

Innovative competence of the bachelor student

Paper International Summer School Ph.D.

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1 Introduction

In the Netherlands in 2002 higher education was reorganized. The bachelor – master structure was implemented and four forms of higher education rose: bachelor and master from Universities of Professional Education and bachelor and master in scientific universities. At the same time the phenomenon of accreditation was introduced. Accreditation is a condition for government funding, recognition of degrees, issuing degrees and offering study grants to students who are enrolled in a course (NFAO 2003a). With accreditation universities have to give evidence they meet criteria for basic quality. One of the criteria concerns level. The level must be shown with international accepted descriptions. The level should be made transparent and make comparison (international) possible. The background of these changes concerns developments like globalization and the rise of the knowledge society. Many developments and changes are in society. In the professional practice of bachelors from Universities of Professional Education, developments and changes are more rule than exception. Are Universities of Professional Education able to prepare their students for this dynamic society? Graduates are 'highly qualified'. Are they able to handle and contribute to the developments? Are Universities of Professional Education able to learn how their bachelor students can handle changes and developments? Are these students competent in developing and innovation? Among them are nature talents who are able to knowledge development or innovation. Should more students have talents for this kind of knowledge development? Should it be possible to develop this talent in a study programme in University for Professional Education to raise or guarantee their level? These questions lead to the following research questions.

2 Research questions

- 1 What is the meaning of knowledge development?
- 2 Is the competence knowledge development to expand in a study programme in University of Professional Education? The study programme should meet the requirements for *accreditation*. How is that to realise?
- 3 Is it possible to assess knowledge development in a justified way? Knowledge development refers to a personal ability. Is it possible to make it visible and assess this? If so, how?
 - What can be considered as bachelor *level* and bachelor's level knowledge development? What is the level in the first year; what in next study phases? Is it possible to determine the level with evaluation?
 - Knowledge development concerns knowledge development from *individual* students. How is to assess the knowledge development from individual students?
- 4 What quality assurance is necessary to guarantee the programme for knowledge development is as valid and effective as possible?
- 5 How can a possible programme be implemented in an University of Professional Education? Nowadays there are a lot of modernizations in higher professional education. What way of implementation is most successful ?

3 Theoretical concepts

Addressing the questions for knowledge development (question 1), assessing and level (question 3) next theoretical perspectives are used.

3.1 Knowledge development

The meaning of knowledge development is ambiguous. Knowledge development has several meanings in literature. Many authors such as Johnson, Lorenz en Lundvall (2002), Kessels (2001), Weggeman (2001), Nonaka and Takeuchi (1995), Polanyi (1983) distinguishes explicit from implicit knowledge.

Explicit knowledge

Explicit knowledge is the knowledge that has been developed and proved in various disciplines. The (governmental) council for education (Onderwijsraad 2003b states that the concept of knowledge development, until recent times, was related to knowledge that is developed on universities. Synonyms for explicit knowledge are declarative knowledge and codified knowledge. This knowledge can be established in books or cd-roms. Johnson, Lorenz en Lundvall (2002) distinguishes know-what and know-why from know-how and know-who. Know- what refers to facts and know-why to laws, principles and processes or causes of phenomena. Know-how and know-who are parts from implicit knowledge. In Universities of Professional Educations knowledge from several disciplines on the bachelors level are relevant.

Implicit knowledge

With implicit knowledge know-how and know-who from Johnson, Lorenz en Lundvall (2002) is relevant. Know-how refers to operational knowledge and being able to make operational explicit knowledge. Weggeman (2001) says 'information put into meaningful action and productive use'. Know-who contains knowing who can deliver the knowledge of ideas or the operational knowledge that fails in specific situations. To make operational explicit knowledge, another knowledge form is necessary. Polanyi (1983) calls it 'tacit knowledge' or hidden knowledge.

Development

With knowledge development the coherence is relevant from the classic concept of knowledge that essentially refers to know-what and know-why with the implicit know-how that is relevant for innovation (Onderwijsraad 2003b).

When a student himself makes connections between well-known knowledge en new information Merriënboer, Clark and De Croock (2002) call it elaborative learning. Elaboration leads to a profound understanding and makes the student able to apply rules of thumb.

Argyris and Schön (1979) developed three theories about learning, namely single loop, double loop and deuterio learning. Weggeman (2001) presents them as follows.

- 'single loop learning is as solving problems. Emphasising discovering and correct mistakes in well known and safe situations;
- double loop learning focuses on renewing an existing situation. Safety is less important. Creating new theories based upon comparison several theories while working;
- deuterio learning: single loop learning and double loop learning to recognize and correct mistakes in a more effective and efficient way and handle reflection processes related to several theories in a more successful way.

Single loop learning and double loop learning have got a lot of imitators, whilst name was changed and the content remained more or less the same: higher and lower level learning (Fiol en Lyles, 1985), generative and adaptive learning (Senge, 1990), tactic and strategic learning (Dodgson, 1991) etc. Essentially there are two levels of learning: a base and a higher level. Bateson called it 'Learning I' and 'Learning II' in 1973. Basically learning is learning on a level with undoubted assumptions. Basically learning is developing or readjusting strategies and performing actions for realising the targets. Learning on a higher level beliefs are discussed and objectives are criticised.'

Work definition

Talent, creativity and implicit know-how, with a good view on knowledge from ideas as a base should do the job at least.

Assessing makes a testable definition necessary. Confusion with flanked concepts like competence is not allowed in a definition. Merriënboer (2002a) indicates the concepts competence and knowledge development overlap, however both concepts are not identical. The difference concerns the meaning of knowledge. In the definition it is also not allowed to mention words from the defined concept. At last the definition should be communicable where through the receiver understands the meaning of the definition soon.

