CENTRAL EDUCATIONAL
SUPPORT UNIT

**Developed by DUO/ICTO
in implementation of the
Education Policy Plan**

05.242/DUO/2005

Guided Independent Learning

A Brochure for Instructors

http://www.kuleuven.be/duo-icto/BZ/brochure_overzicht.htm

KATHOLIEKE
UNIVERSITEIT LEUVEN

1. Guided Independent Learning in a Nutshell 2

2. This Brochure 3

3. Test Your Prior Knowledge 5

4. What Does It Entail? Basic Principles of Guided Independent Learning 8

4.1 Close Connection between Research and Education 9
4.2 Objectives 10
4.3 Student Responsibilities 12
4.4 Decreasing Guidance and Increasing Autonomy 12
4.5 Instructor Responsibilities 12
4.6 A Coherent Educational Practice 13
4.6.1 The Basic Components 14
4. 6.2 ... and Their Coherence 17

5. More Concretely! Shaping Guided Independent Learning 19

5.1 Objective 1: To be familiar with results of scientific work situated in time and space .. 19
5.2 Objective 2: To gain insight in the way in which research results are established 22
5.3 Objective 3: To be able to interpret new information independently 24
5.4 Objective 4: To be able to actively contribute to knowledge development processes ... 27
5.5 Objective 5: To be able to form a substantiated opinion based on critical insight into underlying processes and develop well-founded social viewpoints 29

6. Is It Feasible? Preconditions for Guided Independent Learning 32

7. An All-embracing Concept? 35

8. A Number of Important Educational Findings 38

8.1 Student Characteristics and their Role in the Learning Process 38

8.2 Good Education: A Number of General Instructions 39

8.3 Assignments for and Tasks of Students as Core of Learning Environments 43

8.4 Implementation of Guided Independent Learning: Research Considerations 44

8.5 Students' Learning Activities: A Number of Findings 45

8.6 References 46

8.5 Additional Literature on Guided Independent Learning 47

1. Guided Independent Learning in a Nutshell

Guided Independent Learning:

- is an **all-embracing concept** developed by the K.U.Leuven and based on scientific research. It is not restricted to one teaching method (p. 8 and 35);
- emphasises the close connection between **research and education** (p. 9);
- stipulates the following **objectives** for academic education (p. 10):
  1. to be familiar with the results of scientific work situated in time and space;
  2. to gain insight into the way in which research results are established;
  3. to be able to interpret new information independently;
  4. to be able to actively contribute to knowledge development processes;
  5; to be able to form a substantiated opinion based on critical insight into underlying processes and develop well-founded social viewpoints;
- holds **students responsible** for their own learning (p. 12);
- states that students must become more independent throughout their education and thus need less guidance (p. 12), and;
- holds the **instructor responsible** for the stipulation of specific objectives, the development of an evaluation system and the creation of a learning environment (p. 12) where these three elements are geared to one another (p. 13) and this within the existing context (p. 16).

For those who lack time, it is recommended to read pages 1 to 18 to obtain an overall picture of Guided Independent Learning.
The note of the Educational Board regarding Guided Independent Learning contains additional information on the need for a new and explicit educational concept, the conceptualisation, implications and implementation plan: [http://www.kuleuven.be/admin/du/niv3p/du-i33.htm].

2. About this Brochure

- This brochure is first of all intended for **titular teachers** of courses at the K.U.Leuven. It offers **concrete information** about what Guided Independent Learning can entail for the development and implementation of education at course level[1].
- This brochure contains seven chapters which stand on their own.
  - In the chapter 'Test Your Prior Knowledge', you can verify to what extent **your opinion** about education corresponds to the approach of Guided Independent Learning, based on statements about education.
  - The chapter 'What Does It Entail? Basic Principles of Guided Independent Learning' deals with the core of Guided Independent Learning.
  - In the chapter 'More concretely! Shaping Guided Independent Learning' the **shaping of education** is central. Here, you find concrete examples of different types of objectives for different groups of students.
  - The **preconditions** for Guided Independent Learning are discussed in the chapter 'Is It feasible? Preconditions for Guided Independent Learning'. This chapter discusses students' attitude with regard to Guided Independent Learning and how the concept can be implemented for large groups of students.
  - 'An All-embracing Concept?' deals with the implementation of Guided Independent Learning outside the different courses: including at **programme level** (and the **Permanent Educational Commission's** (PEC) crucial role in this), at **faculty** level and at **university** level.
  - The last chapter 'A Number of Important Educational Findings' starts from **literature** and discusses a number of elements from educational practice. Research and experience learn that the educational reality is complex. It is not possible nor desirable to discuss this complexity in detail in this introduction brochure. Therefore, this last chapter also

[1] With regard to the curriculum level we refer to the document 'Curriculum Development at the K.U.Leuven available or consultable with DUO/ICTO at: http://www.kuleuven.be/onderwijs/beleidsinfo/intern/brochurecurontw.pdf.

refers to research results and contains a short reading list.

- **Additional Help:** This brochure is only a first introduction to Guided Independent Learning. It is not possible to indicate what Guided Independent Learning entails for each specific context. It is up to each titular teacher to translate this into his/her own educational context. However, this does not mean that you are completely on your own to implementation Guided Independent Learning in your course. Do you have any questions with regard to Guided Independent Learning? Would you like some help to implement Guided Independent Learning in your field? The DUO/ICTO faculty is ready to help you out. You can contact them at: http://www.kuleuven.be/duo-icto.

3. Test your Prior Knowledge

Indicate to what extent you agree with the following statements. After completion, compare your interpretation with the view based on Guided Independent Learning.

Degree of conformity:
1 = I completely disagree; 2 = I disagree; 3 = I tend to disagree; 4 = I tend to agree; 5 = I agree; 6 = I fully agree.

Statements		Complete
1.	I give assignments and thus I implement Guided Independent Learning.	
2.	Guided Independent Learning is rather intended for masters and doctora education.	
3.	Guided Independent Learning states that we must exhaustively discuss the contents of a study domain.	
4.	In Guided Independent Learning the instructor is superfluous.	
5.	The statue of Fonske in Louvain symbolises the learning process of academic students.	
6.	Guided Independent Learning and lectures go hand in hand.	
7.	Guided Independent Learning requires working in small groups.	
8.	Guided Independent Learning will result in less face-to-face instruction for first-year students.	
9.	Guided Independent Learning rules out reproduction questions.	
10.	The implementation of Guided Independent Learning requires intensive communication between the instructors of a study programme.	
11.	By means of implementing Guided Independent Learning the K.U.Leuven wishes to educate its students first of all as competent	
12.	Guided Independent Learning wishes to learn the student how to learn.	
13.	Guided Independent Learning focusses on the students' learning proces	
14.	Guided Independent Learning wants to use the computer as much as possible in order to support the student.	
15.	Guided Independent Learning states that mainly first-year students must be supported.	
16.	The introduction of Guided Independent Learning implies that students will have to work less.	
17.	Guided Independent Learning states that feedback constitutes a key components of good education.	

Per statement a mark is given in accordance with the view of

Guided Independent Learning together with a short explanation.

Statements		Answer
1.	I give assignments and thus I implement Guided Independent Learning.	2
	Working with assignments does not constitute the core of the concept of Guided Independent Learning. It is the nature of the assignments, the feedback, the degree in which students are activated and the extent to which assignments are integrated in the student support, which are crucial.	
2.	Guided Independent Learning is rather intended for masters and doctoral education.	1
	Guided Independent Learning is an all-embracing concept and applies to the first bachelor year as well as postacademic education. In the beginning of the curriculum the guidance will be stronger than at the end.	
3.	Guided Independent Learning states that we must exhaustively discuss the contents of a study domain.	1
	A balance must be sought between the discussion of contents and the development of students' skills to follow new developments and generate knowledge independently.	
4.	In Guided Independent Learning the instructor is superfluous.	1
	Particularly the students must be active, but the instructor is essential to support the students' learning process.	
5.	The statue of Fonske in Louvain symbolises the learning process of academic students.	1
	A student is not a blank page waiting to be filled with instant knowledge. Students acquire knowledge independently based on what they already know and master.	
6.	Guided Independent Learning and lectures go hand in hand.	4
	Guided Independent Learning does not exclude nor prescribe specific teaching methods. The concept does emphasise that the choice of teaching method must be considered carefully based on the stipulated objectives, the desired learning activities, the student characteristics and overall support.	
7.	Guided Independent Learning requires working in small groups.	2
	Interaction is easier in small groups, but there are also ways to increase interaction with students in large groups and/or invite them to actively participate in the educational process.	
8.	Guided Independent Learning will result in less face-to-face instruction for first-year students.	4
	The number of contact hours can be reduced, but a more active participation will be required from the students.	
9.	Guided Independent Learning rules out reproduction questions.	3
	The evaluation must be adjusted to the various (adapted) course objectives. Reproduction questions are possible, but are certainly not the only evaluation questions formulated.	

