Final Report

Integrating blended-learning in physics courses: dealing with diversity in classrooms

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Contents

1. Introduction

The Eindhoven University of Technology (TU/e) is facing major challenges with the growth of students. The increasing student population requires the TU/e departments to innovate educational approaches to provide quality of education. However, the large-size courses require creative solutions for the teachers to realize small-group learning while still paying attention to individual diversity and needs during students' learning process.

In addition, the current students' and classroom composition is heterogeneous and diverse in terms of prior knowledge and disciplines. Furthermore, the current TU/e policy is to encourage students with different profiles and interests to enroll in the study programs this demands a different teaching approach to deal with the population of today's classrooms.

Likewise, the TU/e vision on Information and Technology (IT) is to integrate blended- learning at bachelor's but also master's and PhD. level[1]. The rationale behind this vision is to provide students with efficient but also accessible education that meets different learning styles, considers diversity and individual needs both in teaching and in supervision. In addition, it is important that through the combination of face-to-face and digital education the contact time with students is used in an efficient manner during lectures and instructions. However, integrating blended-learning does not stand alone. It needs to be supported by a proper educational strategy and program towards professionalizing the teachers. This will also need to be supported by appropriate resources to operationalize IT and blended learning in newly or adapted didactical.

1.1. The context: the focus of this project

The Applied Physics (AP) department is committed to the TU/e vision. In this regard, the AP is interested in looking for means to still enhance the quality of instruction and looking at possibilities to organize small-group teaching in which attention for differentiation among students, individual support and formative feedback are key elements of the educational forms.

[1] Meijers, A. & Brok, P. den (2013). Ingenieurs voor de toekomst: even essay over het onderwijs aan de TU/e in 2030. Eindhoven: TU/e https://www.tue.nl/uploads/media/TUe_Onderwijsvisie2013.pdf

In this project, we wanted to explore the possibilities that blended learning offers to optimize, for instance, student's self-study time as students will practice exercises at test level and will get immediate feedback from a digital learning environment. This, to enhance teacher-student contact time. We also wanted to address diversity with IT methods by providing opportunities for personalized learning by:

- Enhancing online feedback;
- Intensifying self-study time;
- Improving contact-time;
- Supporting conceptual understanding;
- Addressing differences in learning styles;
- Dealing with large-size classrooms;

Furthermore, an ultimate purpose of this project is to initiate a culture of change towards inspiring and motivating other teaching staff to use other type of IT method.

1.2 Scope of the project: objectives

The overall goal of the project is to optimize education at the Applied Physics (AP) department through the integration of IT tools. The project had therefore the following specific objectives:

- To integrate a digital platform (Oncourse) to test students' knowledge and provide feedback to EM students in learning and practicing concepts;
- To develop an educational strategy suitable to integrate blended learning in education with the support of IT tools that enhance faculty staff to teach large groups by paying attention to individual needs;
- To operationalize blended-learning in three to four AP courses with the necessary financial support.
- Further professionalization of the teachers: most of the teaching staff at the AP department hold already a BKO certificate and/or in the process of getting a certificate.

1.3 Scope of the project: expected outcomes of the project

We expected to reach the following outcomes:

- Pass rate of EM students in academic year 2014/2015 has increased in comparison with 2011/2012 and 2012/2013 cohort of students.
- There is a clear strategy (including financial resources and support) to professionalize teachers in carrying out IT educational innovations.
- Three to four AP courses have integrated blended-learning.
- The 'good practices' are disseminated among AP faculty staff, but also outside the department.

Regarding the dissemination, we aimed at participating in 3TU conference on innovation education projects, presenting the setup and results of the different pilots, and writing a paper for an international journal on the AP experiences.

1.4 Project management

We provide in table 1 an overview of the project management and phases.

Table 1.

Project management and phases	Time line
Initial phase	
- Workshops Oncourse for EM teachers	January, 2015
- Initial meetings around blended-learning policy	
Project implementation	
Preparation of blended-learning materials	Feb.-March, 2015
- Student assistants: insert Oncourse EM questions	
- Implementation of workshops (weblectures, pencasts, other blended-learning tools, etc)	April, 2015
- Teaching EM course	May till July, 2015
- Teaching other (3 to 4) courses with IT/blended learning	May – Nov., 2015
Evaluation of results	Aug.- Nov., 2015
- Analysis of EM pass rates and students' questionnaires	
- Interview with teachers	
Evaluation of results other courses	
- Analysis of the 3 to 4 courses pass rates and student questionnaires	
- Interview with teachers	

Dissemination	October, 2015
- Project presentation in 3TU annual conference	
- Journal paper	December, 2015
Final project report	December, 2015
- Report writing: final report for 3TU management	

2. Description on project activities

2.1. Design of an educational strategy for blended-learning

During the initial phase of the project a number of consultation meetings took place with the director of studies to outline an educational strategy to integrate blended-learning in the Applied Physics courses. After an analysis of the use of blended-learning in the different courses we observed that ICT tools such as clickers and Oncourse online quizzes were used in some of the BSc. courses with two objectives, mainly:

- To activate students;
- As a formative assessment tool.

The following figure shows the bachelor courses which have already integrated ICT tools in previous years to strengthen face-to-face education since the beginning of the Bachelor College.

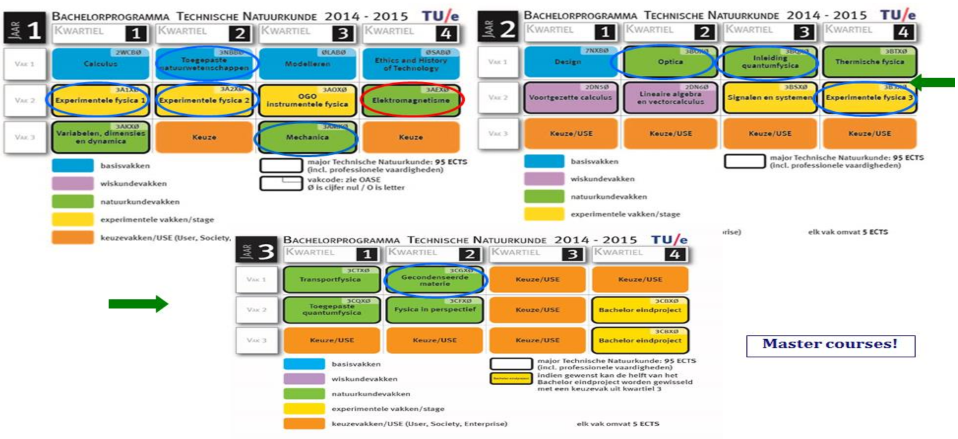


Figure 1. Overview of Applied Physics courses using IT-tools

Despite the use of IT in some AP courses, we were keen on developing an educational strategy for blended-learning aiming at creating a structure and a sound approach to tackle didactical problems, namely:

- Addressing courses with low pass rate and low students' performance;
- Tackling courses with heterogeneous groups, i.e. from different disciplines;
- Enhancing learning during self-study time;
- Improving understanding of concepts and theories;

Based on this strategy we contacted the responsible teachers of courses following specific criteria:

- (Consecutive) low pass rates in the past three years;
- Focus of courses on learning concepts understanding and need to make self-study time effective in order to maximize contact hours;
- Limitations in prior knowledge;
- Courses which deserved the attention of the Education Committee and Examination Committee.

The project activities were also open to all teaching staff at the Applied Physics department who wanted to further carry out innovations and explore other ways to improve teaching and enhance learning. No all teachers who fell under the criteria participated in this project. We believe that the key element to stimulate a culture of change is motivating and not forcing. See table 2 to gain an overview of the courses for this project:

Table 2. Overview Applied Physics courses

Course name	**Period 2015**
Electromagnetics	Year 1 – Quarter 4 (BSc.)
Experimental physics 3	Year 2 – Quarter 4 (BSc.)
Computational and mathematical physics	Year 1 – Quarter 1 (MSc.)
Physics of new energy	Year 1 – Quarter 2 (Bsc.)
Condensed matter	Year 3 – Quarter 2 (BSc.)
Theoretical classic mechanics	Year 2 – Quarter 3 (Bsc).

3. Implementation phase

3.1. Method

We held a meeting with each teachers' team with the intention to analyze the specific educational context of each course. In doing so, we followed, implicitly, a general approach (see Figure 2. Analysis of course context) to redesign courses. The result of this analysis did not always meant a completely redesign of the course but just some adjustments to optimize contact hours and make self-study time more effective.

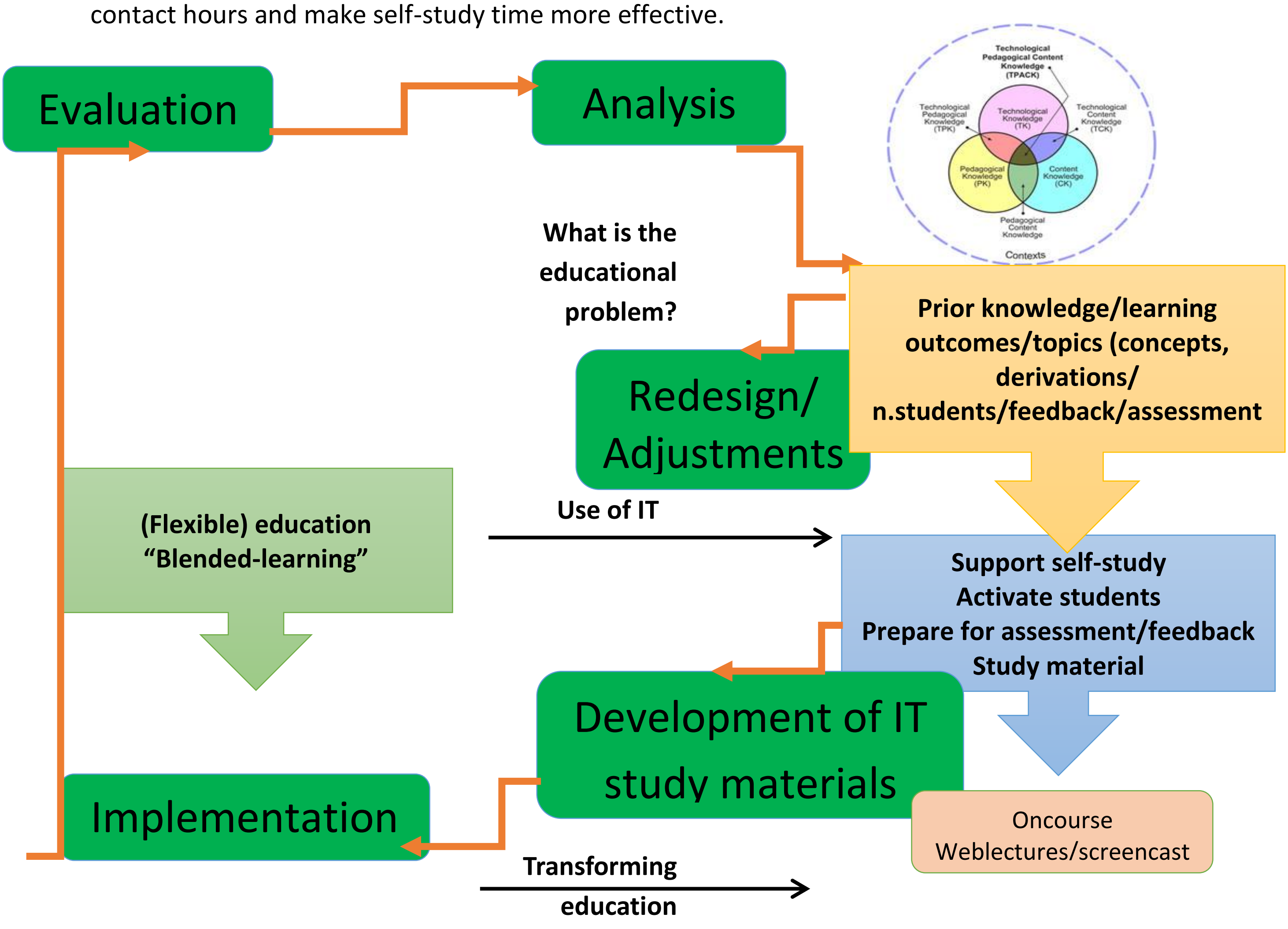


Figure 2. Analysis of educational context & IT tools

We also followed implicitly the TPACK model[2] as a theoretical framework during the training discussions. PCK represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organized, adapted, and represented for instruction.

In the following section we describe briefly the process and content addressed during the training discussions with the teachers' teams.