Knowledge development is inventing and realising innovations based upon elaborated knowledge from multidiscipline knowledge.
Additive: student relates know-what and know-why to know-how and know-who.

Figure 1: work definition knowledge development

3.2 Level

The level concept was introduced at the beginning of this paper. The criterion for level that has been achieved is "The final qualifications that have been achieved correspond to the targets set for the final qualifications in level, orientation and domain specific requirements." This criterion is in the frame work from NVAO (2003a). Accreditation is a vital condition for universities in Holland. In this criterion components are relevant of internationally accepted descriptions, the domain-specific requirements and orientation,

The level criterion is 'The final qualifications of the degree course correspond to general, *internationally accepted descriptions* of the qualifications of a Bachelor or a Master.' According to the guidelines the qualifications should be tested on the internationally accepted descriptions.

The level concept is related to orientation: bachelor and master Universities of Professional Education and bachelor and master (academic) Universities. The final qualifications University of Professional Education (UPE) are partly based on the *professional profiles* and / or professional competences drawn up by or in conjunction with relevant professional field. A bachelor graduate at a University of Professional Education is qualified at the level of a starting professional in a specific *profession* or related professional field for which a degree from a University of Professional Education is required or useful. A master graduated at a University of Professional Education is qualified at the level of an *independent* and / or *managing* professional in a particular profession or professional field, or the level required to function adequately in an *multidisciplinary* environment in which a degree from a University of Professional Education is required or useful.

The final qualifications academic university are based on requirements made by the *academic discipline*, the international *academic practice* and, if applicable to the course, the relevant *practice* in the prospective *professional field*. A bachelor possesses the qualifications that allow access to a minimum of one further University degree course at master's level as well as the option to enter the labour market. A University master possesses the qualifications to conduct independent *academic research* or to solve multidisciplinary and interdisciplinary questions in a professional practice for which a University degree is required or useful (NVAO 2003a). Description of the level does not differ (figure 2)

The criterion from domain-specific requirements is: The final qualifications of the degree course correspondent to the *requirements* made to a degree course in the relevant domain (field of study/ discipline and/or professional practice) by *colleagues* in the Netherlands and a-broad and the professional practice. The domain-specific qualifications should also meet criteria of *internationalization* and '*recent developments*' (NVAO 2003a).

Knowledge and understanding

Have demonstrated knowledge and understanding in a field of study that builds upon and supersedes their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study.

Applying knowledge and understanding

Can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study.

Making judgements

Have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues.

Communication

Can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

Learning skills

Have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy.' (NVAO 2003a)

Figure 2: Qualifications of Bachelors

3.3 Assessment and evaluate

Segers et al (2003) state that changes in the views on learning lead to rethinking of the nature of assessment. Learning should be in congruence with assessment. This has led to the raise of the so called assessment culture. Segers et al portray the aspects of assessments in seven continua.

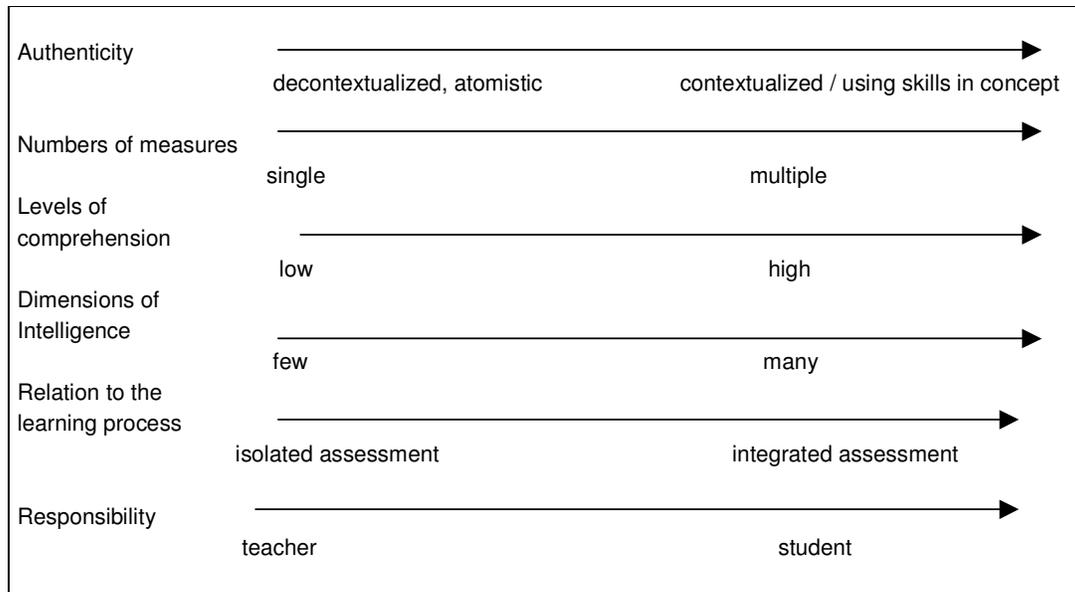


Figure 3 : The Characteristics of Assessment on Six Continua

The first continuum shows a change from decontextualized, atomic tests to authentic contextualized tests. In practice, it refers to the shift from the so called objective tests with item formats such as short answer, fill-in blank, multiple choice and true/false to the use of portfolio assessment, project based assessment, performance assessment, etc.

The second continuum shows a tendency from describing a student's competence with one single measure (a mark) towards portraying a student's competence by a student's profile based on multiple measures.

