TRANSFORMINGEXAMS.COM

A Scalable Examination Platform for BYOD Invigilated Assessment

The Austrian Experience with e-Exams

Dr Gabriele Frankl

Alpen-Adria-Universität

Klagenfurt, Austria

e-Exam Symposium 24 Nov 2018

Melbourne, Australia

Australian Government

Department of Education and Training

MONASH University · The University Of Queensland · University of Tasmania · Australian National University · Macquarie University · ECU Edith Cowan University · CQUniversity Australia · RMIT University · UNSW Australia · University of South Australia

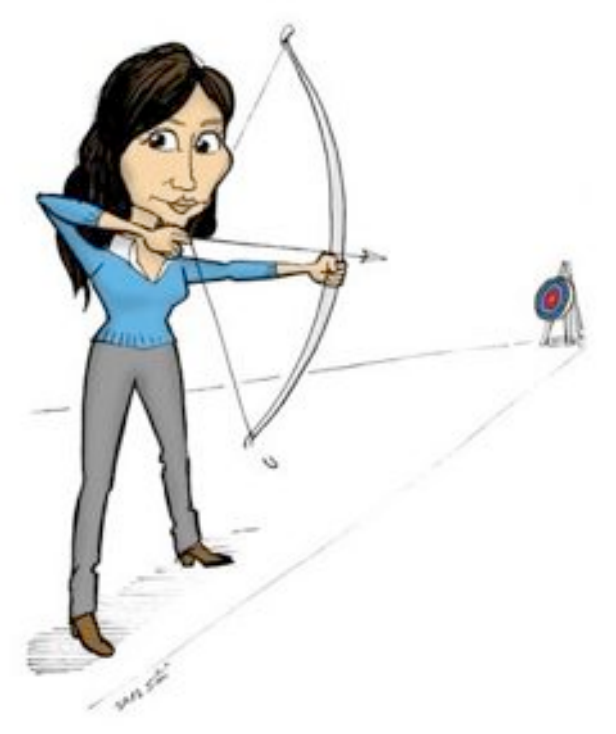
The Austrian Experience with e-Exams

Gabriele Frankl

Alpen-Adria-Universität Klagenfurt

Source: www.hallstatt.net

Agenda



- The Austrian experience
- Why we startet with e-Exams
- Why technical issues are not enough
- Why e-Exams are better than their reputation