3.2. Analysis of education context and selection of IT tool

Analysis of educational context:

- Learning outcomes/type of topics addressed in the courses/lectures (i.e. concepts, derivations, etc);
- Assessment methods and educational approaches;
- Statistical test analysis (SPSS) to gain an overview of students' performance in relation to concepts, calculations, etc.;
- Prior knowledge; homogeneous vs. heterogeneous; number of students;
- Type of course: bachelor major/elective course, master core course, etc.

3.3 Selection of IT tools

The selection of the IT tools consisted of Oncourse, online platform to maximize feedback on progress, assessment and have students actively to engage in the course. Likewise, weblectures aimed at facilitating the prior knowledge missing; making self-study effective and functional; providing additional explanation about specific concepts; diminishing diversity among students with different learning paths. (students who do not always follow the lectures, still have the challenge to watch the lectures).

For each specific course, a tailored-made solution was proposed and the steps below were followed:

- redesigning and/or making adjustments in the course setup;
- training teaching staff on the selected IT tools (i.e. Oncourse, weblectures);
- development of materials;
- implementation and evaluation.

[2] Mishra, P. & Koehler, M.J. (2006). Technological Pedagogical Content Knowledge: A framework for teacher knowledge. Teacher College Record. Vol. 108, N. 6, pp. 1017-1054

3.4. Implementation of training

We organized two training workshops on Oncourse for the applied physics teachers. We invited also Electrical Engineering and Mechanical Engineering teachers to attend the training. The workshop on Oncourse was facilitated by a teacher from the Mathematics department (dr. Hans Cuypers) with ample experience in Oncourse and blended-learning. During the workshops, the teaching staff explored the feasibility of Oncourse as a digital platform to test students conceptual knowledge through multiple-choice quiz questions but also as a formative feedback tool (i.e. students as a first hand to get rapid feedback of their answers) will be considered. Examples of the functionality of Oncourse to create tutorials for feedback were also explained.

A total of 10 teachers attended the sessions. The training sessions were organized on the following days:

Table 3. Overview of training sessions on Oncourse

Day	**Theme**
Session 1 Monday, March 9, 2015	Start level • Monitoring students' assignments in Oncourse • Overview of students groups • Designing multiple-choice questions/quizzes • Overview of students' results
Session 2 Thursday, March 12, 2015	Advanced level • Numeric and symbolic questions • Preparing settings in the system for test questions • Time selection • Randomizing and parametrizing questions

We organized a number of workshops over weblectures for applied physics teachers, but also for Electrical Engineering teachers.

Table 4. Overview of training sessions on weblectures, screencasts and pencasts.

Day	Theme
Session 1 June 9th, 2015	Training workshop: themes – Day 1 • General information on weblectures, screencasts and pencasts • Acting for the camera • Thinking and preparing script • Developing materials • Voice, pose and body language • Preparing slides Coaching on the job (studio coaching) – Day 2 • Recording weblecture in studio • Providing feedback to teachers
Session 2 July 11th, 2015	Training workshop: themes – Day 1 • General information on weblectures, screencasts and pencasts • Acting for the camera • Thinking and preparing script • Developing materials • Voice, pose and body language • Preparing slides Coaching on the job (studio coaching) – Day 2 • Recording weblecture in studio • Providing feedback to teachers

In the coming sections, we present the redesign and the results of the applied physics courses including the integration of ICT tools in the lectures.

4. Results
4.1. Electromagnetics
4.1.1. Analysis of the course context:

Electromagnetism (EM) is a first year course at the Applied Physics (AP) department. The EM course has been taught already for three consecutive years within the structure of the Bachelor College. EM course consists of a combination of two blocks of *studio classrooms*[3] (first block consists of 2 hours lectures and 2 hours *studio classroom;* and the second block is

[3] Gómez Puente, S.M., Swagten. H.J.M. (2012). Designing learning environments to teach interactive Quantum Physics classrooms. European Journal of Engineering Education, 1-10.

made out of four hour *studio classroom*) in which students actively take part in classroom assignments. *Studio classroom* approach is based on short theoretical interactive lectures around concepts such as integration and differential equations, integration of more variables, surface, volume and close path integral among others, followed by multiple-choice *clicker* questions in which the conceptual knowledge of the students is tested. This approach allows immediate feedback. In addition to the interactive lectures, it includes also tutorials in which students work on assignments supervised by the teacher in combination with self-study time.

<u>Educational challenge:</u>

An analysis of the results of the first two years of EM course shows that a total of 46.9% of the AP students in the 2012 have passed the course (including the regular exam and the resit). Regarding the 2013 students cohort, 48.6% of the students have passed the course. A possible interpretation of the low rates is, first of all, that students learn a number of concepts in short time and it becomes therefore difficult to master. In addition, the curriculum provides less maths content in the previous courses. This diminishes students' chances to learn and practice some basic concepts as these are not provided in the curriculum on time (i.e. vectors, analysis and operators such as divergence and rotation).

<u>IT method/tool:</u> Oncourse

Weekly quizzes in the form of homework assignments are developed as both feedback as assessment. Diversity in learning is dealt by giving students the opportunity to go back to the online assignments they did not make correct.

<u>Evaluation:</u>

By integrating feedback and assessment through weekly online quizzes we aimed at:

- monitoring students' understanding of concepts and providing feedback on progress.
- we also wanted to know whether this online system is a suitable form to actively engage students in the assignments during self-study time, and whether it supports student's learning.

Analysis educational context: Electromagnetism (EM)
EM Course design 2013-2014

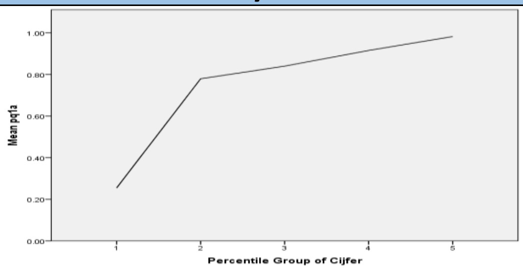
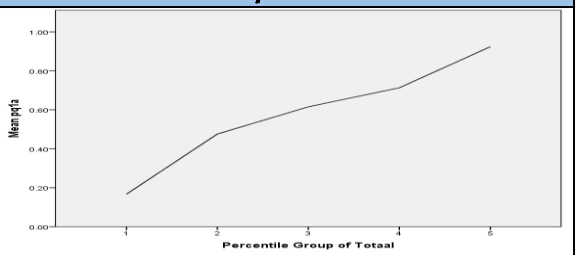
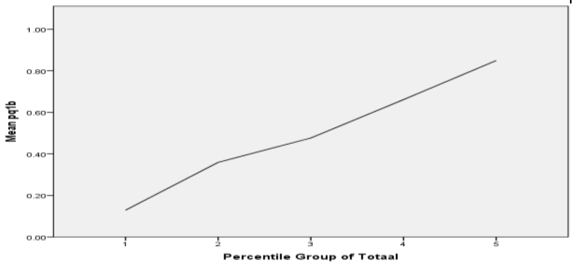
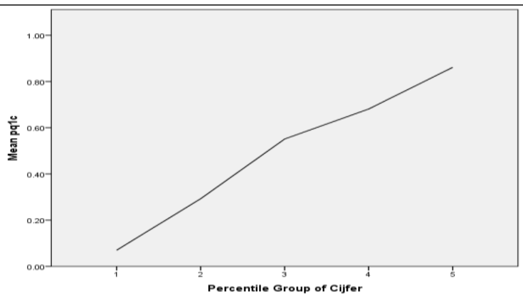
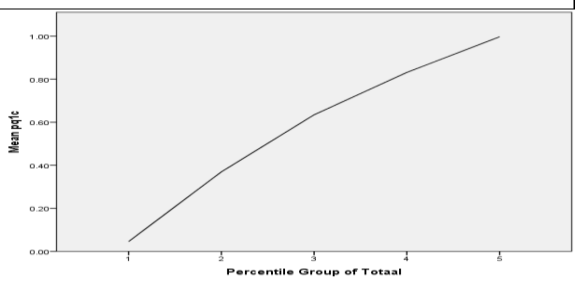
Educational form & didactical setup	Assessment form & assessment plan
Studio classroom **1st. block** – 2 h. lecture 2 h. studio classroom Interactive lecture Self-study Multiple choice clicker questions Problem-solving supervised learning (Tutorials)	60% final written exam 20% Written exam (interim exam 1) 20% Written exam (interim-exam 2) Formative weekly feedback (Not influence on end mark)
2nd. block – 4 h. studio classroom Interactive lecture Self-study Problem-solving supervised learning (Tutorials) Multiple choice clicker questions	• Function of studio classroom: Active students, explain concepts and theories and have students work on assignments

EM Course re-design 2014-2015 with the integration of online feedback and assessment

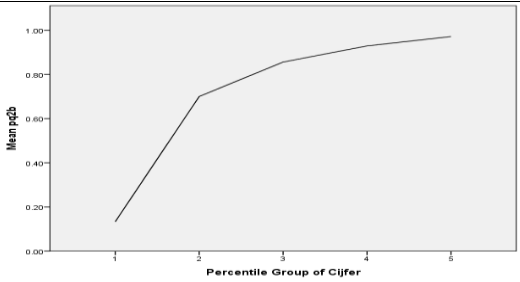
Analysis	Iteration and improvement in course design
Analysis of students' problems • New concepts are taught every week • No time to understand and practice • Low pass rates	**Iteration and improvement in course design** **2e. block** - Feedback (Oncourse online platform) to support practice through homework exercises - Formative feedback/assessment (weekly assessment homework 10%)
Content analysis • Shortage of maths in curriculum • Prior knowledge in integration, differentiation, vectors, divergence, etc)	- Difficult concepts work out examples of problem solving exercises – based on Oncourse homework - Differentiation of students (answers are available after Oncourse test) - Clicker question (during lecture direct feedback over the topic of that day + link to 2nd. studio classroom about the topic of that week)

To analyze whether there are differences in students' performance regarding conceptual understanding we conducted a test analyses with SPSS[4]. We wanted to compare how students performed in different academic years in relation to the understanding of concepts and solving problems. In table 5 we compare the test questions of the final tests in 2014 and 2015.

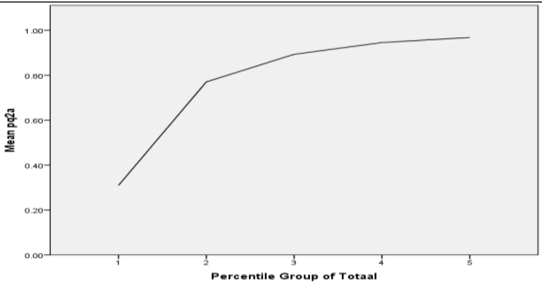
Table 5. Test analysis final exam 2014 and 2015

July 2014	July 2015
 Q1a-	 Q1a - E-veld m.b.v. Coulomb
	 Q1b
 Q1c -	 Q1c- Kracht m.b.v. Coulomb

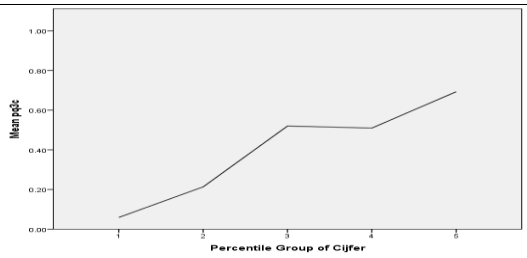
[4] SPSS – Statistic Program for Social Science