The third continuum depicts the movement from low levels of competence towards high levels of competence. This is the move from mainly assessing reproduction of knowledge to assessing higher-order skills.

The fourth continuum refers to the multidimensionality of intelligence. Intelligence is more than cognition; it implies certainly meta-cognition, but also affective and social dimensions and sometimes psychomotor skills.

The fifth continuum concerns the move towards integrating assessment into the learning process. To a growing extent, the strength of assessment as a tool for dynamic ongoing learning is stressed.

The sixth continuum refers to the change in responsibilities, not only in the learning process but also in the assessment process. The increasing implementation of self- and peer assessment are examples of this move from teacher to student responsibility.

Finally, the seventh continuum refers to the shift from the assessment of learning towards an equilibrated assessment of learning and assessment for learning. Research has shown convincingly that using assessment as a tool for learning, including good and well-timed feedback, leads to better results when assessing learning outcomes. So far Segers et al (2003).

Self assessment

Self assessment means the student assesses his own work with quality criteria. Moerkerke (1996) indicates self assessment is not a method for certification, but a method serving one of the most essential learning objectives in higher education, which is being able to assess own work based on quality criteria.

Evaluate in three phases

Van der Vleuten (1995) distinguishes three phases in evaluation, namely measure, appreciate and decide. In the first stage, measurement, must be clear what achievement means which criteria. Standard and weight are necessary to realise the second stage, appreciation. The last stage concerns the decision that can be formative (learning tool) or summative (study progress).

Evaluation criteria

To assess specific, measurable, applicable, reproducible and verifiable (smart) criteria are necessary.

To assess knowledge development criteria are needed from validity, reliability, justification and equality.

- Van der Vleuten (1995) indicates validity concerns the question: "Will be assessed what is intended to be assessed?" Here: "Is intended knowledge development / level assessed?"
Validity depends on several factors, for instance the position of the professional practice.
- Assessment's reliability expresses in the precision from the evaluation. Purpose is to organize the assessment so repeat leads under the same conditions and in the same situation and with the same means to the same assessment decision. To draw repeatable conclusions the subject should be wide. The decision must concern sufficient criteria and components to be reliable. Important decisions can hardly be based on small exams.
- Justification is related to motivation. Moerkerke (1996) indicates assessors have to build their decision in an acceptable way. An assessor interprets, appreciates en assesses the process and product from the student. Assessors are part of the procedures of decisions leading to consequences. Assessment procedures should meet the principles of motivation and equality. Motivation is also called principle of justice.
- According to principle of equality all candidates are treated in an equal way (Moerkerke 1996).

4 Method and data collection

The method addressing research questions concerns development research (4.1). Data are also collected by level evaluations (4.2).

4.1 Development research

Purpose is reaching an useful solution for knowledge development in Universities of Professional Education. A study programme knowledge development cannot from the drawing table be realized. Risks are ill-specified problems or too superficial solutions or solutions being too artificial to be relevant or solutions not tuned to the students. The risk developing a paper product is large. In development research practitioners and researcher work together. Practitioners give adequate information for the solution. Researcher is responsible for the theoretical articulation and the empirical evidence. I worked in constructivist way, the way of evolutionary prototyping (Van den Akker 1999) during one year in an University of Professional Education. A project team with four members, including myself was formed. Three members were lecturers; they had tasks in management and quality assurance; I got the role of the project leader. The University of Professional Education was orientated on teachers for primary schools (Pabo).

The project team worked like figure 4. First definition of the problem. Which problem does the University wants to solve with a project knowledge development? The problems were related to the level of the programme and to assessing. Is the University able to realise characteristics from higher education, higher learning (Fiol en Lyles, 1985) or 'Learning II' ? (explanation in 3.1). Besides there was a lot of modernization of parts of the study programme, but no parallel development in assessing. This University (like more) assessed insufficient for assessing in external quality assurance.

UPE's management point's of view is knowledge development is important; so it was incorporated in programme objectives. The project team proposed a working method with several phases. The first phase consists of design and development of conditions, concepts and study programme; the second phase of evaluating the design with key groups in University; in the second half of the year, the third phase, try out with students and lecturers. Level evaluation takes place before the try out and will be repeated each year. Possibly in the next phase the design has to be readjusted, an implementation plan is developed and implementation can be prepared. Quality assurance yearly checks the validity and effectiveness of the study programme.