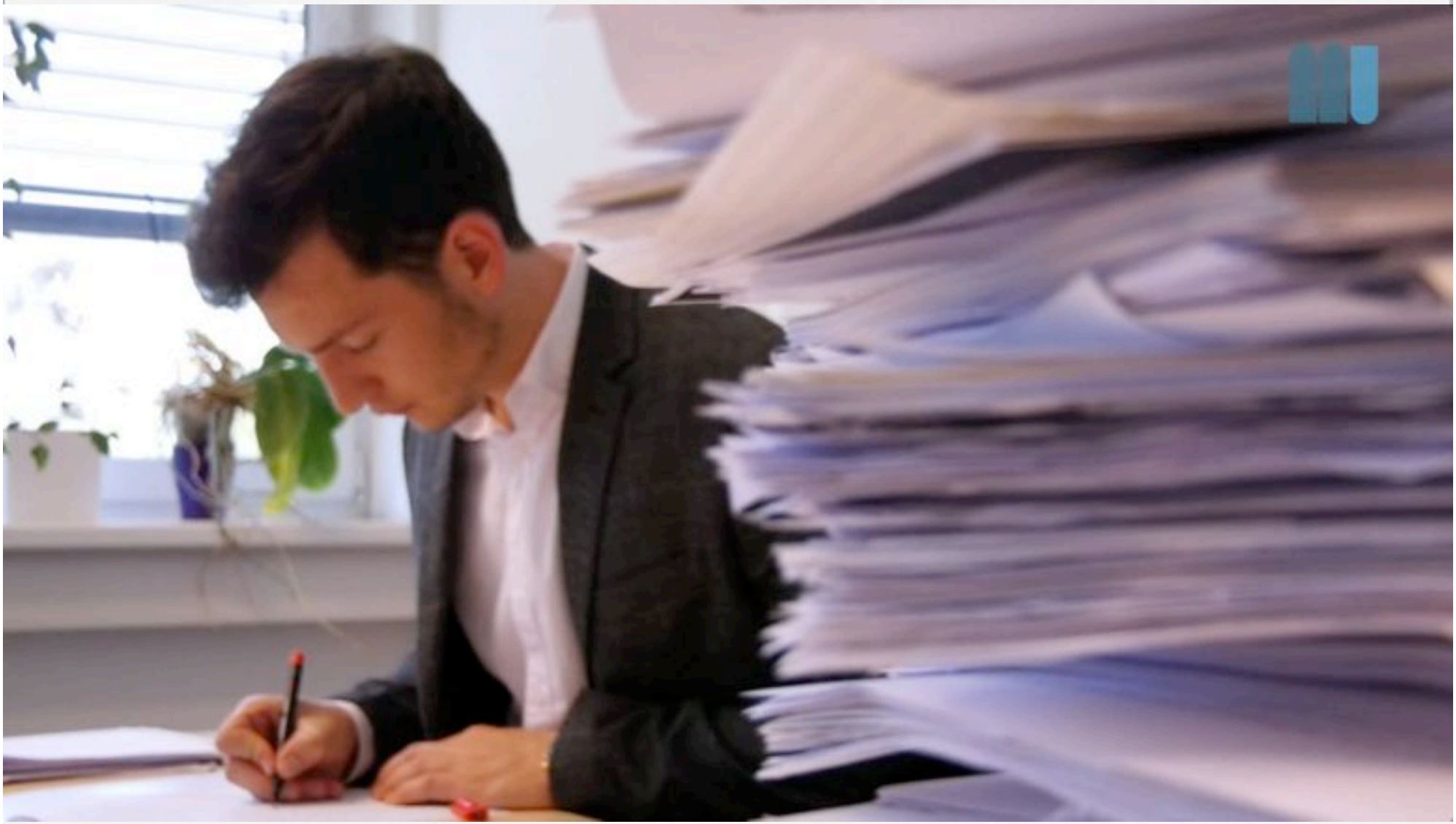
Source: google.com

Source: www.mozartkugel.at

Wolfgang Amadeus Mozart

1756 - 1791

Source: www.salzburg-rundgang.at



Why we started with e-Exams

Oral examination of all students would be great, but is not affordable

9++ reasons for e-Exams

Liebster Freund! —

Ich bin so frey sie ohne alle Umständen eine Gefälligkeit zu bitten; —
könnten oder wollten sie mir bis 20 Ds. künftigen Monats 100 fl. lehnen, würden
sie mich sehr verbinden; — am 20ten ist nur das Quartal meiner Gage zu,
wo ich dann meine Schulde mit das wieder zurückstatten werde. —
Ich habe auf 100 Ducaten (die ich Vrausland zu erhalten habe) auch zu sehr
verlassen; — da ich sie aber bis zu Stunde noch nicht erhalten (sie aber
täglich erwarte:) habe ich mich zu sehr dem Gelde entblößt, so daß ich
augenblicklich Geld vermöchen habe und deswegen mein Vertrauen zu
ihnen genommen, weil ich ihrer Freyheit gänzlich überzeugt bin; —
Nun werden wir uns bald mit einer schönen Nonnen nennen können! —
ihre Sache ist dem Ende sehr Nahe —

Mozart

1

Readability of free text answers

12) Trends CES -> { e-reader; e-books
↳ waren nicht vertreten } -> apple

Uhr mit eigebauten Fernsehen, Portable TV

Die Tragbaren Medien die immer dabei sind und einen Zugang zum Netz verschaffen eine Lernumgebung WO ich will und WANN ich will.

PDS. Geräte die immer mehr zum Terminkalender, Notizbuch persönl. Assistenten werden

13) Mobile Learning

Die Aufgabenstellungen können schwerer sein und so mehr Angebote abdecken
Die Motivation kann gesteigert werden.