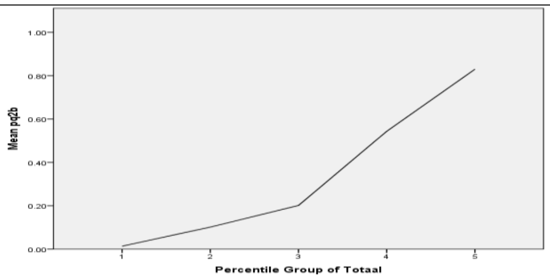
Q2b-



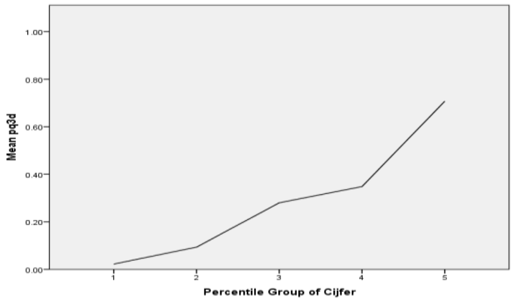
Q2a- E-veld m.b.v. Gauss



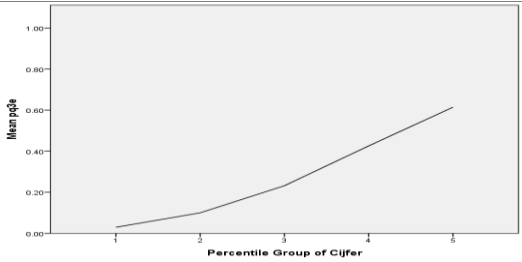
Q3c-



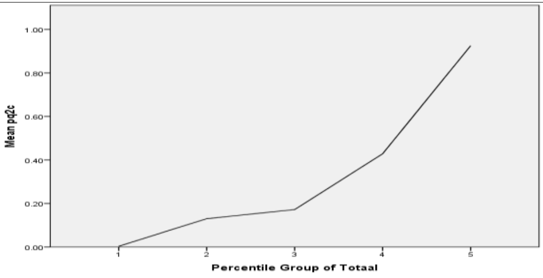
Q2bE-veld/Gauss in materie



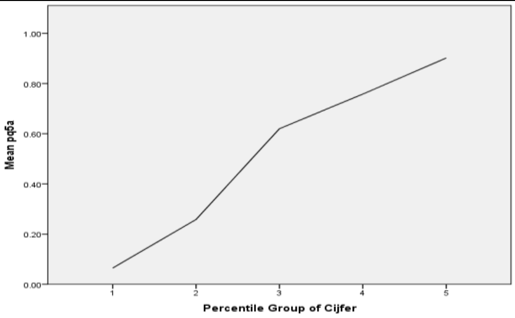
Q3d-



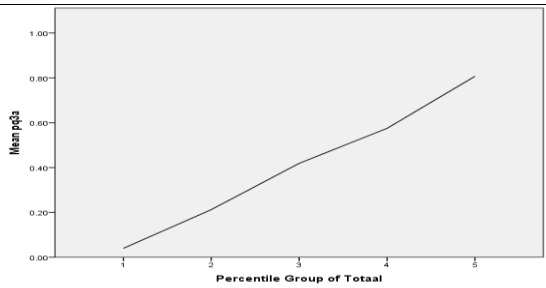
Q3e



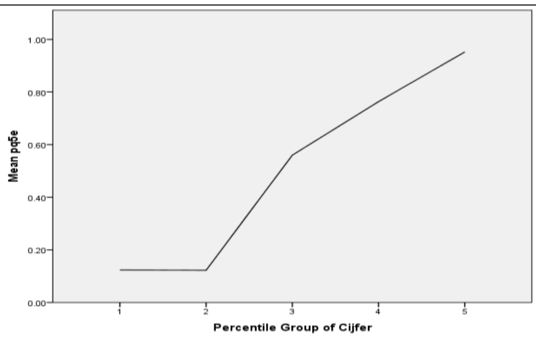
Q2c – Lading in materie



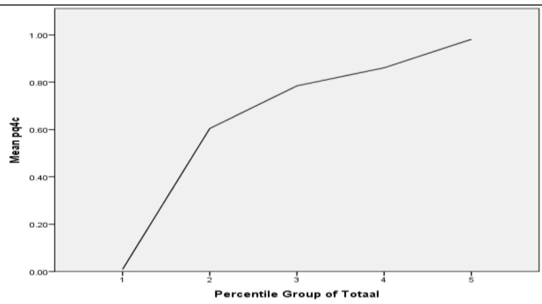
Q5a-



Q3a- B-veld m.b.v. Ampere (eenvoudig)



Q5e-



Q4c- Wet van Faraday

Looking at the students' performance on test questions and whether there is discrimination between students, we observe slightly differences between the 2013/2014 and the 2014/2015 cohort of students. Actually, the students perform more or less the same on the same type of conceptual understanding questions.

We also looked at the p-value indicating the level of difficulty of students' performance in the test questions. We observed that the questions which were difficult in 2013/2014 still remain difficult in the academic year 2014/2015.

Table 6. P-value 2013/2014

Item Statistics

	Mean	Std. Deviation	N
pq1a	.7598	.40202	141
pq1b	.5201	.40702	141
pq1c	.4941	.38016	141
pq2a	.8582	.35239	141
pq2b	.7234	.36305	141
pq2c	.6330	.41139	141
pq2d	.5284	.43000	141
pq2e	.6879	.44537	141
pq3a	.5626	.38242	141
pq3b	.7730	.38948	141
pq3c	.3986	.37302	141
pq3d	.2908	.40247	141
pq3e	.2837	.34654	141
pq4a	.6194	.37708	141
pq4b	.3511	.35729	141
pq4c	.3830	.44710	141
pq4d	.4142	.43599	141
pq4e	.2369	.41030	141
pq5a	.5230	.45208	141
pq5b	.1241	.24933	141
pq5c	.1294	.30851	141
pq5d	.3617	.43089	141
pq5e	.5059	.47074	141

Table 7. P-value 2014/2015

Item Statistics

	Mean	Std. Deviation	N
pq1a	.5822	.39125	213
pq1b	.4988	.35683	213
pq1c	.5792	.43143	213
pq2a	.7825	.32762	213
pq2b	.3421	.40819	213
pq2c	.3347	.44119	213
pq2d	.3324	.32321	213
pq3a	.4126	.33763	213
pq3b	.6216	.38030	213
pq3c	.4930	.42471	213
pq3d	.2636	.30713	213
pq4a	.6150	.43551	213
pq4b	.5383	.39372	213
pq4c	.6526	.44664	213
pq4d	.3887	.37146	213

Comparing the pass rate of the last two consecutive years with this academic year, we observed that there is a slightly improvement in the pass rate.

Table 8. Comparison of pass rates results of three consecutive years

2012/2013	2013/2014	2014/2015
46.9%	48.6%	50%

Regarding students' satisfaction (N=45, out 213 who made the exam filled out the questionnaire), students show satisfaction to a great extent with Oncourse, as a platform and IT tool, to support students to understand the content provide in the lectures; to apply the content of the lectures; to stimulate students' to invest time in the self-study assignments. Finally, students are satisfied with the feedback they get from the Oncourse quizzes.

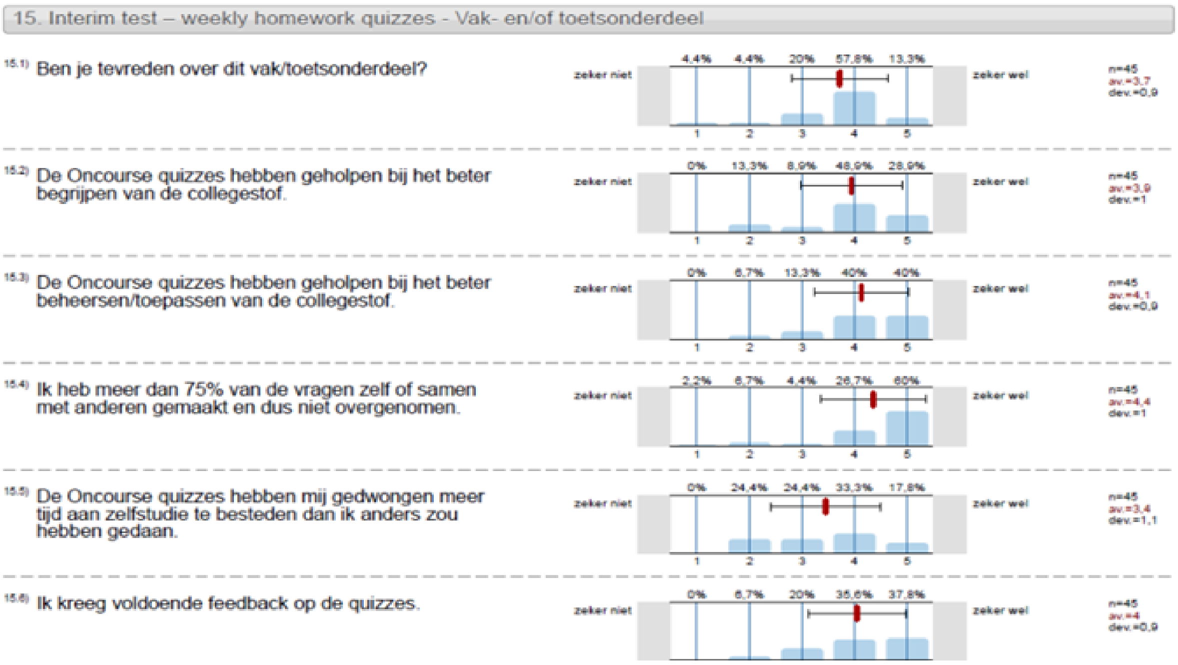


Figure 3. Overview of students' responses over Oncourse (EvASys, 2015)

<u>General conclusions:</u>
Based on these results, we can conclude that despite the integration of the online feedback and weekly assessment to support students' conceptual understanding, this course still remains difficult for the students. Our assumptions are that the fact that not enough maths courses are included in the curriculum in the first year, this may be the cause of students' difficulties in conceptual understanding. The combination of online quizzes with small group instruction could be an approach that better works.

Both teachers and students are satisfied with Oncourse. It is an effective tool to monitor progress and provide feedback on the weekly assignments. In addition, it motivates students to weekly be actively involved in the topics as they make the online homework. However, it is not clear to what extent students work individually on the online assignments. With regards to Oncourse as a systems, it has some limitations as symbolic questions cannot be parametrized.

4.2. Experimental physics 3
4.2.1. Analysis of the course context

The Experimental physics 3 course, is a compulsory second year course in the AP bachelor curriculum. This is a practical lab course were students use dedicated research equipment to perform advanced experiments than in previous experimental courses. In addition, students get introduced to Finite Element Modelling in Matlab.

Educational challenge:

- Students' understanding on some essential content and theoretical elements is not always optimal;
- Supervision op students' progress need to be improved.

IT method/tool: Increasing and maximizing the functionality of Oncourse weekly quizzes and assignments. Oncourse as online learning platform was improved as follows:

- Number of quiz question per experiments were upgraded and increased;
- New questions were developed for the new MRI experiment;
- Objective of the quizzes is that students are better prepared for the practicum assignments were the knowledge of the theory is applied;
- More variation in questions to test knowledge and calculations;
- Intensifying supervision through students' weekly results on understanding, application and knowledge provided by Oncourse.

Evaluation:

- Investigate whether the upgraded questions have a positive effect on students' understanding, application and knowledge.

Experimental physics 3 2013/2014

Learning outcomes - Educational form & didactical setup	Assessment form & assessment plan
Skills in application and operation of advanced experimental techniques and equipment Processing and interpretation of observations and analysis of measured parameters and measurement errors Numerically and analytically solving problems with the computer 4 experiments	Interim report - 70% of the final result Interim examination - 30% of the final result Oncourse quizzes

Experimental physics 3 2014/2015

Analysis of educational challenges	Iterations and improvement
Have students to develop deeper understanding and application in calculations and experiments Improve supervision of students' on experimental performance	→ More assessment questions are developed in order to test knowledge, calculations, etc. Better supervision of students (via Oncourse) on progress, knowledge, understanding, application, etc. Number of questions per experiment are extended and new for the MRI experiment are developed

Table 9. Overview average students' achievements in Oncourse quizzes per experiment 2013/2014