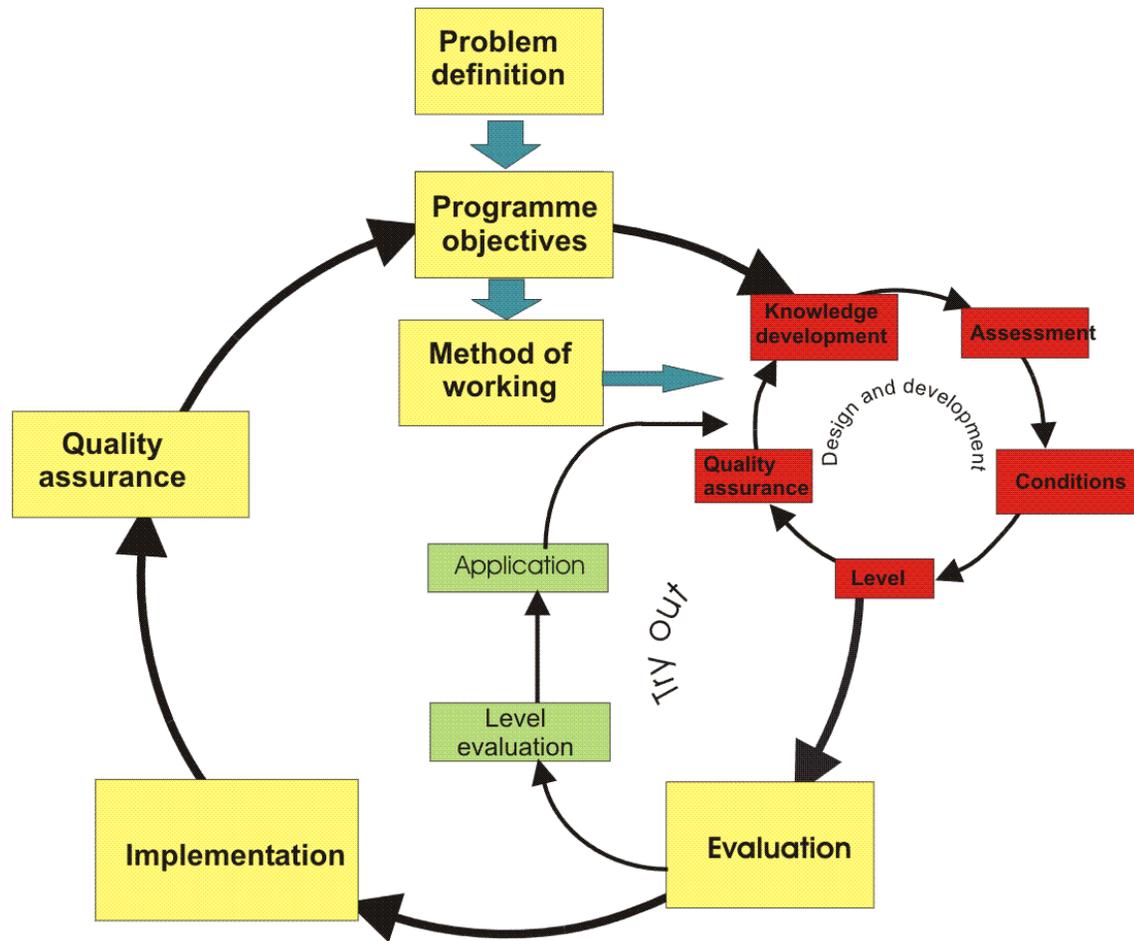


Figure 4: method project team knowledge development

The project knowledge development will be repeated in two other contexts of Universities of Professional Education in 2005/'06. One is a technical university, the other prepares students for the profession of personnel officers.

4.2 Method level evaluation

A method level evaluation was developed. It should meet smart criteria and must meet the principles validity, reliability, justification and equality (3.3). The method consists of 10 steps and 3 phases.

- 01 Connect qualifications with Dublin descriptors
- 02 Check the connection
- 03 Select aspects
- 04 Draft list of questions
- 05 Try out
- 06 Determine list of questions
- 07 Evaluate level and report statistic
- 08 Feedback results
- 09 Complete analysis
- 10 Draw conclusions

Steps 1/6 form the first phase: determine question list. Step 7 is the second phase: level evaluation and report statistic. Step 8/10: drawing conclusions.

In 5.2 method of level evaluation is concretized.

5 Present situation

In present situation, May 2004, problem is defined, programme objectives are determined, design and development has been finished, a project knowledge development for Universities of Professional Education has been developed, design of this project has been evaluated by key groups in the University and now try out with lecturers and students is running (5.1). Level evaluations are also running in 15 UPE's (5.2).

5.1 Project knowledge development

The project knowledge development is realised three times in the study programme: the foundation course, sub graduation phase and graduation phase. Lecturers and students use the assessment instrument. The project is like in figure 5.

5.1.1 Marginal introduction project knowledge development

At the beginning of the project the student gets marginal information. It appeared much information limits the effect on the knowledge development. The student does not meet criteria or other information. He just gets some information in headlines. He will be requested and encouraged to point out a problem in professional practice that has his interest (fascinates) and he likes to work on during a semester.

5.1.2 Problem in professional practice

Starting point of the project is the problem the student points out by himself in the professional practice of the University of Professional Education; it concerns a fascinating problem. These problems are most relevant and correspond with the framework from NVAO: knowledge development takes place in the scope of the professional practice (NVAO 2003a). Besides, these problems are most suitable for knowledge development. Analysis showed that orders and available case orders have too guiding components for knowledge development. In this University students also study with learning questions. The phenomenon learning questions is also suitable for knowledge development; however the guiding way this University made the learning questions made this phenomenon not suitable for this project.

Self-guiding is very important in this phase. The student writes his problem in about one sheet of paper and gives it to lecturer.