Interaktives Lernen LS -> Lernplattformen können als große Hilfe und Unterstützung angesehen werden. Bei Gruppenarbeit und soziale Interaktion bringt das Wissen vielen mehr als das der einzelnen! Nachteil ist die Überbeanspruchung und nicht mehr allein. Zeitmanagement für Gruppen oftmals schwer

Was geschieht mit all den Büchern, die nicht digitalisiert werden? Interessant ist auch die Frage, ob insgesamt mehr Artikel oder kürzere Texte auf den Blogs gelesen werden oder doch Bücher im Mainstream sind. Ein Nachteil z.B. ist, dass man nicht hineinschreiben, man wird zwar auch die Möglichkeit haben, Notizen zu machen, ist zumindest für die Buch-gewohnten Generationen wahrscheinlich Gewohnheitssache.

15.) Social Networks etablieren sich zunehmend zu Plattformen, deren virtuelle Komponente immer stärker verschwindet. Immer mehr Informationen und Daten werden täglich eingespeist, so dass ein immer realeres, in gewissem Sinn zunehmend realitäts-getreues Abbild geschaffen wird. Ähnlich wie beim Mobiltelefon gibt es auch hier Veränderungen hinsichtlich Hinter- und Vordergründe. Es werden von allen Internetnutzern Datensätze zusammengetragen, die Social-Networks sind diesbezüglich Riesen.

2

Structure and overview of free text answers

3

Enhanced objectivity (compared to written AND oral exams) due to the missing halo-effect (see Müller & Bayer 2007)

Question **1**

Not yet answered

Points out of 6.00

Flag question

Describe the history of Styria in the High and Late Middle Ages.

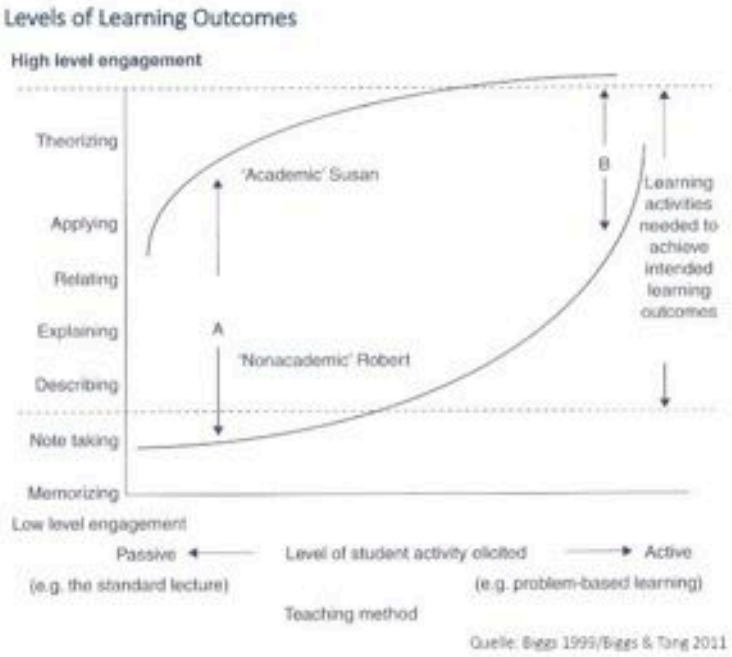
Question **18**

Not yet answered

Marked out of 1.00

Flag question

Please describe what John Biggs (1999) means when he writes about "academic" and "non-academic" students. Additionally, highlight how "non-academic" students can be stimulated to reach high levels of engagement. Use below diagram for your explanation.



Paragraph

Question **19**

Not yet answered

Marked out of 1.00

Flag question

Please have a look at the following video. Describe the economical and cultural importance of this project for the city of Friesach and the region.

Question **14**

Not yet answered

Marked out of 1.00

Flag question

Please list 4 terms that characterize a geo system.

Answer:

Question 7

Not yet answered

Marked out of 1.00

Flag question

Some English terms are also used in German.

Select one:

- True
- False

Question **13**

Not yet answered

Marked out of 3.00

Flag question

Old traffic routes through the Alps-Adriatic-region are

Select one or more:

- Silk Road
- Via Appia
- Bernstein road
- Schräger Durchgang
- Tauernpass and Drau valley
- Brenner road