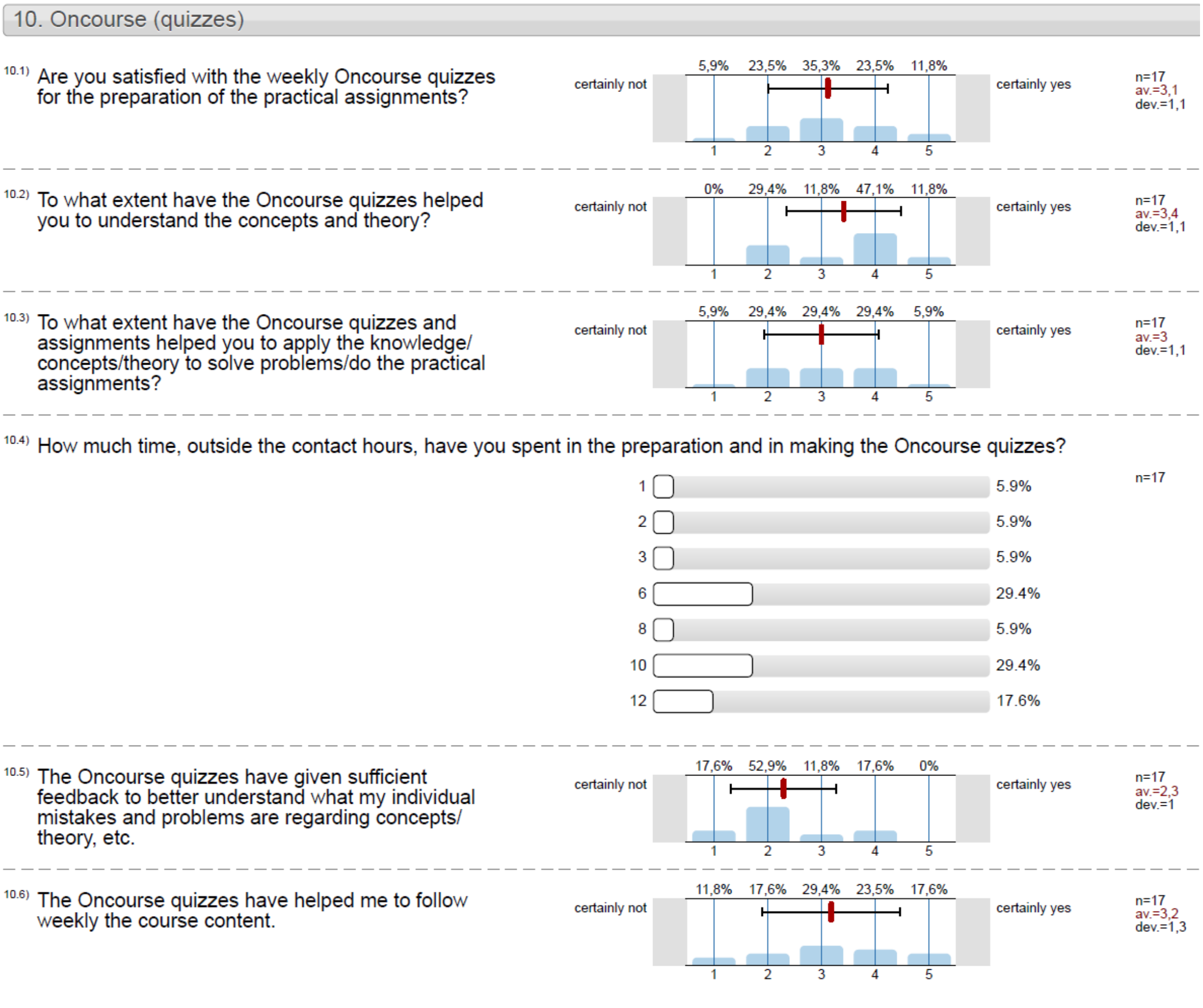
Name experiment	Experiment 1 Week 1	Experiment 2 Week 3	Experiment 3 Week 5	Experiment 4 Week 7
	Mean – SD	Mean – SD	Mean – SD	Mean – SD
Laser Induced fluorescence	6.44 -	7.00	9.00	7.72
Laser Optical Tweezers	7.67	7.33	8.80	7.33
Gamma ray spectroscopy	8.37	8.65	7.67	8.48
Atomic Force Microscopy	5.25	4.33	7.50	9.00
Magnetic resonance imaging	4.63	5.35	5.83	6.25

Table 10. Overview average students' achievements in Oncourse quizzes per experiment 2014/2015

Name experiment	Experiment 1 Week 1	Experiment 2 Week 3	Experiment 3 Week 5	Experiment 4 Week 7
	Mean – SD	Mean – SD	Mean – SD	Mean – SD
Laser Induced fluorescence	7,44 - 1.9		7,31 - 2.4	8,37 - 2.2
Laser Optical Tweezers	7.19 - 2.3	8.66 - 13.0		8.28 - 1.25
Gamma ray spectroscopy	7.53 - 1.82	7.00 - 1.83	8.16 - 1.43	
Atomic Force Microscopy	5.72 - 1.63	5.88 - 1.41	6.38 - 2.37	
Magnetic resonance imaging	8.66 - 1.33	8.11 - 1.22	8.63 - 1.48	7.70 - 3.06

Comparing results of students' performance in 2013/2014 and 2014/2015 we observed in general better means in the Oncourse assignments related to the experiments in 2014/2015. Although this is difficult to demonstrated, we tend to think that the type of additional questions developed to have students practice understanding, knowledge, problem-solving and theoretical type of questions may have influenced the results on the experiments.

With respect to the level of satisfaction on Oncourse quizzes (academic year 2014/2015), students are satisfied with the online quizzes as a mean to support the preparation of practical assignments. In addition, students indicate that the Oncourse quizzes facilitate the process of understanding concepts and theory; and to apply knowledge in solving problems. Some issues for improvement are the feedback. This will be the starting point for further adjustments.



<u>General conclusions:</u>

In this study, we wanted to investigate whether the upgraded questions on understanding, application and knowledge have a positive effect on students' results. We confirmed therefore that the mean of students' scores in most of the experiments is higher than in the previous year.

Despite students' satisfaction with Oncourse assignments, there are still areas for improvement as for instance the functional application of Oncourse. Feedback can be given in the form of tutorials and/or provide step-by-step options to complete an exercise with the overall goal of giving hints in each step filed in by the student.

4.3. Computational and mathematical physics
4.3.1. Analysis of the context

The Computational and mathematical physics (3MA010) is a new master core course in the Applied Physics department. This course is also followed by students of the Fusion master study program. Within the framework of the Graduate School, this course has been redesigned content-wise.

Educational challenge: Due to the different parts and components of the course, it become relevant to introduce a method to monitor students' progress on the one hand. On the other, Matlab is not a program which is known by all students and that may have some consequences to be able to follow the course.

IT method/tool: Oncourse. The need to integrate an online system was two-folded:
- To identify deficiencies in prior knowledge regarding Matlab, maths and numerical components;
- To integrate a monitoring system to follow students' progress.

Evaluation: The teachers were interested to know whether Oncourse is a suitable feedback and support tool for the students when used during the self-study time to solve problems. The teachers' team was also interested to know whether Oncourse is a system for the type of assignments this master course provides.

Educational form & didactical setup	Assessment form & assessment plan
7 weeks independent learning under supervision in 2 blocks of 2 hours per week 7 weeks lecture in 2 blocks of 2 h. per week Including mandatory homework exercises, modelling projects and Q&A sessions	Project reports 1 interim test Final written exam Weekly Oncourse quizzes
Analysis of educational challenges	**Pilot**
Differences in content prior knowledge Differences in knowledge of Matlab applications Improve supervision of students' on experimental performance	Diagnostic test at the beginning of the course to identify deficiencies Feedback on prior knowledge and how to reach minimum level Weekly quizzes to active students and motivate students to study consequently the topics Weekly quizzes to give feedback on progress both for teachers and students

Results:

The Oncourse diagnostic tests were used therefore to assess the Matlab prior skills of the students on the one hand. On the other, to assess the minimal requirements of maths prior knowledge expected for this master course. The results of the diagnostic test show the following:

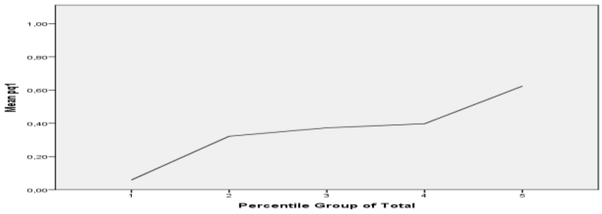
- Students are not always familiar with the basics of Matlab;
- The expected maths prior knowledge is good;
- Some problems regarding numerical assignments were identified.

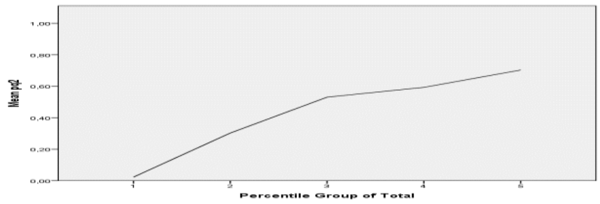
Some of the deficiencies identified in the diagnostic test were addressed by integrating these topics in the lectures and with some additional practical assignments. This helped to optimize lectures and instructions.

To gain an overview of student understanding of concepts and application in solving problems, we have followed students' progress weekly basis on the Oncourse assignments. We have used SPSS to analyze the weekly assignments of the first three weeks in which Oncourse was used. Results of the SPSS analysis show that the students make the practice assignments weekly basis and that this helps to use effectively the self-study time, which also contributes to gain higher grades in the weekly quizzes.

We also analyzed the final test questions with SPSS. We observed that the three questions of the final exam related to the course topics are answered correctly by all groups of students except question 1, and to certain extent, question 2. as shown in the graphs below.

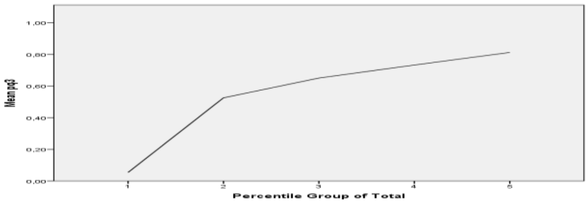
Itemdiscriminatie - analyse per item/vraag





Q2 –

Q1 – Above – Q3- Below



Results of this test infer consequences for the adjustments in the course content, in the themes addressed during the lectures and instructions, but also in the online weekly assignments used to practice the content. We tend to think that regarding question 1 which corresponds to the first part of the course, the students may have forgotten most of the content which is tested after 7 weeks.

The feedback given to the students in these Oncourse online assignments will also be adjusted. The teachers will include online tutorials to provide students with feedback every time they a type in the wrong answer. The feedback functionality in Oncourse will be extended next year based on the results of this experiment.

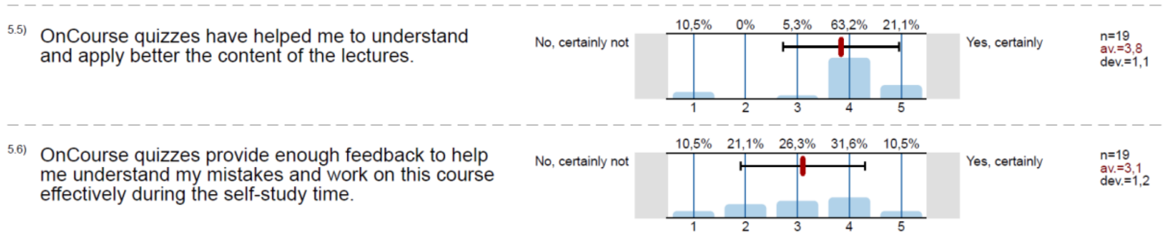
We also wanted to know whether there are correlations between the three questions on the different different topics of the course, and whether there is also a relation with other assignments. Results of the correlations show significant differences between the final exam questions and the test assignments. These results underlie the need to make adjustments in the course setup, in teaching the topics during lectures and instructions, an in the type of assignments provided.

Correlations

		Q1	Q2	Q3	Total	BD	MC
Q1	Pearson Correlation	1	,635**	,579**	,829**	,430**	,401**
	Sig. (2-tailed)		,000	,000	,000	,000	,001
	N	67	67	67	67	67	67
Q2	Pearson Correlation	,635**	1	,597**	,871**	,448**	,427**
	Sig. (2-tailed)	,000		,000	,000	,000	,000
	N	67	67	67	67	67	67
Q3	Pearson Correlation	,579**	,597**	1	,869**	,462**	,450**
	Sig. (2-tailed)	,000	,000		,000	,000	,000
	N	67	67	67	67	67	67
Total	Pearson Correlation	,829**	,871**	,869**	1	,522**	,499**
	Sig. (2-tailed)	,000	,000	,000		,000	,000
	N	67	67	67	67	67	67
BD	Pearson Correlation	,430**	,448**	,462**	,522**	1	,968**
	Sig. (2-tailed)	,000	,000	,000	,000		,000
	N	67	67	67	67	67	67
MC	Pearson Correlation	,401**	,427**	,450**	,499**	,968**	1
	Sig. (2-tailed)	,001	,000	,000	,000	,000	
	N	67	67	67	67	67	67

**. Correlation is significant at the 0.01 level (2-tailed).

With respect to the students' satisfaction with Oncourse as an online tool to practice the content given in the lectures, students are satisfied with the weekly quizzes to facilitate understanding, and as a feedback tool. Although the latest has been positive assessed by the students, we still believe there can be some improvements made in this regard, as the feedback can be also provided in the form of tutorials.



<u>General conclusions:</u>

The teachers' opinions on Oncourse is positive in general terms regarding:

- Identifying deficiencies in prior knowledge through diagnostic quizzes
- Monitoring students' understanding;
- Getting feedback on progress;
- Using this feedback to improve lectures and instructions;
- Involving weekly the students in the topics and homework.