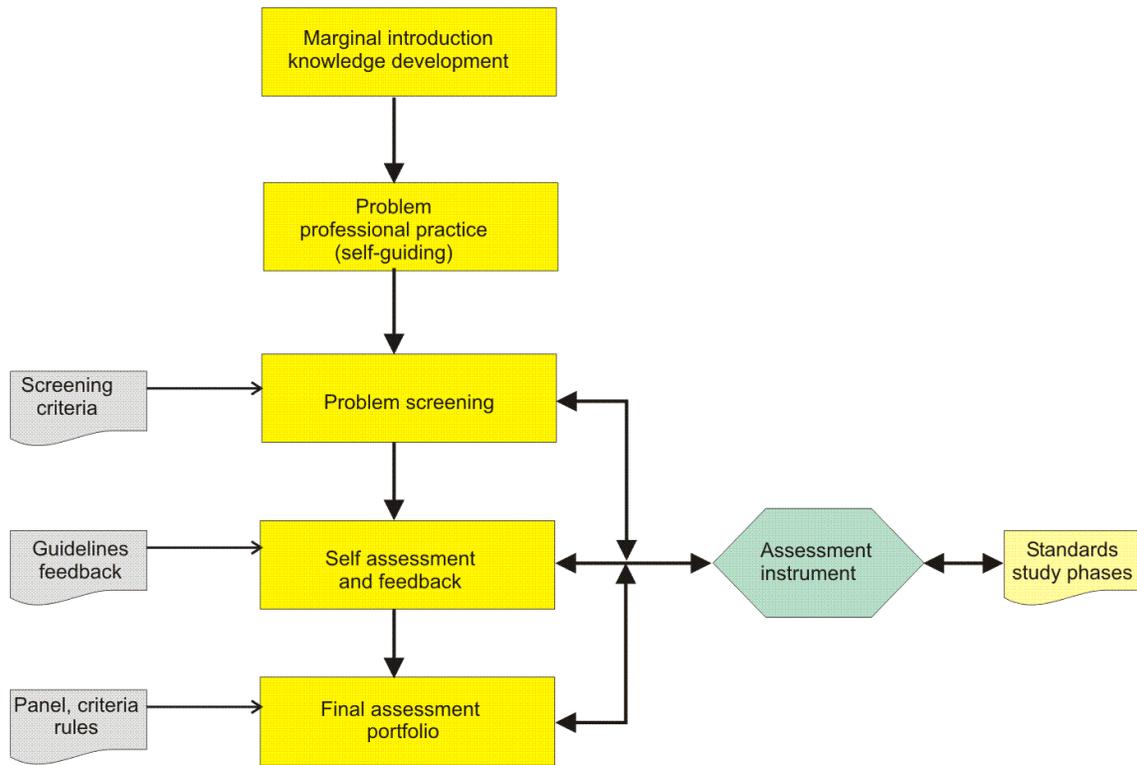


Figure 5: project knowledge development

5.1.3 Problem screening

The lecturer receives the student's problem. Verhoeven (2003) indicates 'study programmes with self-guiding determine the borders how and when students study'. Related to these borders lecturer analyses or screens the student's problem with next criteria.

Professional practice	The problem must come from the professional practice from University of Professional Education.
Individual student	The problem is from the individual student, not from a group students working together (teamwork). (The world of work needs graduates who are innovators by themselves.) The problem is authentic; imitating is hardly possible.

<p>Knowledge development</p>	<p>To what extent this problem is suitable for the student to prove he is able to develop knowledge (<i>innovate</i>) based on an elaborate knowledge from multidiscipline knowledge? In other words</p> <ul style="list-style-type: none"> - Gives this problem the opportunity to the student to prove in what degree he is able to invent and realise innovations? - What multidisciplinary knowledge needs the student to solve the problem? - From what knowledge does the student need elaborated understanding to solve this problem? <p>Lecturers use the assessment instrument.</p>
<p>Level</p>	<p>The problem from the student is on the bachelors level according to the Dublin descriptors. Lecturers use the assessment instrument and the standard study phase.</p>

Figure 6: Criteria for screening problems knowledge development

Lecturers use the assessment instrument in which are Dublin descriptors, working definition knowledge development with which they can check whether the problem meets the criteria knowledge development and 5 x 11 qualifications relevant for knowledge development (237). The structure of the assessment instrument is like figure 7.

<p><u>Knowledge and understanding</u> Have demonstrated knowledge and understanding in a field of study that builds upon and supersedes their general secondary education, and is typically at a <i>level</i> that, whilst supported by <i>advanced textbooks</i>, includes some aspects that will be informed by knowledge of the <i>forefront</i> of their field of study.</p> <p><u>Knowledge development knowledge and understanding</u> The bachelor student shows with knowledge development he is able to invent and realise <i>innovations</i> based upon elaborated knowledge from <i>multidiscipline knowledge</i>.</p> <p><u>Qualifications UPE</u> 11 qualifications UPE with <i>relevance</i> for knowledge and understanding knowledge development</p>
<p><u>Applying knowledge and understanding</u> Can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining <i>arguments</i> and <i>solving problems within their field of study</i>.</p> <p><u>Knowledge development applying knowledge and understanding</u> The bachelor student shows with knowledge development he is able to <i>invent</i> and <i>realise</i> innovations based upon elaborated knowledge from multidiscipline knowledge.</p> <p><u>Qualifications UPE</u> 11 qualifications UPE with relevance for applying knowledge and understanding knowledge development</p>

<p><u>Making judgements</u> Have the ability to <i>gather</i> and <i>interpret</i> relevant data (usually within their field of study) to inform <i>judgements</i> that include <i>reflection</i> on relevant social, scientific or ethical issues.</p> <p><u>Knowledge development</u> The bachelor student shows with knowledge development he is able to invent and realise innovations based upon <i>elaborated</i> knowledge from multidiscipline knowledge.</p> <p><u>Qualifications UPE</u> 11 qualifications UPE with relevance for making judgements knowledge development</p>
<p><u>Communication</u> Can <i>communicate</i> information, ideas, problems and solutions to both specialist and non-specialist audiences.</p> <p><u>Knowledge development</u> The bachelor student <i>shows</i> with knowledge development he is able to invent and realise innovations based upon elaborated knowledge from multidiscipline knowledge.</p> <p><u>Qualifications UPE</u> 11 qualifications UPE with relevance for communication knowledge development</p>
<p><u>Learning skills</u> Have developed those learning skills that are necessary for them to continue to undertake further study with a <i>high degree of autonomy</i>.</p> <p><u>Knowledge development</u> The bachelor student shows with knowledge development he <i>is able</i> to invent and realise innovations based upon elaborated knowledge from multidiscipline knowledge.</p> <p><u>Qualifications UPE</u> 11 qualifications UPE with relevance for learning skills knowledge development</p>

Figure 7: structure assessment instrument

In three study phases the same assessment instrument is used. However, standards differ. Students in foundation course have to make 2 qualifications per dimension in the project sufficient; students in sub graduation phase 4 qualifications per dimension and students in graduation phase uses 5 qualifications per dimension. Weight of knowledge development is twice the qualifications: 2(kd) + 1 (2/4/5 q) See figure 8.