10.	The implementation of Guided Independent Learning requires intensive communication between the instructors of a study programme.	5
	The introduction of Guided Independent Learning will occur gradually and will require the various courses to be geared to one another. This requires intensive communication.	
11.	By means of implementing Guided Independent Learning the K.U.Leuven wishes to educate its students first of all as competent researchers.	4
	The K.U.Leuven wishes to educate students as people who are able to communicate a scientifically founded opinion, function socially and contribute to the development of knowledge. Research skills contribute to each of these elements. Apart from this, also other types of knowlege and skills remain necessary.	
12.	Guided Independent Learning wishes to learn the student how to learn.	4
	This is important, but Guided Independent Learning is not limited to	
13.	Guided Independent Learning focusses on the students' learning	6
	It is indeed up to students to achieve learning results, and thus their learning is central, but they also need the support from instructors.	
14.	Guided Independent Learning wants to use the computer as much as possible in order to guide the student.	2
	ICT can be useful, but it is not a prerequisite for Guided Independent Learning.	
15.	Guided Independent Learning states that mainly first-year students must be supported.	5
	Characteristic of Guided Independent Learning is the gradual decrease of the support. As students progress in their education, guidance must be limited and adjusted.	
16.	The introduction of Guided Independent Learning implies that students will have to work less.	1
	The contrary is probably the case. Students must learn to spread their efforts and work differently with a stronger effect in the long term.	
17.	Guided Independent Learning states that feedback constitutes a key components of good education.	4
	Yes, this is correct. But attention must also be paid to the quality and timing of feedback.	

4. What does it entail? Basic Principles of Guided Independent Learning

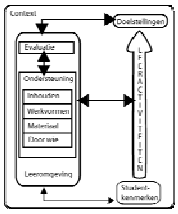
The K.U.Leuven developed **Guided Independent Learning** as a guiding and all-embracing concept for its education. A number of elements are at the basis of this:

- changing conceptions with regard to knowledge and science which emphasise the importance of the method;
- new insights with regard to learning and teaching;
- need for 'useful' and 'efficient' education;
- computerisation;
- computerization, and
- harmonisation of the European education.

These elements are discussed in detail in the note of the Educational Board[2].

The all-embracing concept of Guided Independent Learning has been developed in line with recent scientific developments with regard to learning and teaching in higher education and is the translation and realisation of what 'good education' entails for the K.U.Leuven (for general recommendations with regard to implementing good education: see p. 39). Guided Independent Learning is based on the fact that education at the K.U.Leuven must have a **scientific basis** and that student participation in research is a characteristic of academic education (Verhoeven, Vandeputte & Vanpée, 2000). Guided Independent Learning determines the **objectives** which are characteristic of academic education, the **responsibility** of students and instructors and how the latter **evolves** through successive academic years. Guided Independent Learning has implications for the **teaching methods** and **evaluation forms** used and requires adjusted material and an organisational infrastructure. Guided Independent Learning emphasises the importance of **coherence and consistency** in educational decision-making, both at programme and course level.

[2] The note can be consulted at http://www.kuleuven.be/admin/du/niv3p/du-i33.htm.



This chapter discusses each of these elements in detail. The 'global scheme', as depicted on the right, is intended as a frame and point of reference. The scheme is described in detail from page 13.

4.1 Close Connection between Research and Education

Guided Independent Learning emphasises that education at the K.U.Leuven must have a scientific basis and that participation in research holds an important educational value. The relationship between research and education, established by Guided Independent Learning, can be realised in different ways.

Naturally, in each study programme and preferably in each study field attention is paid to **findings** of scientific research as well as the **origin** and/or background of these findings. Acquiring insight into the origin of scientific findings prevails, since it enables students to critically assess these findings and formulate a well-founded opinion on them. Hence, education lays the foundation for life-long learning. Students should therefore be invited to, for example, read and interpret tables with research results, discuss scientific texts, verify the relevance of research results, repeat an experiment, etc. in order to become actively acquainted with scientific insights and their origin.

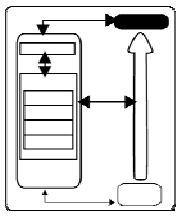
The connection between research and education can also be established by inviting students to **participate in (a part of) a current research.** Hence, instructors' research activities and students' learning activities are integrated. Students conduct research together with the instructor. The instructor receives the opportunity to function as a model researcher for the student. Working on a dissertation or Master's exam are examples of implementing this relationship between research and education. But participation in research should not be restricted to this. Students can also be challenged by means of projects and tutorials.

In order for students to participate successfully in research, they must acquire research skills. In other words, they must **learn to conduct research.** The typical 'methodological subjects' are a tool par excellence for this, but also

seminars on how to use the library or practical lessons in which students systematically solve real problems are useful. Hence, students are supported in implementing learning activities, such as formulating a problem, selecting appropriate techniques, learning new research methods, collecting data, implementing quality controls, reporting in a clear manner.

Research-based education is thus a very broad concept and can be implemented in various ways. Guided Independent Learning allows a personal interpretation of research-based education, but argues in favour of a careful stipulation of courses and curricula which sufficiently (and preferably gradually) confront students with a wide range of activities throughout their education.

4.2 Objectives



The importance which Guided Independent Learning attaches to the close connection between research and education is also expressed in the identification of a number of key objectives.
Guided Independent Learning explicitly states that students in **each** programme and in **each** course must work on the following learning objectives:

- to acquire knowledge of scientific research results situated in time and space (as stipulated in discipline-specific mental frameworks, frames of reference and basic findings);
- to gain insight in the way in which research results are established: this requires an introduction to scientific methods and the development of a critical scientific attitude. Such an attitude is expressed in the ability to positively appreciate research results and the ability to distance oneself from them;
- to interpret new information in order to follow future developments in the field;
- to actively contribute to knowledge development processes; This contribution can take various shapes: questioning of paradigms, extending the field of application, deepening insights. It is of vital importance that students, after each course, are better able to formulate research questions,

describe research methods, gather information, assess information based on its relevance with regard to answering the questions and interpret the gathered information critically, and;

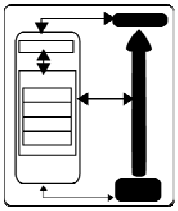
- to form a substantiated opinion based on critical insight into underlying processes and develop well-founded social viewpoints: such an opinion requires the ability to integrate various insights in function of a real problem. Guided Independent Learning therefore advocates a thorough and constant reflection on the social relevance of the acquired knowledge as an essential part of all courses.

As students progress in the curriculum they must achieve the above-mentioned objectives in a more advanced degree. For example, a critical opinion of a first-year student will be less refined than that of a last-year student. In order to achieve these objectives each of the latter must be built up gradually from the first to the last year of education.

Guided Independent Learning states that the previously mentioned objectives must be achieved by each student who graduates at the K.U.Leuven. Additional (theoretical and practical) objectives are however not excluded.

In short, we can state that students must be able to make a contribution to the social functioning. Due to their academic education, graduates are able to introduce themselves to new fields and follow developments in their own field. The purpose of Guided Independent Learning is not only for graduates to develop a number of skills, but also to enable them to evaluate their functionality and adjust if necessary. Graduates have applied themselves to a domain-specific discipline and are able to construct knowledge independently.

4.3 Student Responsibilities



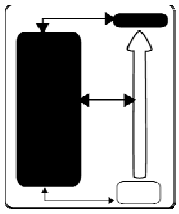
Each student is responsible for his/her own learning. This implies a **triple responsibility:**

- to take note of the objectives which must be realised and demonstrated during evaluations;
- to select and implement the appropriate learning activities in order to realise the objectives, and;
- to inform the teachers (assistants, instructors, etc.) about the difficulties (insufficient access to information, inconsistencies, lack of organisation) they experience in realising the objectives, despite the help on offer.

4.4 Decreasing Guidance and Increasing Autonomy

Guided Independent Learning emphasises that graduates at the K.U.Leuven must be able to contribute to society in an autonomous manner and to construct knowledge independently. To prepare students for this autonomy, Guided Independent Learning emphasises that students gradually need less guidance throughout their study career and that the guidance or support which they need is gradually reduced, both at course and programme level.

4.5 Instructor Responsibilities



Within the concept of Guided Independent Learning, each instructor has a **triple responsibility** together with the Permanent Education Commission (PEC):

- to specify which objectives based on Guided Independent Learning can be pursued in the course;
- to develop and implement an evaluation system which enables the instructor to verify to what extent students have achieved the objectives after completion of the course, and;
- to develop a support system to help students realise the stipulated objectives. This support system must be developed in accordance with the PEC directives, in close consultation with colleagues and staff members involved and with the student characteristics in mind. Assignments with

well-defined expectations and feedback form the core of such a learning environment (p. 43). Interim tests can be part of this learning environment.

