ph.D. research project, the development of intake instruments and the development of the learning tasks must be tuned to each other. Data will have to be exchanged. To date neither the Ph.D. nor the KMT 2000+ project plan have reached their final status so this fine-tuning can not be done yet. On a regular base co-operation and information exchange will take place by the constitution of two groups, called ‘intake’ and ‘evaluation’.

2. Literature study and orientation. Part of this phase is a follow up research on the instruments developed in the study by Martens and Hermans (1999). This research will be held amongst a sample of recently started OUNL students. It will question the use and the effects of the electronic intake instruments that were already developed.

3. Instrument development
Instruments for electronic evaluation/intake and structured interviews will have to be developed. This includes the technical development (in HTML and/or JAVA) of a general tool and the actual content and set up of the instruments, related to the research questions. For all electronic questionnaires the usability as well as validity and reliability will be tested. The extent to which this is done depends on the function of the test. An advice instrument will have to be tested more profoundly. Where possible and required pilot testing will be done, and the U/M lab from Otec will be used.
Next to electronic questionnaires interviews will be used and we will use available figures about the population (such as general characteristics, study career). The interviews will be used as a validation of the other data and as a way to increase the validity of conclusions (triangulation).

4. Data collection
Data will be collected at four moments: the intake, the study (student perspective), the construction (author perspective), and the end of the first KMT 2000+ cycle.

5. Analysis and reporting
Related to the four data collection moments (in phase 3) are the 4 analysis and reporting moments. There will be reports/articles on the intake, the study (student perspective), the construction (author perspective), and the final results of the first KMT 2000+ cycle.

Subjects
Three categories of subjects will be used:
1. Regular students
2. Drop outs (possibly also non-starters)
3. Developers/authors

The exact numbers of subjects will be determined on the basis of availability of subjects (depending on subscription rates). Interviews will be held with at least 7 subjects per category and electronic questionnaires will be sent to at least 15 subjects per category, but preferably to many more subjects.

Design
No direct control groups are foreseen. For efficiency reasons control data will be obtained from other, available data sets. There are data on student and author evaluations of other forms of (innovative and regular) OUNL education (e.g. Brok & Martens, 1998). Also data have been collected about the current KMT Psychology (Joosten & Poelmans, 1998). With one sample T-tests these figures can be compared with the means that are found in the evaluations that are foreseen.

d Literature


der Molen, Brug & Hofstee, 1999) are finalised. In general, the 5 project phases mentioned above will be the starting point (i.e. Gearing of activities and co-ordination; Literature study; Instrument development; Data collection; Analysis and reporting). Phase 2, literature study, will also include a short follow up research related to the research of Hermans & Martens (1999). By means of electronic or printed questionnaires the effects of the instruments used in that research will be investigated with actual OUNL students.

Related to the four data collection moments (in phase 4) are the 4 analysis and reporting moments. There will be reports/articles on the intake, the study (student perspective) the construction (author perspective).

Phase 1 will continue throughout the complete project, phases 2 up to and including 5 will be placed successively in time. The project is in close collaboration with the ‘Humaniora directorate’, faculty psychology. Activities in other Otec research project such as projects from Verreck (tools and procedures for quality control) Moerkerke and de Haan (assessment) are geared to this project.

Global timing. Please note that the exact timing can only be planned when the KMT 2000+ project plan is finalised. Here we will restrict ourselves to a global timing that might be subject to change.

- Literature study/follow up study Hermans & Martens research; 7/1999- 7/2000
- Instrument development; 10/1999- 6/2001
- Data collection; 6/2001-12/2001

Practical and scientific co-operation

There are at least four groups of researchers/project with whom we explicitly seek collaboration:

1. The ‘students’ enrolment’ by de Haan (1999). The analysis of portfolios may become an integral part of an intake procedure. In this project an explorative study into the state of the art and bottlenecks at the Open Universiteit Nederland regarding portfolio assessment is planned. After 1 year (July 2000) it will be discussed how and if this project leads to incorporation of portfolio assessment into our project.

2. There is a group of researchers, oriented on Dutch speaking higher education, that have planned to collaborate on the strongly related themes intake, study careers, study drop out, etcetera. The initiative is from Dr. Prins from the KUN, expert in this field (see e.g., Prins, 1997).

3. In the EKO group from Otec research into effective assessment procedures is foreseen. There is an OTEC research project planned by Verreck (1999). Collaboration is foreseen.

4. Moerkerke (1999) will research the construction of assessment programs. Representatives from the above mentioned projects will be included as consultants.

Quality control

One of the basic project aims is quality control (e.g. of the instruments developed). However, also the quality of the project itself needs to be evaluated. A systematic mid term and end evaluation is planned.