Phase / level/dim.	Knowledge and understanding	Applying	Making judgements	Communication	Learning skills
Graduation	2(kd) + 1 (5q)	2(kd) + 1 (5q)	2(kd) + 1 (5q)	2(kd) + 1 (5q)	2(kd) + 1 (5q)
sub graduation	2(kd) + 1 (4q)	2(kd) + 1 (4q)	2(kd) + 1 (4q)	2(kd) + 1 (4q)	2(kd) + 1 (4q)
foundation course	2(kd) + 1 (2q)	2(kd) + 1 (2q)	2(kd) + 1 (2q)	2(kd) + 1 (2q)	2(kd) + 1 (2q)

Figure 8: standards and weight knowledge development on five dimensions

Students make a project plan (227) and formulate the problem (in neutral terms), targets (knowledge development and qualifications), project phases, time, organization in the primary school and organization this project (self assessment and final assessment) and two or three relevant disciplines. Also according to Pelz en Andrews (1966) knowledge can be effective when a professional feels at home in two or three domains of knowledge.

5.1.4 Self assessment and feedback

The way of coaching is tuned to factors supporting study progress (Prins 1997). For instance students in foundation course do not always have the discipline to study permanently. And according Bandura (1986) (belief in perception from own competences makes successful) self efficacy can grow in coaching. Further exams policy that organize exams regularly but organize re-exams not frequently.

During the project (semester) student meets lecturer ten times. Van der Vleuten (1995) indicates the student is also a homo economicus; he studies for the moments he is assessed. Assessment guides the process of knowledge development. The student tunes his strategy of preparing with the assessment.

Students make reports and products proving their knowledge development. They use criteria for knowledge development (243). In reports and products they indicate the criteria so prove is easily recognized.

The character of the meetings is self assessment (3.3). To make far better use from knowledge development and to resist the student for delay the lecturer assesses the depth and progress from self assessment. Schön (1983) indicates the essence from reflection. 'Through reflection, he can surface and criticize the tacit understandings that have grown up around the repetitive experiences of a specialized practice. It can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience.' At the end the lecturer does not make the decision for the final assessment. The reports from the lecturer about depth and progress knowledge development are one of the criteria for the final decision.

Feedback

The lecturer's feedback is based on the relation criteria, report and products. He feeds back in a formative way. It is not always easy to feedback in an adequate way (to stimulate the learning). Steehouder, Jansen et al (1992) indicate it is important to give positive feedback, negative feedback and feedback with which the student can make progress. Student's self efficacy is important. Students appreciate informative feedback (Moerkerke 1996). Lecturer and student use the assessment instrument. Feed back might not be characterised with overawed or façade behaviour (to hide own mistakes), possibly disparagingly. Purpose of these meetings is making progress in the process of knowledge development. Besides, feed back is an example in the University of professional Education of teachers for primary schools (Ontwikkeldgroep SLO/VSLPC, 1997, pp. 123).

5.1.5 Final assessment

At the end of the project the panel decides the final assessment. Members in the panel should be qualified and they should work with special rules.

Qualifications panel

It is a panel's task to assess the knowledge development from the student. Dupré (2003) indicates that the compounding of the panel guides the decision making. Therefore the members of the panel are qualified for their job.

- Each member knows the concept knowledge development very well (validity) (consensus).
- Each member is familiar with professional practice nowadays (validity) (NVAO 2003a).
- Several disciplines are represented in the panel because the professional field also is multidisciplinary (knowledge development is related to the professional practice)
- The panel is equipped for assessment, the members can listen to each other, they are able to weigh.
- The panel has commitment with the rules and regulations of the performance assessment.
- The panel has three members.

Some of the basic rules are:

- The panel is known with the assessment instrument and accept the content: the level descriptions, the definition of knowledge development, the available qualifications, the standard study phases, the weight of knowledge development etc.
- Evaluating the project knowledge development the members get the opportunity to criticize the final assessments. That is the place and the time to give suggestions for improvement.
- To assess knowledge development is not a matter of politics. So members of the panel do not deliberate before the final assessment, no previous consultation (De Groot, 1994).
- The lecturer from the student is no member of the panel. Analogue to the accountant who cannot be adviser at the same time.

The panel assesses in three phases, namely measure, appreciate and decide (3.3). The first stage, measurement, concerns listing the inventory. The student already shows in report and product(s) what meets the criteria. Panel checks precisely (reliability) the realisation from the knowledge development. The panel uses the criteria from the assessment instrument. The professional practice should be in the problem and in the knowledge development of the student. Members of the panel should reach consensus (validity) about the components of the definition related to the product knowledge development of the student (because of repeatable conclusions) (reliability). The panel also reads the report from the lecturer about the ten self assessments (depth and progress) of the student. Based on this inventory the panel talks with the student and ask him additional questions.

In the second stage, appreciation, the panel uses standards and weight (figure 8). In foundation course student has to make sufficient 2 qualifications. Knowledge development has twice the weight from the qualifications. The panel develops arguments for the appreciation (justification) with support of the criteria from the assessment instrument (237, 243). Each student is treated in an equal way.