4.6 A Coherent Educational Practice

Guided Independent Learning emphasises a coherent and consistent decision process with regard to education. For the titular teacher this implies that the decisions regarding the creation of a learning environment must be taken in a coherent and consistent manner and must lead to an educational practice with clear connections between the various components. The scheme below (Figure 1) gives an overview of the different basic components of an educational practice.

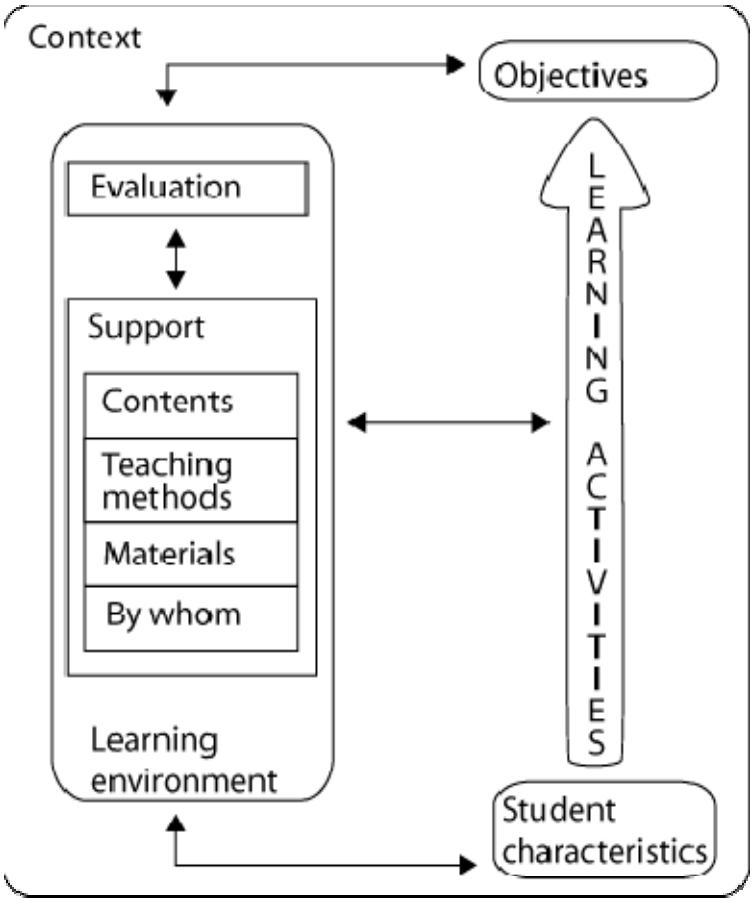
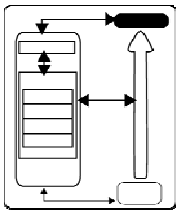
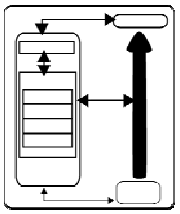


Figure 1: The basic components of an educational practice and their underlying coherence ('global scheme')

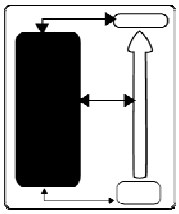
4.6.1 The Basic Components …



The main question when developing learning environments relates to the **objectives** one wishes to attain by means of the course. It is, after all, logical to first determine *what* must be achieved before verifying *how* this can be achieved and *who* can be involved in this. In practice, the first question to be formulated by each titular teacher is the following: 'What must students know, master, … in order to implement specific learning activities for my course?'. As the answer to this question takes shape, the further decision process becomes easier. The objectives as described on page 10 are crucial in this.

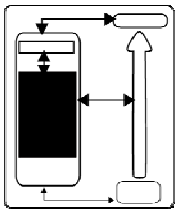


In order to attain the objectives, students must implement specific **learning activities**. Students are not empty vessels. Learning results cannot simply be poured into them. Examples of learning activities are: memorising certain data, following the instructor's reasoning in a lecture, looking for connections between elements of the subject matter, looking up and selecting relevant information, interpreting the core of a text, coming up with examples, solving problems, developing a test set-up, etc. Only by practicing independently, memorising, analysing, etc. students are able to learn. What students learn depends on (the quality and quantity of) their own learning activities (see also p. 45). Within Guided Independent Learning students' personal activities are central and constitute the starting point of their learning process.

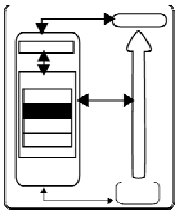


A number of learning activities are initiated by the students themselves. However, the desired learning activities do not always occur spontaneously. To give students a push in the right direction, titular teachers offer them a **learning environment**. The term 'learning environment' indicates that the student remains the main actor. A learning environment elicits learning activities, stimulates students to (keep on) implement(ing) the latter and supports them in the realisation. Guided Independent Learning is based on the conviction that, with the necessary support, students are able to realise the desired learning results independently.

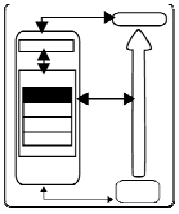
A learning environment consists of two main elements: support and evaluation.



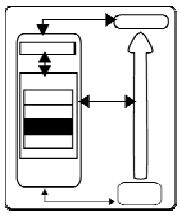
Support implies the offer of domain-specific learning contents, teaching methods, study material and the instructors involved. Each of these elements fulfils its own function in the attainment of the objectives. They provide an answer to the question "WHAT do I offer my students, HOW can I, as an instructor, help students in realising the objectives and WHO can help me with this?".



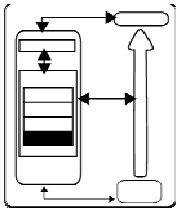
- By verifying which contents in your field you would like to offer your students an **offer of learning contents** is created. This intrinsic *information* can consist of: theories, concepts, research results, background information, etc.



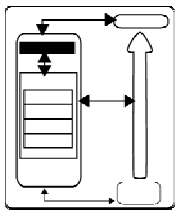
- The instructor must also make decisions with regard to the **teaching methods.** Key questions are: “Which assignments will I give to students? How will I combine practical lessons and lectures? Will I answer students’ questions via e-mail, Toledo or interactive lectures? When and which feedback will I give to students?". The decisions with regard to these questions have organisational consequences and must therefore be organisationally feasible.



- Apart from teaching methods, students can also be supported by offering them **study material** and challenging them to become actively involved in the subject matter. Examples are: syllabi, background texts, PCs, lab material, handbooks, cd-roms, interim tests, exercises, examples of exam questions, set of instruments, applets, videos, schemes, concept binders, protocols, etc. Part of this study material can be offered via Toledo.



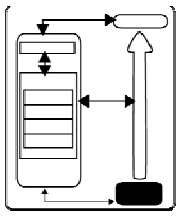
- Education is an interactive event in which various **persons** are involved. Students learn through interaction with the instructor and assistant, but also through communicating with their fellow students.



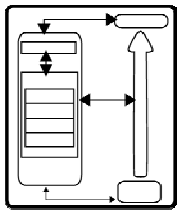
The second element of the learning environment is **evaluation.** Evaluation verifies to what extent students have attained the objectives. This component is important for various reasons. On the one hand, it is useful to conduct frequent evaluations in the course of the educational learning process, so that the learning environment can be adjusted by means of the gathered

information and, on the other hand, because evaluations also indicate for students what is more and less important. A better insight into this can help adjust the learning process more efficiently. Students gear their learning activities to the method of evaluation. When students know that an exam simply boils down to the reproduction of a number of definitions, they will focus on memorising the subject matter. However, if the instructor indicates that the students must demonstrate that they have gained insight into the subject matter or when he confronts them with new problems which they must solve independently, this will lead to an entirely different study behaviour.

There are two other important basic components in the scheme which have not yet been discussed: the **student characteristics** and the **context.**



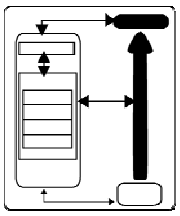
Students have different characteristics which are relevant with regard to realising the objectives: prior knowledge, motivation, learning style, opinions, etc. An optimal learning environment is geared to students' specific characteristics with regard to a course. Students and student groups with different characteristics require different learning environments. Research indicates that a number of student characteristics determine what they themselves regard as their task as a student and how they implement these tasks: domain-specific knowledge, cognitive processing skills, metacognition and motivation (see p. 38).