However, there are also some issues regarding the system as it has some limitations:

- for the mathematical exercises the system cannot properly calculate the values and counts sometimes as a mistake answers that are correct otherwise.

4.4. Physics of new energy

4.4.1. Analysis of the course context: Problem statement

Physics of new energy is a freshman elective course open to all students at this university. The course focuses on making quantitative analysis of the energy flow form primary source to end-user. In this course the following concepts are explored, namely solar and nuclear fusion. It is expected from the students to identify the prospects and challenges of several different renewable energy sources; to explain the different physics principles of energy production and energy conversion; to evaluate the role of a specific energy source by interpreting data from literature and the use of physics knowledge; to describe the principle of a fusion reactor, and finally to describe the functioning of a solar cell.

Educational challenge:

- large-size course including up to 140 students;
- diversity if classroom composition: Heterogenous groups: students from other departments may follow this course although they don't have the same background as they are enrolled in different disciplines;
- students have some conceptual understanding problems.

IT method/tool: Weblectures

- To provide alternatives to zoom in theoretical issues after lecture time as there is no much time left for further explanations on concepts;
- To provide students with alternative study materials to make self-study time functional. By watching the weblectures students can go back to the explanation of concepts as much as they need (i.e. diversity in learning);
- To help students to prepare assignments, for the preparation of the interim and final exams.

Evaluation:

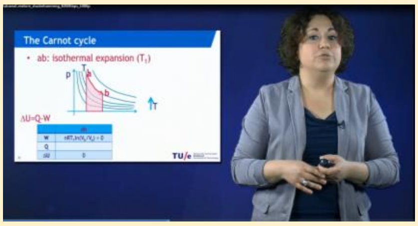
- Teaching staff interested to know whether weblectures influences better understanding of concepts;
- Whether there is a correlation between students' watching weblectures and scores in the exams. Do weblectures enhances self-study time and addresses diversity of learning: help the weblectures to understand better the theory? Do students watch the weblectures during self-study time? Does it help to do the better assignments?

Physics of new energy 2013/2014

Educational form & didactical setup	Assessment form & assessment plan
4 weeks project, 4 hours	Written (3 hours) - 60%
7 weeks lecture, 2 hours	Presentation - 20%
7 weeks tutorial, 2 hours	Interim examination - 20%

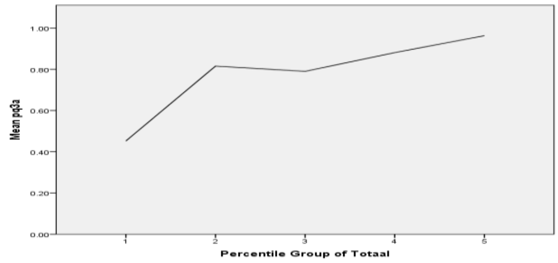
Physics of new energy 2014/2015

Analysis of educational challenges		Iterations and improvement
Differences in content prior knowledge Some concepts on fusion, solar cells and thermodynamics & are difficult for the students Large number of students Students from different disciplines – heterogeneous	→	Weblectures on fundamental concepts No plasma lab and solar cells are included in this academic year to give time for more instructions to have students practice knowledge and more explanations on concepts such as over fusion, solar cells, and thermodynamics

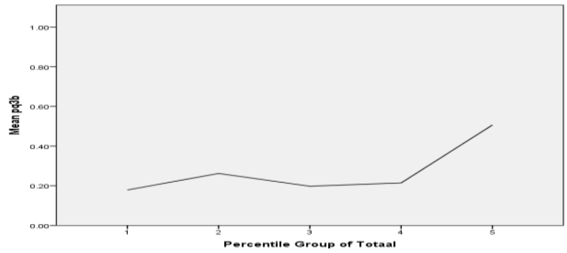


The weblectures of the course 3DEX0 are available through mediasite.

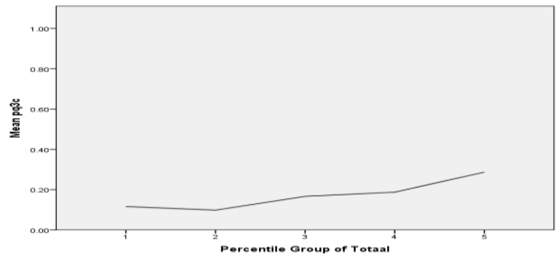
During the analysis of the course context, we also analysed the students' performance to gain an overview of students' understanding of concepts. As shown in the analysis of the test questions below, students have mainly problems with concepts such as fusion and solar cells.



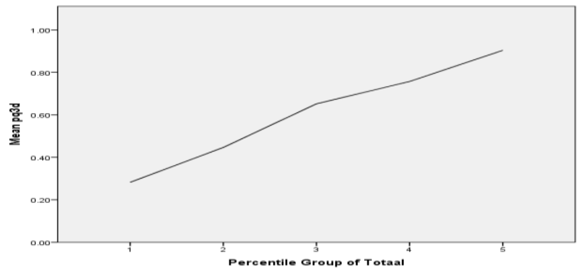
Q3a-



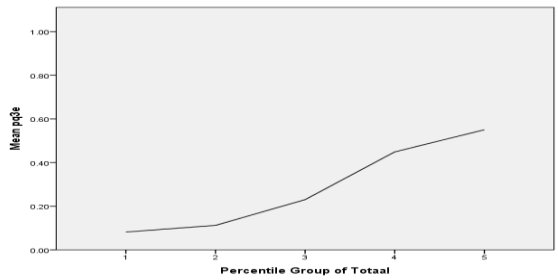
Q3b -



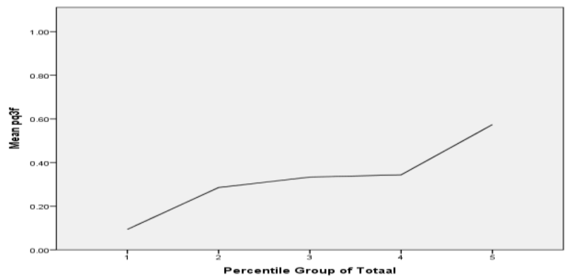
Q3c-



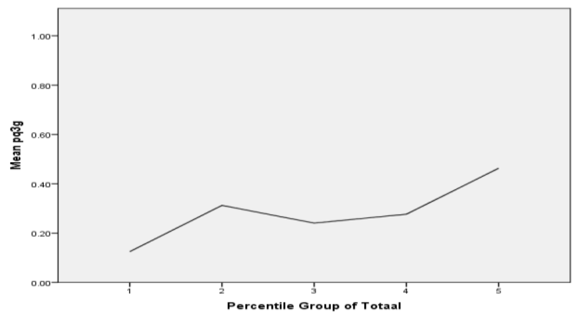
Q3d-



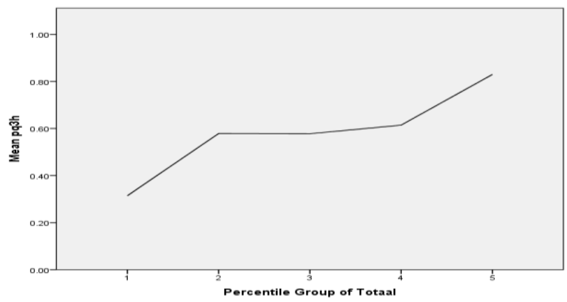
Q3e-



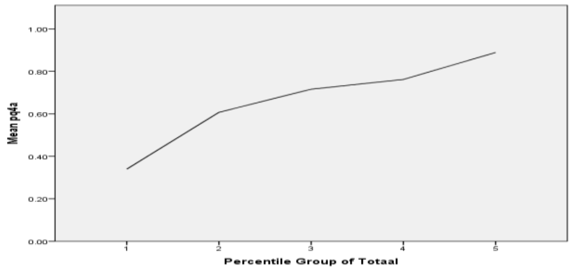
Q3f-



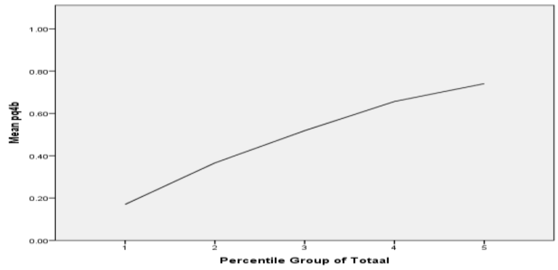
Q3g-



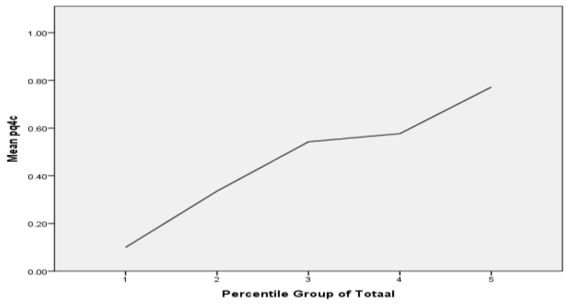
Q3h -



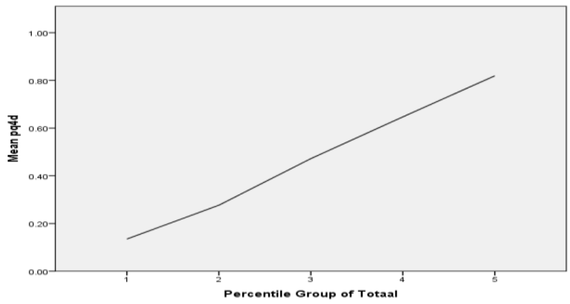
Q4a-



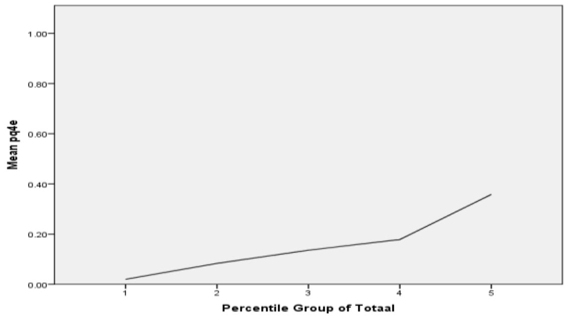
Q4b-



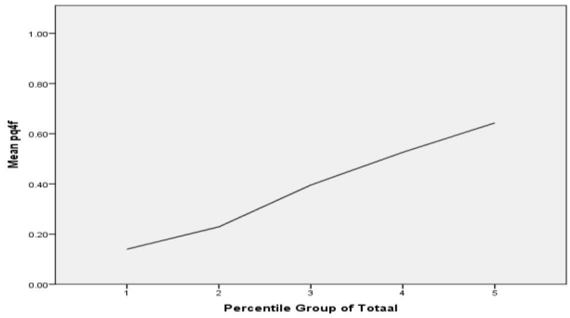
Q4c-



Q4d-



Q4e-



Q4f-

Results:

** As this course is now under implementation in Q2, we cannot report yet about the results and effects of weblectures on students' conceptual understanding.

4.5. Condensed matter

4.5.1. Analysis of the course context: problem statement

This course is a third year compulsory course teaching mechanical, thermal, electronic, optical and magnetic properties of materials are determined by their underlying structure. Present developments in materials science and nano-technology, such as new nanoelectronics, photonic structures, plastic solar cells or superconducting materials are also studied. Use of periodicity and symmetry of crystal lattices, concepts like 'reciprocal space' and quantum mechanical quasi particles play an important role in this course.

Educational challenge:

- Understanding the new concepts is generally experienced as the most difficult part of the course Condensed Matter Physics.
- Some essential knowledge taught in previous courses and years is forgotten.

IT method/tool:
Weblectures in combination with clicker questions and Oncourse
a. Clicker quizzes reviewing the material taught in the foregoing, plenary lecture;
b. In some cases new material or extensions of material, not taught in the plenary lecture
c. Exercises of different level. Simple questions are aimed at making you familiar with material taught in the plenary lecture. Conceptual questions are aimed at making you think deeper about the new concepts taught. Understanding the new concepts is generally experienced as the most difficult part of the course Condensed Matter Physics. Other questions are aimed at making you familiar with how to use the theory in solving problems, including calculations and derivations. Making all types of questions is a very useful (if not essential) preparation for the Interim and Final examination.
d. Some questions make use of pre-programmed *Mathematica* codes or other (web) software. This will be announced well in advance. In those cases it will be essential to bring your laptop to the Studio classroom.
e. Some questions are labeled "***Recommended problem for deeper insight***" or "***Additional problems for further training***" and are meant for those students who seek more challenge or more opportunities for practicing. Usually, time will not be sufficient within the Studio classroom; so those exercises should be done in self-study time.
Part of the self-study is aimed at learning to solve problems in Condensed Matter Physics by using *Mathematica*. In parallel, those *Mathematica* exercises will help you in mastering some of the new concepts introduced in the lectures. This part of the self-study is implemented in "OnCourse".