The last stage concerns decision. The final decision is summative: it counts for study progress. The panel connects the decision to the appreciation. The appreciation is related to the criteria within the five level dimensions. The degree in which the panel agrees influences the reliability from the decision. The panel writes the final decision with arguments so it is suitable to put in port folio from the student he can show when applying for a job.

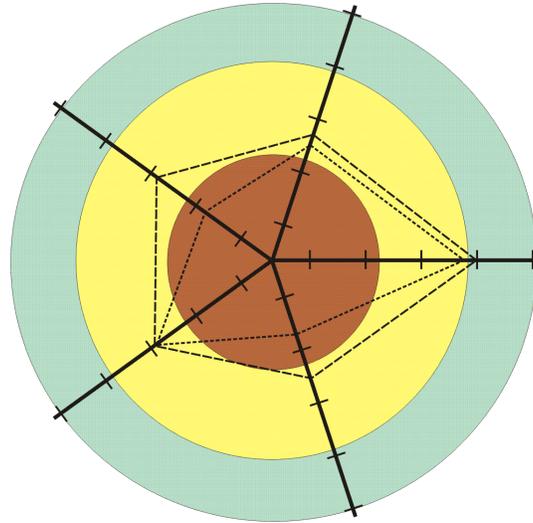


Figure 9: framework students results knowledge development three study phases on five level dimensions

5.1.6 Implementation knowledge development

Implementation should be a systematic process. Rogers (1962) characterises implementation from innovations in four points.

Rapidity from the innovation process. He distinguishes different tempi in groups adapting the innovation: innovators, early adopters, early majority, late majority and laggards. Each group handles the characteristics from the innovation in another way. The 'late majority' has been interested in a direct and easily usability from the new idea, while the 'innovators' accept possible any inconvenience.

Implementation needs time. Each group needs its specific presentation. To reach the several groups and anchor the innovation an adapted presentation is necessary. Each group needs a specific attention to effect the innovation.

Communication is important.

The innovation should be concrete, so the lecturers can work with it. Not just vision or ideas but anchoring in the work from the staff. Anchoring requires more than a conference or study days. An implementation plan is needed to make visible and phase the implementation.

The project knowledge development started with three lecturers, in the second semester there are three lecturers for the try out. In one year six lecturers are familiar with the method, special with the way of coaching and assessing. Working with criteria is not wide well known. Each of these six lecturers can learn two other colleagues, makes 18. In this UPE are 80 staff members, so in more than three years knowledge development can be implemented. Meanwhile a systematic support for learning inter vision and testing ideas with colleagues is necessary. This way of extension and support should be stable. Via quality assurance check the effectiveness of the support and implementation.

5.1.7 Quality Assurance

In quality assurance from innovation three criteria are relevant, validity, practicality and effectiveness. Validity refers to the extent that the design is based on state-of-the-art knowledge (content validity) and that the various components are consistently linked to each other (construct validity).

Practicality refers to the extent that users (and other experts) consider the intervention as appealing and usable in 'normal' conditions.

Effectiveness refers to the extent that the try outs and outcomes with the intervention are consistent with the intended aims (van den Akker 1999).

Validity can adequately be evaluated through experts appraisal, practicality via micro evaluations and try outs and effectiveness in field tests, the level evaluations.

5.2 Level evaluations

Method level evaluations is introduced in 4.2. Briefly the method is as follows. Three components of the level are used: Dublin descriptors, qualifications and orientation (3.2). The Dublin descriptors are general in nature. They are applicable to universities in European countries and all different kind of universities who have to specify these descriptions. The method has three phases. In the first phase domains-specific qualifications are connected to the five dimensions of Dublin descriptors (4.2). Key concepts are connected with knowledge and understanding and so on. Result of phase 1 is the question list according to the five dimensions. Examples will be shown in Summer School. Step 5 from the first phase is a try out. Question lists are made for graduates, managers of the graduates, representatives of the branch and students. In step 5 the question lists are tested with representatives of these groups. Test results are absorbed and the definitive question list can be determined.

The second phase is running in this moment, May 2004. The result score graduates counts. The score graduates' managers is a check. Score representatives branch is check from the image. Score students gives insight in developing level. Table 10 is a framework of the basic lists made from each dimension.

Graduate 1						
K&U	-2	-1	dn/na	0	+1	+2
01		X				
02					X	
03			x			
04				x		
05						x
06						x
07					X	
08				x		
09					X	
10					X	
Tot.	0	1	1	2	4	2

Table 10: Basic list

Compiling lists are made of each dimension. Table 11 is a framework for knowledge and understanding. Compiling lists will be made from each question with results from the individual graduates; the total number graduates; the number sufficient results and percentage sufficient results.

K&U	Grad 1	Grad 2	Grad 3	Grad 4	Grad 5	Number Grad.	Number Suff.	Perc. Suff.
01	-1					86	10	12%
02	+1					86		23%
03	Dn					86		85%
04	0					86		52%
05	+2							
06	+2							
07	+1							
08	0							
09	+1							
10	+1							
Rating	6							

Table 11: compiling list

Table 12 views the percentages of the results of all dimensions per UPE. These results can be used for benchmark.

L-dim.	UPE A	UPE B	UPE C	National
K&U	40%	35%	12%	
Appl				
Mak. J.				
Comm.				
L.skills				

Table 12: list bench mark

In the third phase 3 steps are made. Figure 13 is an example for presenting results level evaluations with students where level is in development. It shows four study phases. The circle is divided in the 5 level dimensions, the lines show the average year result. Lines are illustrative, because in this time evaluation is running .