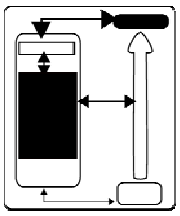
Finally, a learning environment, the objectives, the learning activities and student characteristics are always situated in a certain **context.** As a result, instructors are limited in their decision-making. They must, for example, take into account the organisational preconditions (how many co-operators, which rooms, which technological tools, etc. are at their disposal). Certain rules and regulations must also be taken into account (the exam regulation, the fixed study time, academic schedule, etc.).

4.6.2 … and Their Coherence

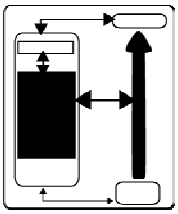
The aforementioned components are not separate and their coherence becomes apparent when discussed step by step. In an effective educational setting these **components** are coherently and consistently implemented.



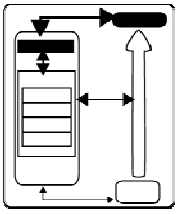
- The course **objectives** determine which **learning activities** students must implement. If one of the objectives, for example, consists in critically assessing the scientific articles in their field, they must learn to analyse these articles, identify and situate the strengths and weaknesses by implementing these activities independently in order to attain these objectives.



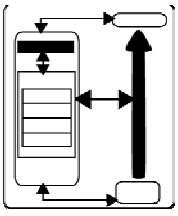
- Also the **student support** is geared to these **objectives.** If the support is limited to offering scientific articles and an instructor who clarifies the essence of the articles, the students are not stimulated to implement any learning activities resulting in the attainment of these objectives, i.e. for students to be able to critically assess scientific articles in their field. Apart from offering scientific articles, the support must also stimulate students to critically assess these articles and offer tools to discuss them in their scientific context.



- The aforementioned also indicates the connection between the **support** of students and their **learning activities**.

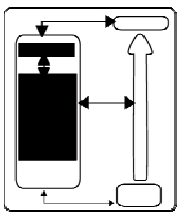


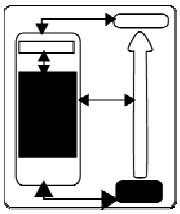
- Also the **evaluation** is adjusted to the **objectives.** You cannot verify whether the students are able to critically assess scientific articles by simply asking them to discuss an article which has already been discussed in class or to list a number of key elements. By means of evaluation, students must be asked to critically assess a new article independently.



- **Evaluation** and **learning activities** are closely connected. As soon as students know that the evaluation will consist of providing a critical assessment of a scientific article, they will gear their learning activities to this type of evaluation. They will study in a particular way and process the subject matter accordingly.

- Also **evaluation** and **support** are closely connected. Students are prepared for the evaluation by means of the information offer, working methods, study material and instructors. The support is therefore geared to the evaluation.
- Finally, the **support** must be adjusted to the **student characteristics** in order for the students to implement the desired learning activities. By offering effective support student characteristics can even be changed and by selecting articles which correspond to students' personal interests their motivation for a particular field can be increased.





5. More Concretely! Shaping Guided Independent Learning

This chapter is based on the main objectives of Guided Independent Learning and contains concrete ideas and examples with regard to shaping education. After a brief situation of each objective:

- a number of concrete objectives are provided which originate from existing educational frames of reference;
- a basic structure for learning and educational activities is provided;
- suggestions are formulated for various groups of students;
- descriptions of a prototypical example are given, and
- examples from the Examples Database[3] are offered.

5.1 Objective 1: To be familiar with results of scientific work situated in time and space

For this first objective knowledge is interpreted in its broadest sense. It refers to being able to reproduce and gain profound insight into the coherence of results, their relevance and usefulness. In principle, students are expected to acquire information or do exercises round relatively well-known concepts and (basic) skills.

EXAMPLES OF CONCRETE OBJECTIVES

- Students have acquired a historical framework from which they can identify historical events and in which they can situate concrete events.
- Students know which main tests are used to do microbiological assessments.

[3] The Examples Database is an easily accessible online database containing a description of concrete educational practices based on the structure of the global scheme, which are an example of how student-centred and activating systematic education is implemented in higher education. The database is accessible at http://www.kuleuven.be/icto/bv/bv.html.

- Characteristic of sociologists is that –in their own specific way– they are first of all specialists in all kinds of social relationships. This implies that alumni know:
  - which insights sociology (and for an important part also other disciplines such as economy, (social) psychology, anthropology, law, history) contains with regard to social relationships;
  - scientific (and also popular) literature about society, which databases they can access, which database offers what kind of information, etc.
- At this level, students must dispose of a range of advanced insights in criminological and criminologically relevant problems as well as an extended factual knowledge concerning the development and (solution of) problems which occur in the policy and practice of institutions involved in crime control.

LEARNING ACTIVITIES OF / ASSIGNMENTS FOR STUDENTS

Students will achieve these objectives more successfully if they implement the following learning activities:

- to visualise what is expected from them;
- to gather the necessary information;
- to analyse the information and understand the separate components;
- to connect different information elements by means of diagrams and/or summaries;
- to make connections between intrinsic elements and examples, and
- to come up with examples.

SUPPORT ACTIVITIES OF THE INSTRUCTOR / ASSISTANT

The instructor (possibly together with co-operators) can help students realise these objectives by:

- clearly indicating which tasks (cf. supra) students must implement;
- offering the contents in a structured manner (well-structured syllabus, handbook, lecture). As the contents are more and more provided in the form of all kinds of materials, lectures or face-to-face instruction can focus more on the processing of the information;
- providing examples and formulating self-assessment questions;
- offering the information in different ways (word, images, etc.);
- discussing why certain answers of students (e.g. to self-assessment questions) are correct or incorrect;
- clearly defining the subject matter, and
- indicating the relevance of contents by means of examples and cases.

GEARING TO STUDENT CHARACTERISTICS

As students' prior knowledge increases, they will also be better able to manage their own information processing process more independently. Finally, support must be limited to offering students objectives (on which the evaluation will be based) and possible indications about where (book, articles, website) the necessary information can be found. The added value of face-to-face instruction is then situated in discussing the exact meaning of the information and comparing the different interpretations.

EXAMPLES FROM THE EXAMPLES DATABASE

Activating Lecture - Transfer of Information

The activating lectures for the Transfer of Information course support a large group of students to actively gain insight in the subject contents. Students' learning activities are also supported outside the lectures by means of practice sessions and Toledo.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=47.

Peer instruction - Physics and Introduction to Biomechanics

Central in this example is the teaching method which confronts students with multiple choice questions during the lecture, for which they must indicate the correct answer by means of cards. Then, students receive the opportunity to discuss the questions and possible answers with fellow students and communicate their final answer by means of the cards. Finally, the instructor discusses the correct answer in detail. By means of this method the main physical concepts are offered.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=57.

5.2 Objective 2: To gain insight in the way in which research results are established

According to the concept of Guided Independent Learning gaining insight into the method, the approach which has led to particular research results / findings is even more important than the knowledge of these results.

EXAMPLES OF CONCRETE OBJECTIVES

- to be aware of the contextuality of each historical and social event.
- to develop a critical point of view with regard to all kinds of coverage about society.
- to be able to discover the strengths and weaknesses in criminological evaluation research.
- critical interpretation of computer calculation based on physical insight.

LEARNING ACTIVITIES OF / ASSIGNMENTS FOR STUDENTS

- to identify a problem and approach in an article.
- to repeat a lab experiment.
- to assess a proposal for scientific publication in group / individually as reviewer.
- to identify / select research problems.
- to predict a method used for a research question / research result (and possibly confront it with the actual approach used).

ASSIGNMENTS FOR THE INSTRUCTORS

- to illustrate methodical aspects.
- to ask 'why' questions and 'how did you reach this result?'.
- to demonstrate the research approach.
- to demonstrate a critical attitude (also occasionally discussing a 'bad' research / article).
- to explain evaluation angles and criteria.

GEARING TO STUDENT CHARACTERISTICS

- It is recommended to gradually increase the complexity (after broader orientation) by, for example, introducing more angles, points of attention in the implementation, analysis or evaluation.
- It is recommended to gradually build up an evolution from demonstrating + explaining, demonstrating + inviting students to explain, inviting students to demonstrate + explain, to implementing in new circumstances.

EXAMPLES FROM THE EXAMPLES DATABASE

Research methods in criminology

Research methods in criminology consist of an integrated educational path related to methodological education both with regard to contents and shape. The methodological

knowledge and skills are no longer split up (quantifying versus qualitative and evaluative / testing versus exploring) but offered in successive stages of empirical scientific research. The transfer of knowledge is immediately followed by the application of this knowledge in a project in small groups.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=27.