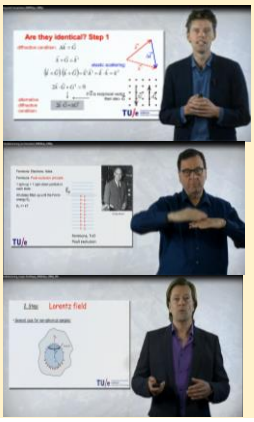
- Evaluation: focuses on whether weblectures influences better understanding of concepts; whether weblectures are used as study-material during self-study time.

2013-2014

Learning outcomes - Educational form & didactical setup	**Assessment form & assessment plan**
7 weeks studio classroom, 4 hours The classes will be a mixture of lectures, studio-classroom and instruction.	Written (3 hours) - 70% Oncourse quizzes – 10% Interim examination - 20% Clicker questions

2014-2015

Analysis of educational challenges		**Pilot**
Differences in content prior knowledge Some knowledge is not present/forgotten in previous courses/years Some difficult concepts Interest to make contact hours more efficient by enhancing self-study time	→	Oncourse quizzes – providing extra feedback/tutorials Interim examination - Clicker questions • No extension of the topics • (Still) more interaction in lectures (→clickers) • Recap-blok /preparation for questions in studio-classroom (→ clickers) • Lectures focus more on concepts • More self-study out contact hours • Deeping / derivations via extra slides → Weblectures • Repetition relevante topics for lecture → Weblectures • OnCourse / Mathematica = 1 ects



Examples of the additional tutorials developed in Oncourse to increase feedback.

Interactive feedback

Part E introduces Mathematica functions Eigenvalues, Eigenvectors and Eigensystem.

b) Use the function Eigenvalues to solve the eigen values that fulfil $\begin{pmatrix} 0 & T \\ T & F \end{pmatrix} \cdot \begin{pmatrix} u \\ v \end{pmatrix} = \lambda \begin{pmatrix} u \\ v \end{pmatrix}$. What is the largest eigenvalue?

sqrt(F^2 + T^2)

Your answer is incorrect.

Your answer is incorrect.

You have correctly selected 0.

Hint:

a) Use Mathematica code "Solve[... , {s, t}]" and beware to use "==" instead of "=" in the equations!

b) To define the matrix, use either "{{a,b},{c,d}}" or the Basic Math Assistant window. Use "." for the product of matrix and vector. The final code should look like the one under D. in the Mathematica file!

c) Check whether you normalized your components (i.e. sum of the squares of the components should equal 1), and the second component is a positive value.

Attempt 2/3

Try again

TU/e Technische Universiteit Eindhoven University of Technology

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Question 5

Correct

Mark 14.00 out of 14.00

Flag question

Edit question

We continue with the BCC crystal from Question 4. Take care: the lattice constant of the conventional lattice is denoted $a0$ (and not a); you should use $a0$ (and not a) in your answers!

a) Using your function, calculate the volume V of the primitive unit cell.

V = a0^3/2

✓

One possible correct answer is: a0^3/2

b) Using your function, calculate the reciprocal lattice to the BCC lattice (only Mathematica action needed).

c) What is the length of your first, second and third reciprocal lattice vectors?

Length first lattice vector: 2 sqrt(2) pi/a0

✓

One possible correct answer is: sqrt(2) 2 3.14159265358979323846 / a0

Length second lattice vector: 2 sqrt(2) pi/a0

Your answer is correct.

Note that answers where a is used rather than $a0$ are not correct.

a) $V = \frac{(a0)^3}{2}$

c) The length for all three vectors is: $\frac{2\sqrt{2}\pi}{a0}$. You probably just computed this with your code. However you could have expected it, since the primitive lattice vectors are a factor $\sqrt{2}$ shorter that those of the conventional cell. So the reciprocal vectors should be a factor $\sqrt{2}$ longer!

Results:

** As this course is now under implementation in Q2, we cannot report yet about the results and effects of weblectures on students' conceptual understanding.

All weblectures of the three teachers involved in this course are available in mediasite.

4.6. Theoretical classical mechanics

4.6.1. Analysis of the educational context

The theoretical classical mechanics is a second year elective course to introduce the concepts of space & time, and Einstein's special theory of relativity. In this course, the symmetry properties can simplify the equations of motion of point masses, rigid bodies and continua. In addition other concepts such as the phase space, which is the basis of statistical mechanics, is also studies.

Educational challenge:

In this course, the weekly assignments were a concerned as the relation between study time and effort required to make the assignments was not in balance. In addition, the assessment form based on marking stake-proof exercises was not optimal. Furthermore, some concepts remained difficult for some students.

IT method/tool:

- Weblectures to zoom in difficult concepts and make self-study time more efficient;
- in combination with Oncourse assignments to have students' apply theory in solving problems; and introduce a proper assessment method.

Evaluation:

The responsible teacher of this course is keen on learning:

- whether Oncourse facilitates students' conceptual understanding in solving problems;
- weblectures enhances self-study time and addresses diversity of learning: help the weblectures to understand better the theory? Do students watch the weblectures during self-study time? Does it help to do the better assignments? Is there a relation between watching weblectures and better marks in exams?

Setup of the course 2013-2014

Learning outcomes - Educational form & didactical setup	Assessment form & assessment plan
7 weeks independent learning under supervision in 2 blocks of 2 hours per week 7 weeks lecture in 2 blocks of 2 hours per week The independent learning under supervision will be a combination of mandatory homework assignments and mini-projects	Written - 60% (Homework) assignment - 20% Assignment(s) - 20%

Redesign of the course 2014-2015

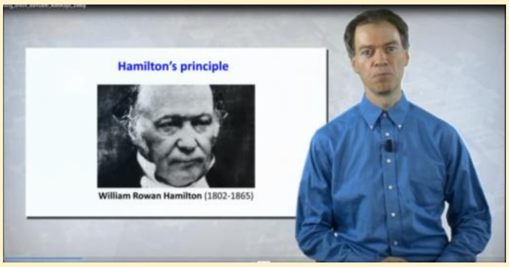
Analysis of educational challenges

- Difficult concepts
- Important to have students to actively work on assignments after the lectures through quizzes and homework
- Students can ask questions about difficult stuff during the independent learning

Pilot

- Oncourse quizzes to provide weekly feedback on progress

- Lectures focus more on concepts
- More self-study out contact hours (Oncourse)
- In-depth derivations via extra slides → Weblectures
- Repetition relevante topics for lecture → Weblectures



Results:
** As this course will be implemented in Q3, we cannot report yet about the results and effects of weblectures on students' conceptual understanding.
The weblecture is available through mediasite.

5. Dissemination of project activities

This project has been disseminated according to a number of activities proposed in the project proposal.

- 3TU Education Day held at TU/e in November 2015.
- Applied Physics Education Day.
- Paper on educational innovations (still under construction).

6. Lessons learned

We have learned from this report a number of lessons (based on the pilots conducted at this time):

1. Diversity in learning can be addressed by IT tools. In order to integrate a tailored made approach to deal with students' differences in learning is important to conduct an analysis on the conditions of the course: learning outcomes/topics; number of students; heterogeneous vs. homogeneous, etc.
2. IT tools are useful means to give feedback to students and to enhance self-study. An in-depth analysis of the educational conditions of each specific course is crucial to design the best didactical strategy.
3. The use of IT tools doesn't automatically guarantee an increase in pass rates. Other educational approaches may also be applied to guarantee a success.
4. Blended-learning does not stand alone. A proper didactical support in the redesign or adjustments of the course, together with a proper technical platform are essential components in order to enhance learning content.
5. In this project we also have explored several forms of feedback. Despite the good results, feedback still need to be more tailor-made at the service of the learning of students. Other forms of feedback such as tutorials in Oncourse need to be explored.
6. To initiate a culture of change it is important to motivate the teaching staff by supporting them in developing further their ideas.
7. Dissemination of good practices that work facilitates the process of motivating other teaching staff. Illustrating with examples that work how blended-learning is integrated paves smoothly the way for others to learn. This is a strategy to motivate the teaching staff to professionalize.

7. Concept journal paper (still under construction)

Abstract

The Eindhoven University of Technology (TU/e) is facing major challenges with the growth of students. The increasing student population requires the TU/e departments to innovate educational approaches to provide quality of education. However, the large-size courses and classroom composition that is heterogeneous require creative solutions for the teachers to realize small-group learning while still paying attention to individual diversity and needs during students' learning process. In addition, it is important that through the combination of face-to-face and digital education the contact time with students is used in an efficient manner during lectures and instructions. In this paper we investigate how different undergraduate and graduate courses have integrated blended- learning in order to meet some of these educational challenges. In addition, we also want to present an educational strategy to initiate culture change in the faculty towards an educational innovations.

Introduction

The current university environment at the Eindhoven University of Technology is characterized by complexity and by conditions that are demanding. Since the introduction of the Bachelor College and the institutionalization of the Graduate School the TU Eindhoven has adopted drastic changes not only at curriculum level to educate the *Engineers of the Future* but also in the didactics to meet differences in learning styles, but also other challenges such as large groups, differences in prior knowledge and disciplines. These changes in curriculum and education of the engineers arise from the need to provide a service in line with society's requirements.

Paving the path for a culture of change

Changes in education that matters

Discussion

Conclusion

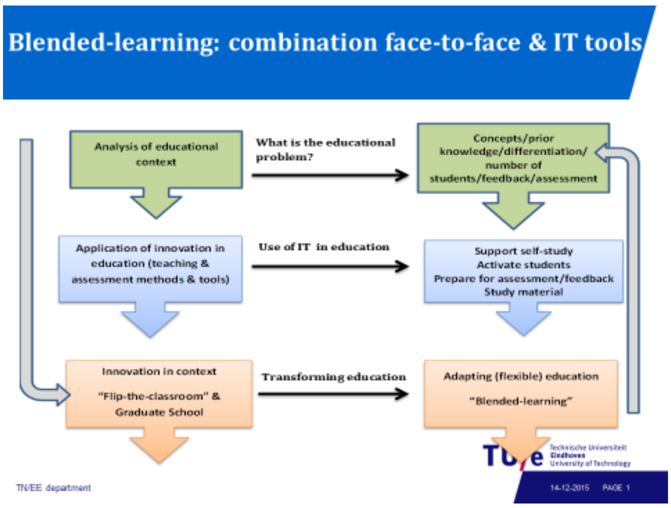
References

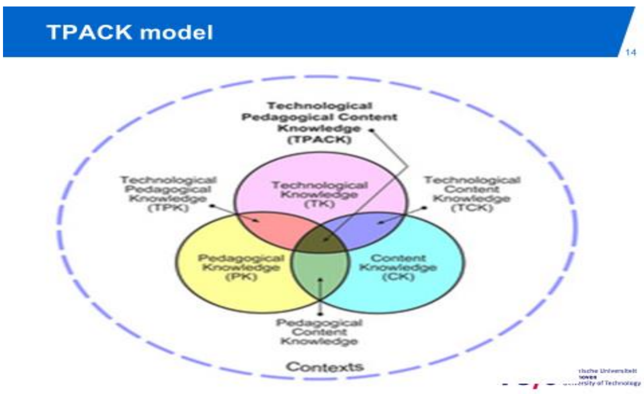
Appendices

Appendix 1 – Training ‘Blended-learning and redesign of courses with ICT tools’

Appendix 2 – Training workshop ‘Weblectures, pencasts and screencasts’

Appendix 1 – Training course/discussions with AP teaching staff to redesign blended-learning courses





Why to choose for weblectures/pencasts? Objectives and use

- To increase study results, to deepen in content, to explain concepts/ examples, or solve organizational problems

Applications to increase study results:

- Explanation basic concepts to meet deficiency problems (e.g.prior knowledge)
- Catch missed lectures/balance level
- For preparation of exams/assignments (self-study time)
- Motivating/activating – in assignments
- For further explanation of theory/to complement notes
- As instruction (to show the work-out of a formula)
- Demonstration or for reflection
- Different learning styles

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Weblectures, pencasts and screencasts

Weblectures: short lectures of 10 minutes

Pencasts: short explanation of the work-out of a method, problem-solving technique with voice-over (digital pen)