Question 17

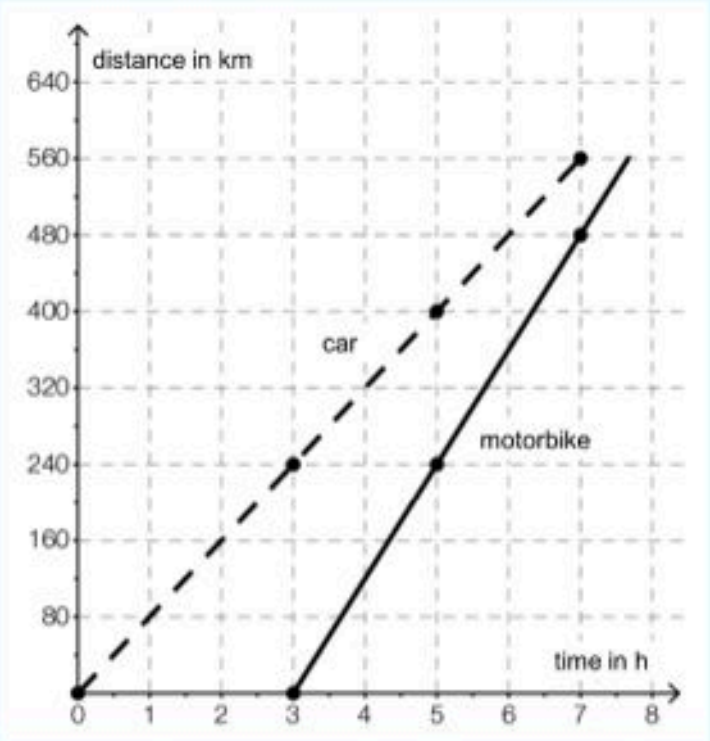
Not yet answered

Marked out of 1.00

Flag question

Edit question

A motorcyclist drives the same distance (560 km) as a car driver. Both movements are exemplary assumed as linear in the following time-way-diagram. The highlighted points have whole-number coordinates.



Choose the two answers that are a correct interpretation of the diagram.

Select one or more:

- a. The whole journey time of the motorcyclist for this distance is higher than the one of the car driver
- b. The average speed of the car is 40 km/h lower than the one of the motorbike.
- c. The motorbike has an average speed of 100 km/h
- d. When the car driver reaches his/her goal, the motorbike is still 120 km away.
- e. The motorcyclist starts three hours after the departure of the car driver

Question **11**

Not yet answered

Points out of 4.00

Flag question

DIRECTIONS:

Step 1: Read the sentences in each group, and decide which sentence is the best topic sentence. Select "best topic sentence" from the list.

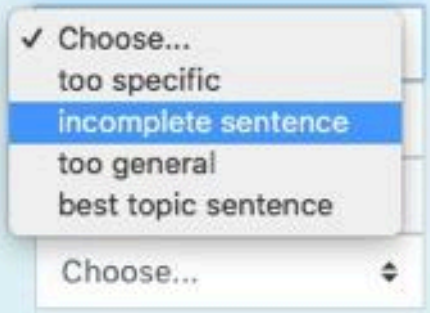
Step 2: Decide what is wrong with the other sentences. They may be *too general*, or they may be *too specific*, or they may be *incomplete sentences*. Select the appropriate description from the list.

Superstitions have been around forever.

Is made of green cheese.

A lunar eclipse is an omen of a coming disaster.

People hold many superstitious beliefs about the moon.



Question 6

Not yet answered

Marked out of 10.00

Flag question

DIRECTIONS: Choose the most appropriate answer for each of the blanks (each word/phrase will be used only once): as soon as, as well, at one time, for example, just, like, personally, to a certain extent, together.

The little shops of London were, _____, clustered together in small "village" groups and there are _____ several groups _____ this in South London. Such a group normally includes a variety of shops which _____ are enough to provide for most of the everyday needs of the community. _____, each shop depends on the others for its survival. _____ one closes down, _____, the butcher, the others enter a decline. Residents have to leave the "village" to reach another butcher and while they are going along the nearest High Street, they buy their groceries and bread _____, so the "village" grocer and baker lose their trade. _____, I think it is a great pity that the little shops are disappearing, and I am willing to buy from them _____ for the pleasure of enjoying their friendly atmosphere.