Maxwell Learning Environment Electrotechnology

Maxwell is an interactive multimedia programme based on a simulated electrotechnical lab. Maxwell is used to help students think across subjects when processing the subject matter of different related courses within the study programmes of electrotechology and mechanics - electrotechnology. Striking is the far-reaching integration of the Maxwell software in lectures, practice sessions and practical lessons.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=50.

Kinematics and Mechanical Dynamics

Most of the study material of the 'Kinematics and Mechanical Dynamics' course is offered by means of Guided Independent Learning with a well-documented learning platform as a central element. Apart from this, there is also a syllabus, lectures and practice sessions in which students can receive additional support to successfully complete three assignments/tasks.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=13.

5.3 Objective 3: To be able to interpret new information independently

The mountain of (scientific) information grows each day. Students must not only be able to process prestructured information, they must also find their way through a huge amount of information and identify the key elements.

EXAMPLES OF CONCRETE OBJECTIVES

- to be able to find relevant literature with regard to a topic, process and critically assess it.
- to be able to link the most recent developments in the field to insights already acquired through studying and to topical problems.
- to be able to interpret information gathered by means of an experiment.

LEARNING ACTIVITIES OF / ASSIGNMENTS FOR STUDENTS

- to summarise new texts and take a critical viewpoint with regard to them.
- to formulate conclusions based on a number of tables.
- to compare different interpretations with regard to the relevance of a text or research result.
- to gather information on a research or practical question in relevant literature or websites and substantiate the selection made.
- to create a new entity (paper, website) based on various pieces of information.
- to moderate a discussion and report in plenum.
- to explain a point of view and anticipate questions from other viewpoints.
- to critically discuss a given interpretation.
- to come up with possible implementations / implications of new scientific findings.

ASSIGNMENTS FOR INSTRUCTORS

- to demonstrate an interpretations process, indicate and substantiate why certain interpretations (of texts, research results) are (in)acceptable (from different, explicit points of view).
- to give students feedback:
  - indicate additional sources of information;
  - indicate elements which were insufficiently discussed or absent;
  - clarify coherence and consistency in argumentation, and
  - indicate other (theoretical) angles which could lead to an alternative interpretation.
- to answer questions from students.
- to select basic material.
- to set up and maintain a (computer-based) discussion (forum) by raising specific questions and propositions.

GEARING TO STUDENT CHARACTERISTICS

A gradual increase in the complexity is also recommended in this respect (e.g. from one table to a book with tables; from one text with a relatively unambiguous meaning to a more complex text).

CONSIDERATIONS

- Independent interpretation requires a great effort from students. Unclear evaluation criteria make this even more difficult.
- Large groups can make intensive interaction between students and instructors even more difficult. During instruction in large groups it is therefore recommended to focus on the demonstration of the correct interpretation. Apart from this, the interaction can be intensified by:
  - inviting small groups to implement assignments;
  - using forms of computer-mediated interaction, asking students to vote, and
  - inviting groups to give each other feedback.

Examples from the Examples Database

Reading of Law Texts

'Reading of texts' is an optional assignment in the framework of a co-operation relationship between three courses of the first year in Law: 'Sources and Principles of Law', 'Fundamental Philosophy' and 'History of Public Law'. The purpose is to stimulate students to independently process the literature and make connections between texts. The assignment consists of two parts: 'reading' and 'writing'. Each student's reading is critically discussed in the group sessions. During these discussions the instructors help discover new information in the presented texts. In an individual session near the end of term the instructors give the students feedback on their writing exercise.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=51.

Galatea

The 'Galatea' website takes a central place in the course of Interartistic Comparatism. The website offers students material (combination of text and images) and assignments to solve a problem independently. The face-to-face instruction every two weeks mainly functions as feedback moment for the students.
http: //www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=25.

5.4 Objective 4: To be able to actively contribute to knowledge development processes

In academic education the connection between research and education is based on the conviction that students, by actively participating as 'co-researchers' in current research, learn how to conduct research independently, to use and to contribute to a gradual extension and consolidation of the available knowledge. Here, the emphasis lies on the independent generation or construction of new insights, implications and possible implementations.

EXAMPLES OF CONCRETE OBJECTIVES

- to be able to formulate relevant research questions.
- competence in written expression: to be able to present a topic in a clear and structured manner based on different viewpoints, critically assess these viewpoints and develop a personal viewpoint.
- to be able to manage all stages of the problem-solving process.
- to be able to make a well-founded choice for a certain theoretical point of view and anticipating the implications of this.
- to be able to set up and implement a limited research, using quantifying and qualitative research methods.

LEARNING ACTIVITIES OF / ASSIGNMENTS FOR STUDENTS

The main assignment is active participation in a complete research cycle.

- to select the problem area.
- to identify a problem (problem-finding).
- to select and formulate a research question.

- to gather and process relevant background information.
- to gather and process relevant research literature, research information.
- to select the appropriate research method.
- to gather and process additional information, if necessary.
- to analyse and interpret information.
- to formulate conclusions (intrinsic and methodical).
- oral and written reporting.

ASSIGNMENTS FOR INSTRUCTORS

- to provide a summary of unsolved problems, research questions.
- to question the approach of students and suggest alternatives.
- to offer heuristics to deal with problems, to report.
- to comment on / appreciate the approach of students.
- to illustrate evaluation criteria by means of concrete examples.
- to refer to appropriate sources of information.
- to give feedback on contents and form of oral or written reports.

CONSIDERATIONS

- This is already discussed in many lectures.
- Students must understand how and why subassignments are relevant. It is therefore advisable to situated these exercises in a broader context when practicing subskills (e.g. using equipment, writing a bibliography), so that students understand the relevance.

GEARING TO STUDENT CHARACTERISTICS

With regard to the specific student characteristics it is important to gradually increase the complexity of assignments by reducing the degree of prestructuring. A pre-structured assignment is well-described and the various steps to be taken are clearly indicated. For example, a research assignment for

students in the second bachelor year will be more defined and outlined than a dissertation assignment in a master year.

Examples from the Examples Database

Heuristics

In 'Heuristics and historical exercises: Contemporary history' a learning platform (with assignments) is used in combination with lectures to teach students heuristic skills. Heuristic skills are strategies to find historical sources, tools and scientific literature, skills to critically evaluate their usefulness and relevance. The Heurodot[2] learning platform used is specifically designed for this purpose. HeuroDOT stands for *Heur*istics and *E*xercises *A*pplied in a *D*igital *E*nvironment.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=39.

Research into Market Research

Conducting research with students into (market) research techniques/problems and trying to attain the international research standards.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=58.

5.5 Objective 5: To be able to form a substantiated opinion based on critical insight into underlying processes and develop well-founded social viewpoints

The university and its graduates are not situated outside society. Students must develop skills to validate their knowledge, use and adjust it if necessary. Making a judgement, taking a viewpoint and substantiating it are essential in this society. This requires the ability to integrate insights in function of a real problem. Guided Independent Learning therefore advocates a thorough and permanent reflection on the social relevance of the acquired knowledge as an essential part of all subjects.

EXAMPLES OF CONCRETE OBJECTIVES

- to be able to assess social events, problems and solutions from a broad humane and ethical position based on philosophical insights.
- to be able to assess scientific data and to take a position, for example with regard to the effect of passive smoking during pregnancy, reimbursement of homoeopathic therapy, use of alternative energy resources, active welfare state, dioxin in chicken, use of laptops in early childhood education.
- to take a critical standpoint with regard to social developments and official views on policy and society.

LEARNING ACTIVITIES OF / ASSIGNMENTS FOR STUDENTS

- to form a personal opinion.
- to listen to the opinion of others.
- to enter into a discussion with fellow students.
- to trace the origin of statements / opinions.
- to formulate advice with regard to socially relevant decisions.
- to advocate and substantiate a solution.
- to keep portfolios.

ASSIGNMENTS FOR INSTRUCTORS

- to invite guest speakers.
- to select problems / discussion points.
- to formulate (additional) questions for reflection.
- to ask what is relevant.
- to incorporate social coverage.
- to give a personal opinion and substantiate it.

GEARING TO STUDENT CHARACTERISTICS

- to start from problems of which the relevance is recognised by the students.
- to gradually increase the demands with regard to substantiation.

EXAMPLES FROM THE EXAMPLES DATABASE

Fundamental Pedagogics

In Fundamental Pedagogics the students read a number of texts in the form of assignments. The purpose of these research assignments is to let the students go through and practice the various stages of the research process. First year students are not yet able to monitor and guide their own learning and research process independently. They therefore receive guidance in the supporting lectures and tutorials.
http: //www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=24.