Screencast: a digital recording of computer screen output enhanced with audio narration

Functions of your IT tool
Phases in learning functions & process:
Orientation, practice, feedback & assessment

Level learning outcome	Orientation (learning functions & process)
Remember/Understand Knowledge (acquire) (Orientation)	1.Theory/facts/laws/information/concepts 2. (Understand) Problem approach: methods; strategies; algorithms; heuristics; rules
Application/Analysis (Practice, feedback, assessment)	Processing methods & strategies /use in new situations - Make operational, examples of application Synthesizing information
Problem solving (evaluation/creation) (Practice, feedback, assessment)	Apply approach in complex/previous examples or assignments

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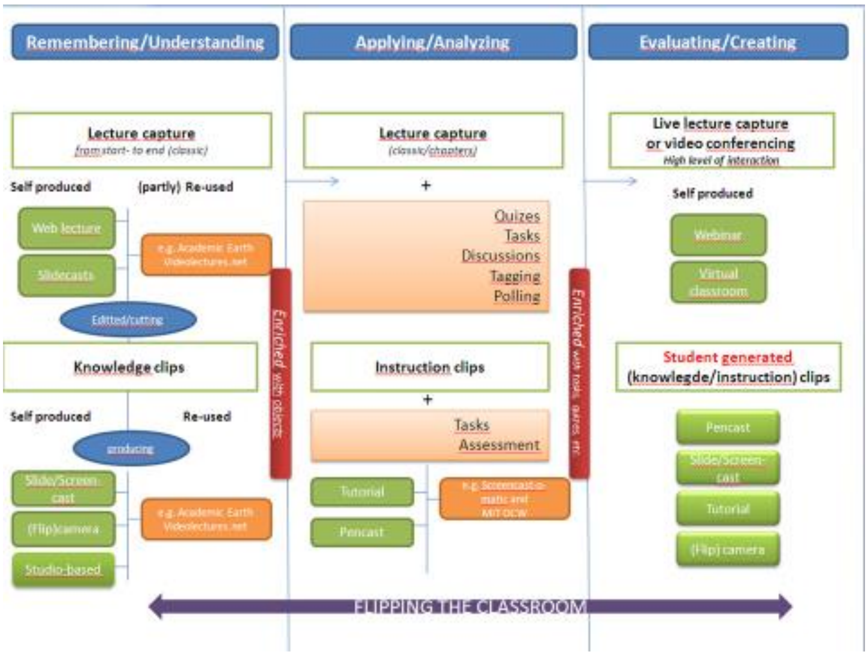
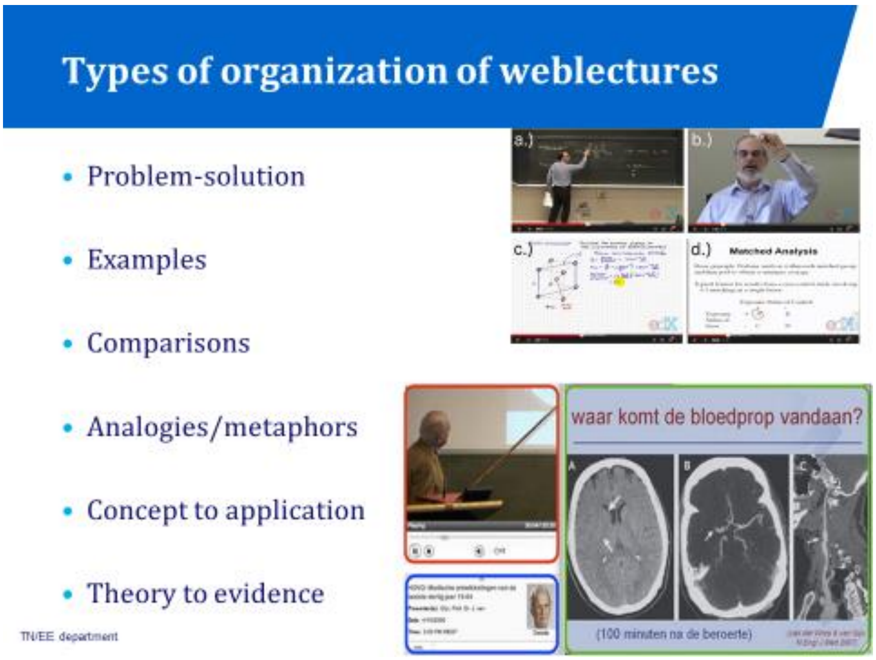
Week	Educational form	Students' time-on-task, effective self-study time through support of IT tools: Learning functions: Orientation, practice, feedback & assessment	Learning outcomes & process
2	Lecture 1 (2h)	• Theory/new concepts • Clicker-quiz } Orientation • Demonstration	Remember/understanding
2	Self-study time	▪ Weblecture/Pencast/Screencast } Orientation ▪ **Practice** online quizzes/exercises/ assignments } Practice & formative assessment	Application/analysis Processing information Problem solving
2	Instruction (2h)/ independent learning/group work	• **Feedback** (teacher reviews before) online-quizzes/exercises/assignments } Practice, feedback, • Additional explanation/theory	**Feedback (for learning):** monitor understanding in application
2	Lecture 2 (2h)	• Clicker-quiz (in-depth questions) } Practice • Theory } Orientation • Demonstration	Remember/understanding
2	Instruction (2h)/ independent learning/group work	• **Feedback** (teacher reviews before) online quizzes/exercises/assignments } Practice & feedback • (Additional) explanation/theory } Orientation	**Feedback (for learning)**: monitor understanding in application
2	Self-study time	▪ Online quizzes/assignments (**Assessment**) } Practice & assessment ▪ Weblecture/Pencast/Screencast/ ▪ Reading (preparation next lecture) } Orientation	Application/analysis Processing information Problem solving **(Assessment for learning)**
3	Lecture 1 (2h)	▪ Examples to explain theory (from weblecture/reading) } Orientation ▪ Etc	Remember/understanding


Remembering/Understanding
Applying/Analyzing
Evaluating/Creating
Lecture capture
from start- to end (classic)
Self produced
(partly) Re-used
Web lecture
Slidecasts
e.g. Academic Earth Videolectures.net
Editted/cutting
Knowledge clips
Self produced
Re-used
producing
Slide/Screen-cast
(Flip)camera
Studio-based
e.g. Academic Earth Videolectures.net
Enriched with objects
Lecture capture
(classic/chapters)
+
Quizes
Tasks
Discussions
Tagging
Polling
Instruction clips
+
Tasks
Assessment
Tutorial
Pencast
Enriched with tools, quizes, etc.
Live lecture capture
or video conferencing
High level of interaction
Self produced
Webinar
Virtual classroom
Student generated
(knowlegde/instruction) clips
Pencast
Slide/Screen-cast
Tutorial
(Flip) camera
FLIPPING THE CLASSROOM


Types of organization of weblectures
Problem-solution
Examples
Comparisons
Analogies/metaphors
Concept to application
Theory to evidence
a.)
b.)
c.)
d.)
Matched Analysis
waar komt de bloedprop vandaan?
(100 minuten na de beroerte)
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Engage the student within your weblecture

- Present situations by asking to guess, hypothesize or predict outcomes
- Use bolded word for emphasis – present in steps ideas
- Hyperlink to other references
- Links to demonstrations/videos
- Include clip art to break up the text

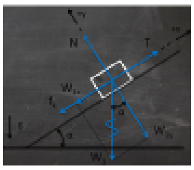
A weblecture is a (short) lecture, so

- Develop **introduction, body** and **summary** (as traditional lecture)
- Organize lecture by topics

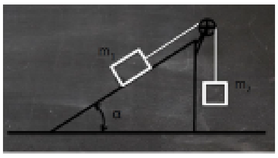
Combining theory & explanation of formulas

- Combination weblectures & smartboard/blackboard
  https://www.youtube.com/watch?v=brN9citH0RA

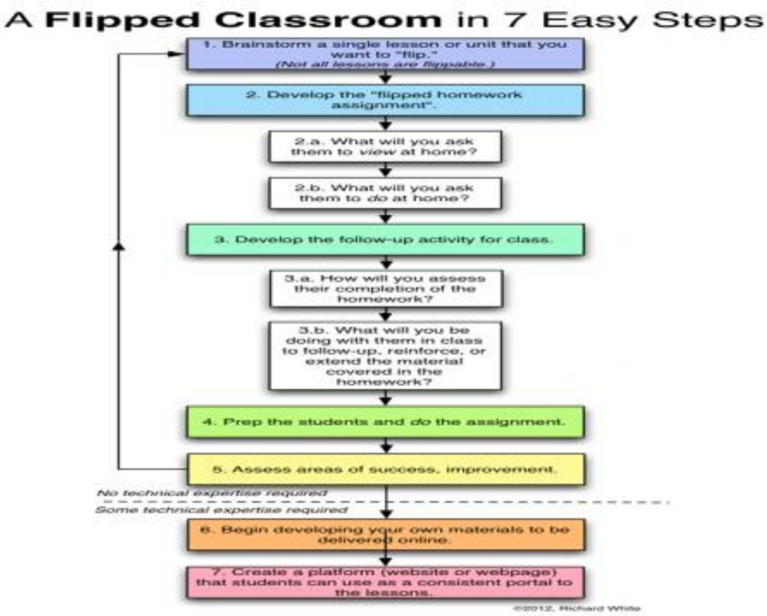
- Blackboard: zoom in when writing/explaining & use colours,bold letters



$$m_2 = m_1 (\sin\alpha + \mu_k \cos\alpha)$$



- Smartboard -
- In class- use a tablet as projection via beamer
  http://www.showme.com/sh/?h=msKNzcG



References (I)

- Weblectures/Pencasts/screencast (TU/e Maths department)
http://www.win.tue.nl/~pcuijper/pages/QEES.html

- Pencasts:
https://www.khanacademy.org/science/physics
https://www.youtube.com/watch?v=QiWsX9JRb6c
http://www.youtube.com/watch?v=_8adOMuouuc

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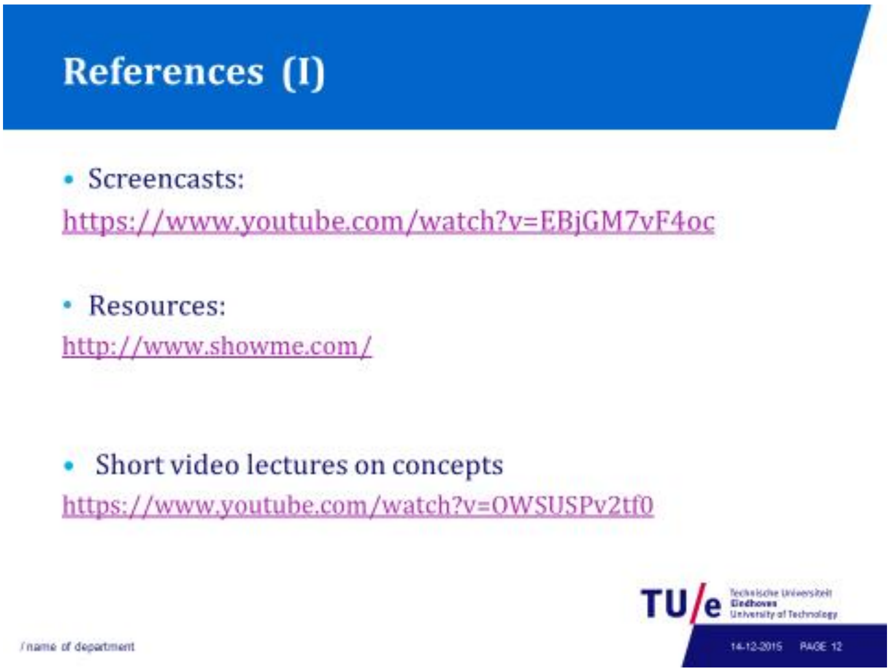
References (I)
Screencasts:
https://www.youtube.com/watch?v=EBjGM7vF4oc
Resources:
http://www.showme.com/
Short video lectures on concepts
https://www.youtube.com/watch?v=OWSUSPv2tf0
/ name of department
TU/e
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Appendix 2 – Training workshop 'Weblectures, pencasts and screencasts'

Cindy de Koning Media **Training : microlecture/ knowledge clip/ weblecture ©, ®, ™ :**

You should see a microlecture as a tv show. There is a host (lecturer) and footage (your teaching material, e.g. in slides). You use a maximum of about 10 minutes to tell your story. There should be alternating shots of you and your material. This is recorded in a studio.

Goals

Goals cannot be reached until several things are clear. Your own hand is a good trick.