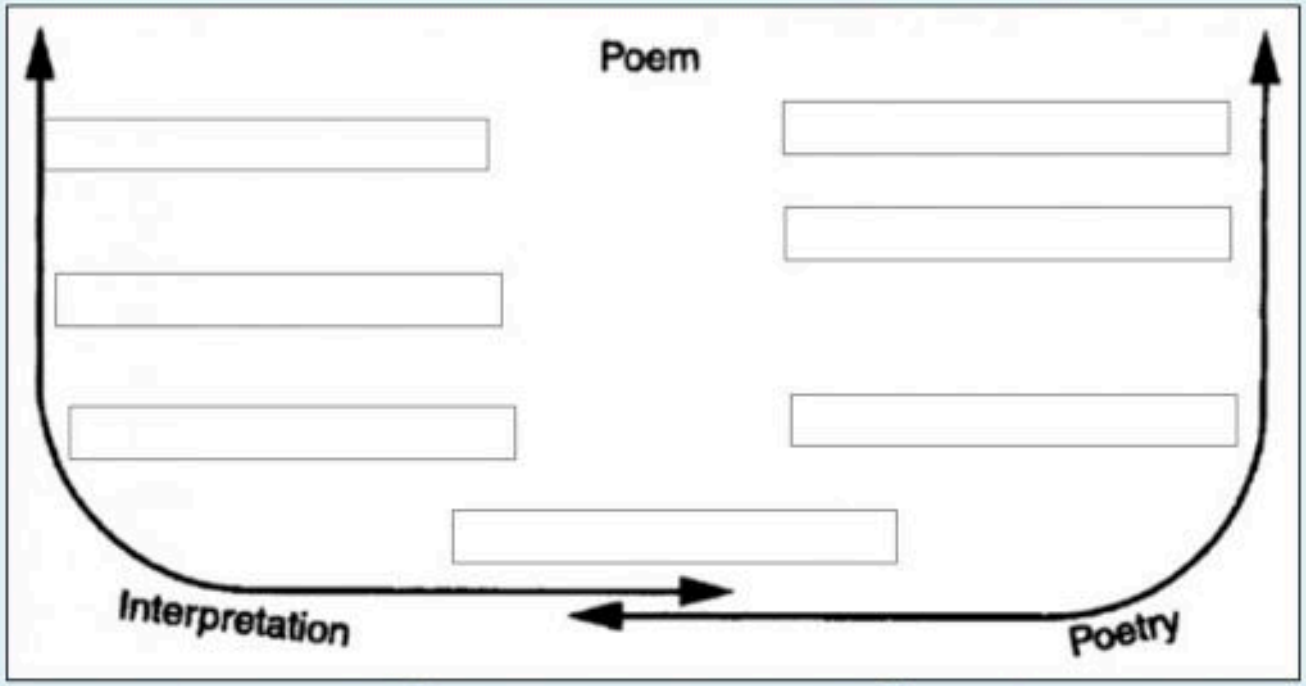
Question **4**

Not yet answered

Marked out of 1.00

Flag question

DIRECTIONS: Drag each label to the appropriate place on James Holmes' diagram showing "the interrelationship between translation and critical interpretation" regarding poetry.

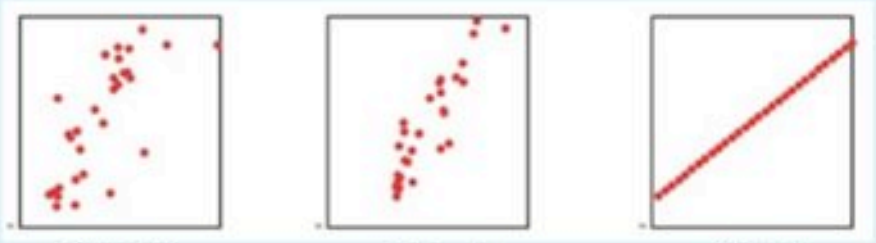


Poem inspired by poem	Critical essay in another language	Poem 'about' poem
Critical essay in language of poem	Prose translation	Imitation
	Verse translation (metapoem)	

Pearson Correlation coefficient

Please assign the following values of the Pearson correlation coefficient [0.7 / 0.2 / -0.9 / 1 / 0 / 0.9] to the respective pictures:

Picture A | Picture B | Picture C



Picture D | Picture E | Picture F

Picture A: approx.

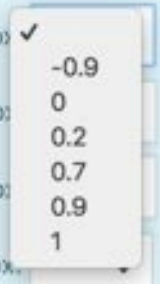
Picture B: approx

Picture C: approx

Picture D: approx

Picture E: approx

Picture F: approx.