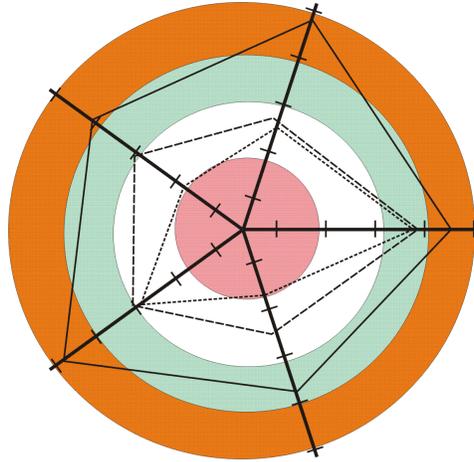


Figure 13 : framework level results students

Evaluation takes place in three phases (3.3). First results must be clear like table 10, 11, 12 and 13. Second standards and weight are necessary (consensus). The last stage concerns the conclusion.

Xxxxxx

6 Draft conceptual point of view

Conceptual point of view can be represented by content and development like in figure 14. Content concerns the concept knowledge development, quantification, assess and evaluate. Development concerns conditions, student learning and course organization by the UPE.

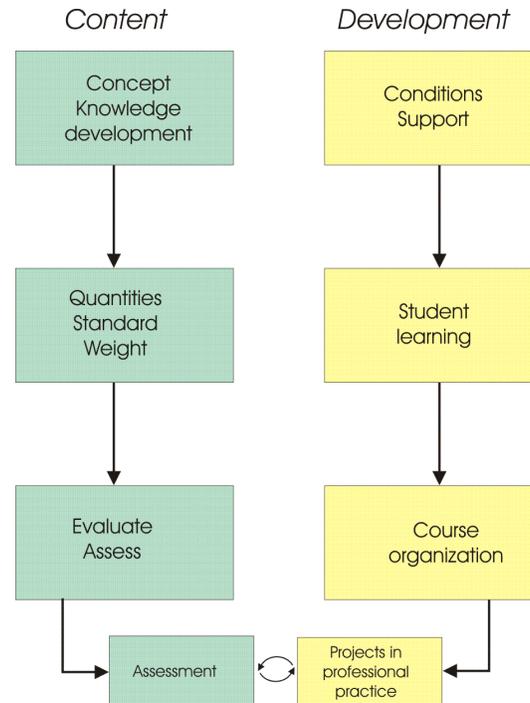


Figure 14: draft conceptual point of view

6.1 Draft interpretation

Concept knowledge development has been defined in a testable way: Knowledge development is inventing and realising innovations based upon elaborated knowledge from multidiscipline knowledge (3.1) Until now this definition seems concrete enough.

Quantities are the five level dimensions (figure 2). Standards concern degrees of complexity according to the study phases: foundation phase realises 5x2 sufficient qualifications, sub graduation phase 5x4 and graduations phase 5x5 sufficient qualifications. Weight concerns level dimensions, the relation knowledge development and qualifications (and their internal criteria). Each level dimension has the same weight. Weight knowledge development is twice the qualifications (figure 8). (The five level descriptions seem to be dimensions. They are distinguishable from each other. Standards and weight also seem usable. In June 2004 panels are assessing and making decisions.)

Evaluate has characteristics on the right side from assessment (figure 3): problem is contextualized; five dimensions are assessed. Knowledge development is inventing and realising innovations based upon elaborated knowledge from multidiscipline knowledge. Skills knowledge development are higher than order than reproduction knowledge. Multi dimensions intelligence by reflection, meta cognition in self assessment. Integrating into learning process by self assessment and feedback. Student is far responsible. Assessment for learning in self assessment; assessment of learning with the final decision. Evaluate in three phases with the support from an assessment instrument (knowledge development, level descriptions, qualifications) and smart criteria (3.3). Criteria problem screening, self assessment, panel. Guidelines feed back. Assess should meet criteria validity, reliability, justification, equality In practice the three phases are essentially. (Counsellors are not used to work with so many criteria.)

Conditions for realising knowledge development concern self-guiding (marginal information); fascinating (self selected problem); students in professional practice; individual; level evaluation; assessment instrument; policy exam; qualified counsellors. (Students are enthusiast and motivated. There were far more students who wanted to participate in the try out.)

Students learn knowledge development special by individual behaviour, self assessment, feedback (guidelines), proving / showing knowledge development. Knowledge development is higher level learning (3.1). (Most lecturers have to learn a lot and need support.)

Education has to arrange / improve facilities (explicit knowledge) (ICT) (library). The didactic concepts are in line with the aims and objectives (high level learning). The teaching methods correspond to the didactic concept (self assessment, feedback). Staff is known with professional practice: qualified counsellors; panel; implementation plan; quality assurance; level evaluations. (The level evaluations meet accreditation requirements: aims and objectives of the degree course; level that has been achieved and gives input for programme criteria (knowledge development, reflecting qualifications, didactic concept, assessment).) (Project knowledge development meets accreditation criteria quality of staff, guidance and internal quality assurance. High level learning requires another way of thinking, behaviour and organizing education.) (Some UPE's have a long way to go.)

Projects in professional practice are the most usable solution for extending knowledge development in UPE's.

6.2 Issues

- Are conditions in project knowledge development adequate for assessing knowledge development with principles of validity, reliability, justice and equality?
- Are conditions level evaluations adequate for drawing conclusions in a valid and reliable way?
- How far is it predictable projects knowledge development raise UPE's level?
- A nice name for project knowledge development should be invented.

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