Tutorial Private Law

In the 'Private Law' tutorial students are expected to prepare the tutorial individually. During the tutorial and based on this individual preparation small groups of students formulate a possible answer to a case on procedural law. The students also write a critical note on a recent judgement and report on a study visit to a court.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=38

Tutorial Political Sciences

Practical lessons in which the students become acquainted with the political practice and acquire specific skills for the politological profession. The practical lessons combine individual and group work.
http://www.kuleuven.be/icto/bv/bvbank/voorbeeld.php?vbid=16.

6. Is It Feasible? Preconditions for Guided Independent Learning

The gradual introduction of Guided Independent Learning implies that all teaching methods used at the K.U.Leuven will become more differentiated. Each instructor decides how s/he works with the students. However, what is desirable is not always feasible. This is mainly due to the not yet entirely adjusted and rather rigid infrastructural and organisational structure embedded in the old view on teaching as the transfer of knowledge. Instructors must therefore keep in mind a number of preconditions, such as the available material, rooms, organisation of examination periods, etc. There is however an openness and willingness to offer new methods the necessary opportunities with regard to infrastructure and organisation.

Apart from infrastructure and organisation there are a number of other factors which may hinder this innovation: the attitude of students, the large groups of students, the amount of subject matter, the time investment for instructors and study load for students.
Gradually, students will most probably adjust to the new demands. Already, students are willing to fully co-operate if the assignments are sufficiently relevant to them, if the demands are realistic and if they can count on sufficient support. For example, by indicating that the purpose of assignments is to prepare students for the exam, the latter will invest more than the absolute minimum or the mere formal character of the assignment.
When working with large groups of students Guided Independent Learning may require more interaction between students and instructors and may complicate the provision of individual feedback. The table below contains a number of possible routes to solve implementation problems in large group contexts. Each of these routes is already followed by the K.U.Leuven.

Increased Interaction during a Lecture	Raise questions at the beginning of and during lectures.
	Split up groups; each group attends a lecture every two weeks.
	Reserve the lecture for comments on the syllabus and for answering questions.
	Give students in an auditorium voting cards and ask them to vote on propositions.
More (Multimedia) Information	Internet connection and AV/Dataprojector in each room.
	Apart from syllabus also Toledo, cd-roms and references to websites.
Intensifying Feedback	Develop / use computer-assisted teaching programmes.
	More group work, reduce the number of tasks.
	Reduce the number of assignments and exercises so that there is more time for feedback.
	Draw up a FAQ lists.
	Elektronic exercises and tests with feedback.
	Invite fellow students to give feedback.
Activating Students	Take-home-exam with oral explanation.
	Problem-posing teaching.
	Group assignments, exercises, lectures in a limited number of weeks (e.g. three weeks of lecture limited to one course).

The amount of information within a certain field and the need to establish a knowledge basis on which other courses can build is a common concern among instructors. Time for an activating approach seems hardly available. Students can be asked to process part of the subject matter independently, which would make time for a more activating approach to the complex subject matter. Discussing possible overlaps of subject matter between different courses and verifying whether all the information must be presented in class, can also create some more time during lectures. The conclusion that many students, despite having 'seen' the subject matter in face-to-face instruction, do not master this knowledge in a longer term (and need a recapitulation of the subject matter in other courses), emphasises the importance that students actively set to work with the subject matter. Students who do this, remember the subject matter much better. Students can also be invited to actively set to work with the information by, for example, searching for examples, counterexamples, applications for principles and concepts, or by introducing new concepts starting from a concrete problem or phenomenon. Activating teaching methods

should allow students to acquire skills which enable them to process new information independently later on.

Instructors indicate that they have little time to update their own course. A gradual implementation of Guided Independent Learning seems appropriate in this case. The exchange of thoughts on this matter with colleagues, programme directors, faculty and central education supporters can facilitate this process.

Students also indicate that they already have a heavy workload. New, activating teaching methods can replace teaching methods where the students' role is less active or less relevant learning activities can be omitted. For example, students can be invited to make a formularium for what they would normally memorise, which would make more time to focus on learning how to apply or process the subject matter in a structured manner.

7. An All-embracing Concept?

Guided Independent Learning is an all-embracing concept because:
- it is broader than a teaching method;
- it functions as guideline for the entire academic education, and
- it specifies the role of university within society.

Guided Independent Learning does not only focus on the teaching method or approach. It also deals with all other aspects of the teaching environment (objectives, learning activities, evaluation, etc.). Characteristic is that it does not impose strict guidelines. Guided Independent Learning is an 'open' concept. However, this does not imply that 'anything' is possible. Guided Independent Learning does formulate a number of requirements with regard to organising education. The two main requirements are:

- The education must have a functional purpose. It must enable students to achieve the objectives. Teaching methods which do not meet these requirements should be omitted. There is, for example, not much point in providing information to students during face-to-face instruction if they can read it themselves. Nor is it relevant to give students assignments, if it is impossible to give them any feedback afterwards.
- Guided Independent Learning explicitly states that participation in research activities is the ideal way for students to achieve the objectives.

Guided Independent Learning applies for all study programmes and courses. Working in the context of Guided Independent Learning is not only a matter of students, instructors and assistants. Also policy makers, administrative and technical staff members are constantly confronted with this concept. The implementation of Guided Independent Learning holds consequences for the entire university infrastructure, the organisation of academic life and the (educational) policy pursued.
Each university department must define its specific interpretation and implementation of the concept in mutual agreement. The general rule is that when taking education-related decisions it is verified whether the decision

helps realise the objectives of Guided Independent Study and whether it enables and supports the students and instructors to take up their roles.

Guided Independent Learning implies a clear choice with regard to the university's social position. With Guided Independent Learning the K.U.Leuven positions itself as a critical university, as an independent partner. It is a semi-autonomous institution which entitles itself to determine its own objectives and the best way to achieve them. It is not an ivory tower situated outside the world looking upon it in a contemplative manner, commenting on it and providing it with strong ideas, neither is it a cog in the machine which is merely subservient to the ruling rationality.

Due to the fact that Guided Independent Learning is also an all-embracing and relatively open concept, it invites everyone to take conscious, substantiated decisions with regard to education.

By means of the general scheme, individual instructors can do this for their course and the corresponding teaching activities. This should however occur in mutual agreement with the instructional team members. Together they can decide which support is most geared to the students' needs, which evaluation methods are most appropriate, who will be responsible for which aspects of the support.

Decisions at course level should however not be taken lightly. They must always be tested within the PEC. Only then, the PEC can safeguard that the study programme enables the students to achieve all the objectives of Guided Independent Learning and that there are sufficient guarantees for students to participate in research activities. The development of the course syllabi and the consultations with regard to the study programme during PEC meetings play a central part in this. The PEC also has the important task to make sure that the students' study load remains acceptable. This is important when various instructors give assignments to their students. In this respect, it is not superfluous luxury to create an overview of assignments and deadlines for the students.

Also at faculty level Guided Independent Learning constitutes an important point of attention. The faculty teaching cells (to be established) must support the further implementation of Guided Independent Learning. This means that these cells constantly stimulate the study programmes to turn education into a dynamic event where the connection between research and education is central.

Individual instructors, instructional teams, faculty teaching cells and PEC can always appeal to DUO/ICTO[4] with regard to shaping their teaching in a context of Guided Independent Learning.

Guided Independent Learning is also a guideline for educational decisions at university level. This is clearly indicated in the educational development plan[5], which stipulates an even more systematic and well-considered introduction of Guided Independent Learning as one of its main objectives.

4 You can contact DUO/ICTO: http://www.kuleuven.be/duo-icto/.

5 To be consulted at: http://www.kuleuven.be/onderwijs/beleidsinfo/onderwijsontwikkelingsplan.htm.

8. A Number of Important Educational Findings

In this last chapter we will focus on a number of elements from educational practice and research results with regard to learning and teaching in higher education. The results illustrate that the educational practice is a complex practice and that absolute conclusions are seldom correct. A short reading list is enclosed at the end of this chapter.

8.1 Student Characteristics and Their Role in the Learning Process

Domain-specific knowledge refers to the knowledge of facts, concepts, definitions, formulas, algorithms, rules, etc. which constitute the contents of a study domain. The amount, organisation, availability and accuracy of students' prior knowledge can vary considerably. Students with an accurate prior knowledge have less difficulties calling information to mind. They are also better able to decide what is important and what is not (to make a selection of the material on offer). Apart from this, they are also better (i.e. more economical and efficient) at memorising information, since they can relate it to existing structures and insights.

Cognitive processing strategies are all mental activities which students use more or less consciously in order to process information and hence achieve their learning objectives. A typical example of a processing strategy is relating. This strategy is, for example, used by students to connect the different topics of a course in order to obtain an overall picture. Other strategies are memorising, concrete processing (e.g. when the student interprets daily events by means of the knowledge which s/he has acquired in a course), analysing (e.g. when a student studies the individual elements of a theory) and critical processing (e.g. when a student compares his/her personal view on a subject with the view of authors).