1. What are you good at (thumb)
2. What do you want to learn (index finger)
3. What do you dislike (middle finger)
4. Which characteristics are you dedicated to (ring finger)
5. What makes you small and insecure (little finger)

Good to know

- You never get a second chance to make a first impression
- First impression 55% what they see, 38% what they hear, 7% what you say
- This means it has to work, be genuine!
- Appearance
- Outfit must be well groomed and not distracting
- Is everything working OK? Check that!

Presentation basics

- A good presentation starts with preparation
- Know what you want to say and what you are talking about
- What is the purpose of your preparation, for whom is it
- Use everyday language, not jargon. Active.
- Must you use jargon? Explain it in 1 word
- Tell, tell, tell. Tell but also repeat
- Be aware of your posture. Straight and open back. Stand stably and: how do you use your hands and arms
- The camera is your audience
- Your eyes are your greatest asset when communicating in front of a camera
- Rest

Cindy de Koning Media Training : microlecture/ knowledge clip/ weblecture ©, ®, ™

Sheets/Storytelling

- KISS, keep it short and simple
- Use examples
- What can I do with teaching material
- Which questions are you going to answer
- What do your students know/realise after the lesson
- Don't overfill your slides, they need to follow your story
- Too full can lead attention away from lecture
- Build up logically
- Repeat
- Use examples
- Know how to end
- Summary

Support

- Use films, slides, powerpoint etc. This is effective. Show something logical.
- Proportionate use, do not hide behind it
- Choose the right moments to show your material
- Plan when it should be you in the picture, and when you want to show your source
- Do not just read out your PowerPoint. Because what extra value are you then?
- You tell the story, the material is there to support it,

Presentation on camera

- Be ready
- Be a team with your cameraman / video editor
- Speak calmly, in your head it all seems to go faster
- Tell
- Mind your breathing, you need good posture to breathe properly
- Switch subjects in a natural way
- Adapt the tone of your presentation to the subject
- Stand calmly and do not 'nest' (twist and turn)
- Discuss beforehand with your director / video editor / cameraman when to do what
- Keep looking at the camera. Looking away is impolite and unconvincing. Seek contact.
- Do not say I think or I suppose, for you know!
- Re-take until it is right. But remember perfect is almost impossible.

- Be well prepared. Know when to do what. When to show what. When should you be in the picture and when should your source be shown (source can be film, photo, graphic or slide)

- Have two copies of that preparation in paper. One for yourself and one for video editor. Discuss with him when to show what.

- Make sure you know where to stand in the studio. Is your sound working properly? Is your face powdered? Are your clothes and hair all right? Is everything working, the clicker? Discuss beforehand what to do when something goes wrong. Say nothing and pick back up so it can be cut out.

- You hear the leader, take some rest and start with a welcome. (Close) Because of the fact that a title with your name is shown, this should be at least 10-15 seconds. Welcome viewers and shortly describe what you are going to do. Also state the series of weblectures or microlectures the lecture belongs to (if applicable). Don't take too long, you are filmed in close shot.

- After the welcome, you start the lecture. Discuss with the technician when your lecture starts. He will switch from Close to Total.

- When you're finished, make sure you have a short and clear conclusion. And know how to end.

- Here too, having discussed this is important. You are filmed in Close again!

TWO Formats: SPLIT and GREEN SCREEN

SPLIT

- You stand in one spot
- Welcome in Close
- Lecture in Total
- Your slide is shown next to you, this is 'laid over' like a cover
- Variation: split and full screen
- Little room to move
- Make sure there is action and movement in your slides
- Say what you see
- You are in front of a GREEN SCREEN; a screen on which you can show anything. This provides a lot of options. Attention: **do not wear green clothing**!
- Conclusion in close shot

GREEN SCREEN

- As above, but
- no slides next to you, your slides are your background
- they must be strong
- switching to fullscreen is possible only with a hard switch to another slide
- text can only cover 2/3 of the slide. You are in front of it.

Other facts

close is your head and shoulders
Medium is head to waist, together with your slide/board
Total is head to –in this case- knees, together with the board
Full screen is only your source in the picture. You are invisible

- Format 16 : 9
- Two sets of clothing. No black, white, stripes. Blazers and v-necks work well.
- You operate your own slide
- LARGE font. Must be legible also in a smaller screen
- If you want to point something out, then do not say 'this', but name what you mean. You could be on fullscreen, the viewer will not be able to see what you are pointing at.
- Do not introduce yourself, you will receive a title on screen.
- Do not look too much at the screen next to you but right in front of you, you have a screen there. You can see the same thing the viewer sees there (when it comes to material).
- Put films in your PowerPoint, but also hand them in as separate files.
- You do no more than 3 takes. 1 Dress rehearsal, 2 and 3 for real.
- Watch the recordings between takes with your video editor. You can indicate better what should be shown when. Know how you are shown, head only or part of your body as well.
- Mind your hands, waving around is disturbing. But a little movement is natural.
- The camera is your friend
- Make sure you can look straight into the camera, not up or down
- Test the sound as well. Squeaks and beeps are annoying
- Shape and contents have to match!
- Know your beginning and your end
- Be you!

Cindy de Koning Media **Training : microlecture/ kennisclip/ weblecture** ©, ®, ™ :

- Zie een microlecture als een tv programma. Je hebt een presentator (docent) en beeldmateriaal (je lesstof in bijvoorbeeld slides). In maximaal een minuut of 10 vertel je je verhaal. Je bent dan wisselend met je materiaal in beeld. Je neemt dit op in een studio.

Doelen

Doelen bereik je pas als je aantal dingen helder hebt. Een ezelsbruggetje is je eigen hand

1. Waar ben je goed in (duim)
2. Wat wil je leren (wijsvinger)
3. Waar heb je een hekel aan (middelvinger)
4. Aan welke eigenschappen ben je trouw (ringvinger)
5. Wat maakt je klein en onzeker (pink)

Goed om te weten.

- Een eerste indruk kun je nooit meer overdoen
- Eerste indruk 55% wat ze zien, 38% wat ze horen, 7% wat je zegt
- Het moet dus kloppen, ben echt!
- Uiterlijk en uitstraling
- Kleding moet verzorgd zijn en niet afleiden
- Werkt alles? Controleer dat

Presentatie basics

- Goede presentatie begint bij de voorbereiding
- Weet wat je wil zeggen en waar je het over hebt
- Wat is het doel van je presentatie, voor wie
- Spreektaal, dus geen vakjargon, aktief
- Is vakjargon nodig, leg in 1 woord nog even uit wat het
- Tell, tell, tell. Vertellen maar ook herhalen
- Ben je bewust van je houding. Open en rechte rug. Sta stevig en stabiel en wat doe je met je handen en armen
- De camera is je publiek
- Communiceren voor de camera doe je voor het grootste gedeelte met je ogen.
- Rust

Sheets/Storytelling

- KISS, keep it short and simpel
- Gebruik voorbeelden
- Wat kan ik met lesstof
- Welke vragen ga je beantwoorden
- Wat weten/realiseren je studenten na de les
- Geen volle slides, moeten je verhaal volgen
- Te vol leidt af
- Bouw logisch op
- Herhaal
- Gebruik voorbeelden
- Weet hoe je eindigt
- Resumé

Ondersteuning

- Gebruik maken van filmpjes, dia's, powerpoint etc. werkt goed. Laat wel iets logisch zien.
- Doseer het, verstop je er niet achter
- Kies de juiste momenten om het te laten zien
- Bedenk wanneer je zelf in beeld wil zijn en wanneer je de bron wil laten zien
- Lees niet je powerpoint voor. Wat is dan de meerwaarde van jouw aanwezigheid
- Jij brengt het verhaal, t materiaal moet je verhaal versterken

Presentatie op camera

- Zorg dat je er klaar voor bent
- Ben een team met je cameraman/schakeltechnicus
- Praat rustig, in je hoofd lijkt het sneller te gaan
- Vertel
- Let op ademhaling, goede ademhaling kan alleen met goede houding
- Maak natuurlijke overgangen
- Pas je toon presentatie aan bij onderwerp
- Sta relaxed en nestel (wiebelen en draaien)niet
- Overleg met de regisseur/schakeltechnicus/cameraman wanneer je wat wil
- Blijf in camera kijken. Wegkijken onbeleefd en ongeloofwaardig. Zoek contact
- Niet ik denk of ik geloof, je weet het immers.
- Doe het zo vaak over tot het goed is. Maar bedenk wel dat perfect bijna niet te doen is

Format Weblecture

- Ben heel goed voorbereid. Weet wat je wanneer wil doen. Wanneer wil je wat laten zien. Wanneer wil jij in beeld en wanneer moet je bron in beeld. (bron kan filmpje, foto, graphic of slide zijn)

- Heb dat ook op papier 2 exemplaren. Een voor jezelf en een voor de schakeltechnicus. Overleg met hem wanneer je wat wil laten zien.

- Zorg dat je goed weet wat je plek is in de studio. Werkt je geluid? Heb je poeder op je gezicht? Zit je kleding goed en je haar? Werkt alles, het klikkertje. Spreek ook goed af hoe je handelt als het mis gaat. Niks zeggen en oppakken zodat er geknipt kan worden.

- Je hoort de leader, neemt rust en begint met een welkom. (Close) Omdat er een titel met je naam verschijnt, moet dat zeker 10- 15 seconden zijn. Heet welkom en vertel kort wat je gaat doen. Zeg ook als het een onderdeel is van meerdere weblectures/microlectures. Maar ook niet te lang, je bent immers close in beeld.

- Na het welkom, begin je met je lecture. Spreek door met de technicus waar je lecture begint. Dan schakelt hij van Close naar Totaal.

- Als je klaar bent, zorg dan ook voor en heldere korte afronding. En weet hoe je eindigt.

- Ook hier is het van belang dat je dit hebt doorgenomen. Je bent weer close in beeld

TWEE Formats: SPLIT en GREEN SCREEN

SPLIT

- Je staat op 1 vaste plek
- Welkom op close
- Lecture in totaal
- Naast je wordt je slide vertoont, dat wordt er als het ware over heen gelegd.
- Afwisseling tussen split en fullscreen
- je hebt weinig bewegingsruimte
- zorg voor actie en beweging in je slides
- benoem wat je ziet
- Je staat voor een GREEN SCREEN: een groen scherm waarop je alles kan laten zien wat je wil. Dat geeft heel veel mogelijkheden. Let op **geen groene kleding** aan
- Afsluiting op close shot

Cindy de Koning Media **Training : microlecture /kennisclip/weblecture** ©, ®, ™ :

GREEN SCREEN

- als bovenstaand maar
- geen slides naast je, je slides zijn je achtergrond
- moeten sterk zijn
- schakelen naar fullscreen kan alleen met harde schakeling op andere slide
- tekst kan maar tot 2/3e slide. Je staat er zelf nl. voor

Close is je hoofd en schouders
Medium is hoofd tot je navel, samen met je slide/bord in beeld
Totaal is van je hoofd tot in dit geval je knieen, samen met het bord
Full screen is alleen je bron helemaal in beeld. Je bent niet te zien

Andere weetjes

- Formaat 16 : 9
- Twee setejes kleding. Geen zwart, wit, streepjes,. Jasjes en v-hals werkt goed.
- Je bedient je slides zelf
- GROOT lettertype. Moet ook in kleiner scherm leesbaar zijn
- Als je iets wil aanwijzen, zeg dan niet deze maar benoem. Het kan zijn dat het fullscreen staat, dan heeft aanwijzen geen zin omdat de kijker niet ziet wat je aanwijst.
- Jezelf niet voorstellen, je krijgt een titel
- Kijk niet teveel naast je maar voor je, daar heb je een afkijk. Daar zie je hetzelfde als de kijker ziet.(wat beeldmateriaal betreft)
- Filmpjes zet je in je powerpoint maar ook los aanleveren
- Je doet 'm 3 keer. 1e keer generale, 2e en 3e keer voor het echt.
- Kijk ze tussendoor terug samen met schakeltechnicus. Kun je nog beter aangeven wat wanneer te zien moet zijn. - weet hoe je in beeld gebracht wordt, alleen je hoofd of ook gedeelte van je lijf
- Let op je handen, wapperend in beeld stoort. Maar een beetje bewegen is naturel
- De camera is je vriend
- Zorg dat je er recht in de lens kan kijken dus niet omhoog of omlaag
- Test ook het geluid. Kraakjes en piepjes irriteren
- Vorm en inhoud moeten kloppen!
- Ken je begin en afsluiting.
- Blijf jezelf!