Metacognition refers to a student's conceptions with regard to his/her personal reasoning and learning and how these can be affected. For example, some students believe that positive courses are much more difficult than humane courses. Others are convinced that the subject matter is best studied by copying it a number of times. Metacognition also refers to the strategies students use to control their learning: planning, monitoring the learning process, regularly testing whether the studied material is really understood and, if necessary, adjusting the strategy and reflecting on the process afterwards.

Learning orientations or students' drive to study: Some learning orientations are situated in the job market (from obtaining qualifications to learning how to exercise a certain profession), other orientations are situated within the person (personal development, proving and testing oneself). There are also academic orientations (deepening of the interest in a study domain, establishing an educational career, learning for the sole purpose of it) and a category which is more related to the circumstances in which the learning occurs, the conditional learning orientations (gaining or maintaining social contacts, breaking away from the daily routine).

8.2 Good Education: A Number of General Instructions

Keep students' domain-specific prior knowledge in mind (incl. misconceptions)

It is recommended that the instructor indicates which knowledge and skills are required in order to start the course successfully and, if necessary, also offers tools by means of which students can determine themselves whether they really master this knowledge and skills. Hence, students know where they stand. This advice complies with the Educational Board's request to formulate starting terms for each course.

Instructors must at least make an effort to gear their teaching to the concepts and views which students 'bring into class'. Examples are misconceptions in physics, in history, with regard to media figures, etc.

It is the instructors' task to 'dis-cover' the ideas and concepts they wish to discuss and put themselves in the place of a student who is confronted with them for the first time. The most self-evident strategy for this is to invite students to explain their conceptions. This can be achieved by:

- presenting students with a questionnaire;
- confronting students with answers given by current and previous students to a number of key questions which will be discussed in the course, and providing comments with them;
- initiating a group discussion, etc.

Pay attention to students' cognitive processing strategies

Instructors mainly focus on domain-specific knowledge which they believe is essential for their study domain. But they should also pay attention to the way in which students acquire and process this knowledge. Guidance with regard to cognitive processing strategies should be incorporated in the actual education, by the study domain specialist him/herself.

The following overview contains an illustration of possible actions of instructors to support students in processing the subject matter.

Cognitive Processing Strategies	*Possible Interventions*
Focussing Attention	• Highlight important elements in diagrams • Important paragraphs in bold or italic • Oral emphases by use of voice and connective sentences
Storing Information (in a way which indicates underlying relationships)	• Present or invite students to present figures and diagrams which represent the relationships in the subject matter • Invite students to come up with examples
Relating	• Formulate comparative questions • Encourage students to look for similarities and differences between various aspects of the material and represent them in diagrams and tables
Recapitulation and Practising	• Guided practising and systematic reviewing of relevant information
Summarising	Make suggestions and ask questions which help students summarise the subject matter

It is generally recommended to avoid too strong or permanent guidance. Chances are that too rigid working methods are established, so that students tend to study at a more superficial level rather than to really understand the material. It is also important that instructors explain their own expert behaviour and make it more transparent for students (e.g. by looking for solutions to problems together with students even if mistakes are made). Finally, it may also be interesting to closely observe students during the implementation of tasks. Based on these observations instructors are able to give concrete indications, suggestions and feedback with regard to processing the subject matter.

Work on metacognitive strategies

Self-organisation is a key element to train students in life-long learning. Teaching students to manage their own learning process is best done by stimulating them to monitor their own learning process carefully and independently. In this respect, the instructor can suggest students to regularly check the progress made in their learning process. The instructor can, for example, encourage students to ask themselves the following critical questions:

- What do I still have to learn?
- What do I already know?
- How can I understand this element better?

It is the instructor's task to invite the students to explain their knowledge and solution procedures and visualise the latter by means of information and communication technology (e.g. discussion forums). Reflection is then made possible by confronting them with ideas and working methods of experts and fellow students. The following table contains a number of suggestions in this respect.

Metacognitive Activities	*Possible Interventions*
Orientation	• Offer a clear contents overview • Indicate problems which will be discussed
Guidance	• Clarify objectives • Study tasks • Give examples of exam questions
Evaluation	• Interim tests • Invite students to make tests themselves
Diagnosing	• Invite students to explain their problem solving process
Adjusting	• Discuss various study strategies • Invite students to compare solution approaches

Work on students' motivation

Instructors can influence students' motivation. Various 'interventions' can increase students' motivation to make a greater effort for a course. It is important to (a) be a motivated role model as an instructor, (b) arouse intellectual curiosity in students, (c) create learning situations in which students experience that learning is more important than achieving and (d) give positive feedback to increase students' sense of competition and efficiency. For each of these points of attention Lens (1999) suggests a number of concrete interventions, for example:

Motivating Role Model	• Show explicit interest in the subject taught • Use up-to-date material • Refer to (not yet published) research of yourself and (inter)national colleagues
Arousing Intellectual Curiosity	• Formulate questions and exercises which force students to confront and integrate new material with their prior knowledge • Ask unexpected and unusual questions: What is incorrect in this table? Which mistake did I make in this reasoning? Why is the research as discussed up to now worthless? • Indicate the relevance of the contents for the students' studies and future profession
Indicating that learning is more important than achieving	• Ask open questions rather than true/false questions • Give constructive, formative feedback • Make error analyses • Clarify your own mistakes in theoretical and empirical research and indicate how you learnt from this

Positive Feedback	• Assign tasks with a medium level of difficulty Work with individual students and indicate knowledge gaps which the student must fill (as soon as possible)

8.3 Assignments for and Tasks of Students as Core of Learning Environments

- Students achieve the study objectives by implementing appropriate learning activities. They can take the initiative in this respect. Instructors can also stimulate them by indicating which activities are more or less appropriate.
- When students are invited to set to work with the learning contents, it is recommended to give them **assignments**. When formulating assignments not the learning contents are central, but what the instructor expects from the students at the end of the assignment and particularly why s/he gives the students this assignment. When students clearly understand the relevance of assignments for other parts of the subject matter, other courses or their future professional situation, they are more motivated to work on the assignments.
- Students' motivation is also increased by clear, inviting instructions accompanying the assignments. Instructions indicating:
  - what they must do;
  - how they must do this;
  - with whom they can co-operate;
  - whom and when they can ask for help;
  - how much time they receive for the assignment;
  - what will happen with the result of the assignment, and
  - what they can do when they have completed the assignment earlier.
- To help students get started it is important to draw their full attention to the instructions accompanying the assignment. Putting the assignment down on paper or in a presentation can help them to remain focused. Check whether students have understood the purpose of the assignment before they set to work. By putting the assignment and instructions on Toledo, the student can reread the original assignment when needed and questions with regard to contents and implementation can be avoided.

- To let students work with the learning contents at an abstract or concrete level it can also be useful to incorporate **group work.** A first requirement for successful group work is that the assignments clearly indicate that the students must co-operate in order to complete the assignment successfully. This creates a positive mutual dependence among students. It is also important that all group members remain individually responsible for the results of the group work. The specific contributions of the individual group members must remain visible in the planning, implementation and evaluation of the assignment, so that students clearly see that each individual contribution leads to a result.

8.4 Implementation of Guided Independent Learning: Research Considerations

Instructors

Already in the early '70s Entwistle (1997) studied the objectives of academic instructors. He interviewed them with a set of very concrete questions concerning their daily concerns, specific objectives, how they distinguish weak from stronger students, how they mark exams and how they evaluate their teaching. Results indicated that the instructors mainly focussed on the development of critical reasoning. This concern was however not translated into the method of teaching (lectures, tutorials, practical exercises) and examination: “It seemed that lecturers looked for critical thinking, yet taught and assessed conformity in ideas and the acquisition of detailed factual knowledge.”. The author refers to a "lack of relationship between intention and performance”.

Students

Hounsell (1997) indicates that various conceptions of students with regard to knowledge, learning and education result in three reaction patterns regarding a lecture presented by the instructor as an exposition of three theories dealing with a certain problem:

- When students believe that knowledge consists of correct answers and that the instructor will provide an answer to each problem, the students will wait

until the instructor indicates which of the three theories they must study.

- Other students may assume that absolute knowledge exists, but at the same time they may believe that the instructor sometimes confronts them with problems and procedures so that they can find the correct answer themselves. In this case, the students will regard the lecture as a kind of game in which it is their task to find out which theory is correct.
- Finally, there are students who are convinced that an answer can only be correct within a particular context. They also believe that contexts can differ. These students assume that the instructor will confront them with three legitimate theories which can be examined with regard to their scope, internal consistency, fit with various data, prophetic force, etc.

8.5 Learning activities of Students: A Number of Findings

- Students usually tend to use certain strategies when processing new information. In this respect, Vermunt (1992) refers to four characteristic 'learning styles':
  - Disorientated learning style: students with this type of style implement few or no processing strategies.
  - Reproduction-oriented learning style: these students process the subject matter step by step and in a rather superficial manner. They mainly use strategies such as memorising, repeating and analysing.
  - Meaning-oriented learning style: these students process the subject matter in depth and mainly use strategies such as relating, structuring and critical processing.
  - Implementation-oriented learning style: these students focus on the concrete processing of the subject matter. Concretising and testing the subject matter to personal experiences are dominant processing strategies.
- Lonka, Lindblom-Ylänne and Maury (1994) examined how the strategies used by students during an entering exam in medicine relate to their exam results. The students received an essay discussing the ecological consequences of a number of recent technological and scientific developments. The essay also contained three types of questions:

reproduction questions, synthesis questions and questions concerning the implementation and assessment of what had been learnt. By means of questionnaires, observations and protocol analyses, the researchers registered which strategies were used by the students. Their analyses lead to the following conclusions:

- As the students used more processing strategies, they obtained better results.
- The use of processing strategies has no impact on the result of reproduction questions. It does however affect other types of questions. When students underline words in the text, they are better able to answer synthesis questions. Constructing a conceptual network increases the chance of answering implementation questions correctly.

- Schoenfeld (1992) examined how academic students solved unseen geometry problems in pairs. He analysed the students' activities and the time they spent on implementing them. The most typical strategy used by students was the following: reading the question, quickly choosing a certain approach (e.g. making certain calculations) and following this approach without considering alternatives, even when they did not make any progress. In about 60% of the cases, metacognitive strategies were absent, such as planning and monitoring the solution process effectively.
- Morgan and Beaty (1997) followed students during their studies at the Open University. Their interview data indicate that gradually students gain self-confidence, organise their studies more efficiently and take more control. In other words, they become more capable of managing their own learning process. Also their conceptions with regard to learning change. Initially, they regard learning as ‘memory work’ and as the mere addition of knowledge. Later, they start viewing learning as a way of understanding and relating knowledge to real life.
- Vermetten, Lodewijks & Vermunt (1997) found that the learning strategies which students claim to use change in a positive sense throughout two years of study. More in-depth processing strategies (such as relating, critical processing and realisation) and self-organisation are more often reported by students in later years. Researchers ascribe these changes to context-related

factors. At the same time, students indicated that the instruction also became more activating.

8.6 References

Entwistle, N. (1997). Contrasting perspectives on learning. In F. Marton, D. Hounsell, & N. Entwistle (Eds), *The experience of learning. Implications for teaching and studying in higher education* (Second Ed.) (pp. 205-277). Edinburgh: Scottish Academic Press.

Hounsell, D. (1997). Understanding teaching and teaching for understanding. In F. Marton, D. Hounsell, & N. Entwistle (Eds), *The experience of learning. Implications for teaching and studying in higher education* (Second Ed.) (pp. 238-257). Edinburgh: Scottish Academic Press.

Lens, W. (1999). *Studiemotivatie. Theorie voor de praktijk* (Voordracht gehouden in het kader van de Onderwijskundige Vorming voor Beginnende Docenten van de K.U.Leuven, Houthalen) [Study motivation. Theory for practice (Lecture within Educational Development Training for Beginning Staff of K.U.Leuven, Houthalen)].

Lonka, K., Lidblom-Ylänne, S., & Maury, S. (1994). The effect of study strategies on learning from text. *Learning and Instruction, 4(3),* 253-271.

Morgan, A. & Beaty, L. (1997). The world of the learner. In F. Marton, D.

Hounsell, & N. Entwistle (Eds), *The experience of learning. Implications for teaching and studying in higher education* (pp. 217-237). Edinburgh: Scottish Academic Press.

Schoenfeld, A. (1992). Learning to think mathematically: Problem solving, metacognition and sense making in mathematics. In D.A. Grouws (Ed.), *Handbook of research on mathematics learning and teaching* (pp. 334-370). New York: Macmillan.

Verhoeven, J.C., Vandeputte, L., & Vanpée, K. (2000). *Universiteiten en hogescholen. Elk hun eigen roeping?* Leuven: Departement Sociologie [Universities and institutions for higher education. Each their own vocation? Leuven: Department of Sociology].

Vermetten, Y.J.M., Lodewijks, H.G.L.C., & Vermunt, J.D.H.M. (1997). Verandering en stabiliteit in het gebruik van leerstrategieën tijdens de eerste twee jaar van een universitaire studie. *Tijdschrift voor Hoger Onderwijs, 15(2),* 123-135 [Change and stability in the use of learning strategies during the first two years of a university study].

Vermunt, J.D.H.M. (1992). *Leerstijlen en sturen van leerprocessen in het hoger onderwijs: Naar een procesgerichte instructie in zelfstandig denken.* Amsterdam : Swets & Zeitlinger [Learning styles and controle of learning processes in higher education. To a process-oriented instruction].

8.7 Additional Literature on Guided Independent Learning

Elen, J., Roossels, W., Clement, M., Verhesschen, P., & Waeytens, K. (2003). Begeleide zelfstudie aan de K.U.Leuven: Een stand van zaken. In N. Druïne, M. Clement & K. Waeytens (red.), *Dynamiek in het hoger onderwijs. Uitdagingen voor onderwijsondersteuning* (pp. 31-43). Leuven: Universitaire Pers [Guided Independent Learning at the K.U.Leuven. A state of the art].

Léonard, R., Clarebout, G., Lowyck, J., & Elen, J. (2004). *Booiz: Onderwijs-opvattingen en percepties van studenten m. b. t. Begeleide zelfstudie. Rapport OOI-project (2001/08).* Leuven: CIP&T [BOOIZ: Educational views and perceptions of students with regard to Guided Independent Learning. Project report (OOI 2001/08)].

Five good reasons to work with Guided Independent Learning

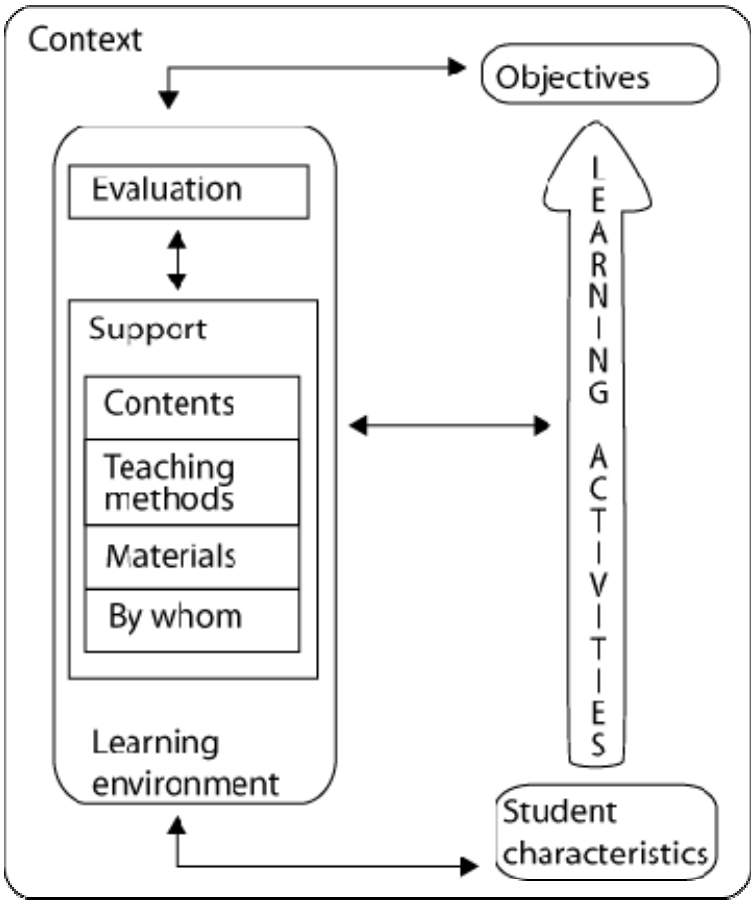
In Guided Independent Learning students must take personal responsibility for their own learning process and are forced to play an active role.

Guided Independent Learning is an open concept which gives you the freedom to choose your own teaching methods in accordance with the objectives.

Guided Independent Learning creates a framework where the mutual insemination of research and education receives more opportunities.

In addition to basic knowledge students acquire skills to keep track of the developments in their field and function in a socially acceptable manner.

Critical, motivated and independent students are more interesting communication partners.


Context
Objectives
Evaluation
Support
Contents
Teaching methods
Materials
By whom
Learning environment
LEARNING ACTIVITIES
Student characteristics