Question **3**

Not yet answered

Marked out of 2.00

Flag question

Define

$$\lim_{x \to 0} \frac{2x^2 + 8x^3}{\log(1 + 9x^2)}$$

to exact three decimals.

Answer:

4

A huge variety of question types
&
lecturers make more use of various question types when testing online, since the testing environment offers impulses for experimentation

27,67	✔ 1,00	☑ 0,75	✔ 1,00	☑ 0,25	✔ 1,00	✔ 1,00	☑ 0,25	☑ 0,25	✔ 1,00
21,97	✔ 1,00	☑ 0,50	☑ 0,42	✔ 1,00	✔ 1,00	✔ 1,00	☑ 0,50	✖ 0,00	☑ 0,75
24,05	☑ 0,30	✔ 1,00	☑ 0,67 ⚑	✔ 1,00	☑ 0,25	✔ 1,00	✔ 1,00	☑ 0,25 ⚑	✔ 1,00
25,83	☑ 0,75 ⚑	✔ 1,00	☑ 0,33 ⚑	☑ 0,25	☑ 0,50	✔ 1,00	✔ 1,00	☑ 0,25 ⚑	✔ 1,00
25,83	✔ 1,00	☑ 0,75	☑ 0,67	☑ 0,75	✔ 1,00	✔ 1,00	☑ 0,75	☑ 0,25	✔ 1,00
23,67	✔ 1,00	☑ 0,75	☑ 0,33	☑ 0,50	☑ 0,50	✔ 1,00	☑ 0,75	☑ 0,25	✔ 1,00

5

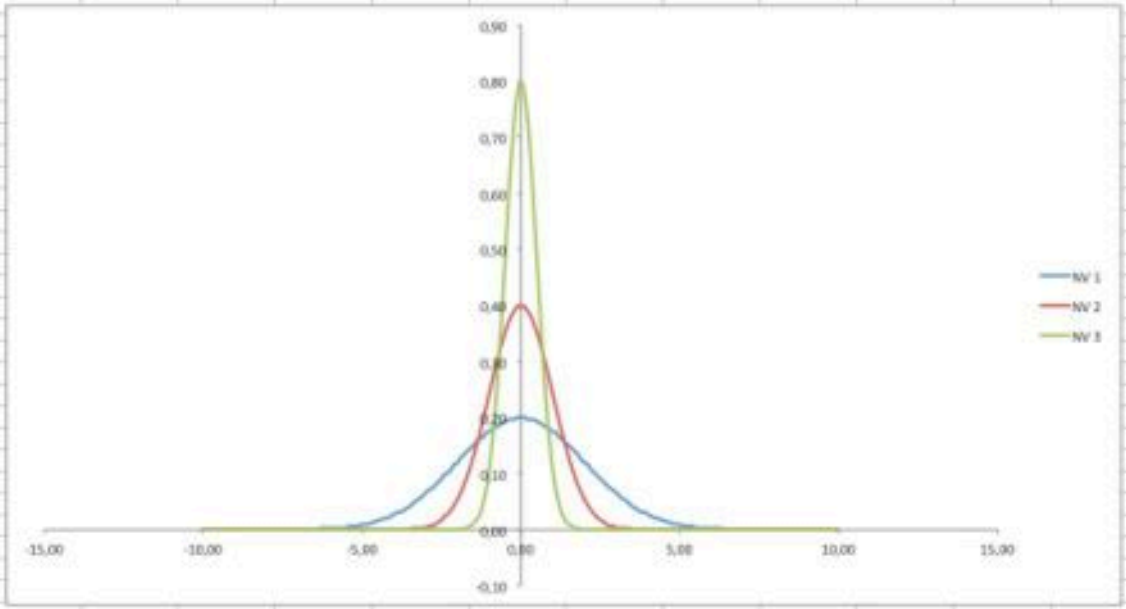
(Semi-)automatic correction of (semi-)standardized question types

Normalverteilungen (Gleiche Mittelwerte, verschiedene Standardabweichung)

Mittelwert		0	0	0
Standardabweichung		2	1	0,5

Bei der Funktion NV2 (Mittelwert 0, Standardabweichung 1) handelt es sich um die Standardnormalverteilung

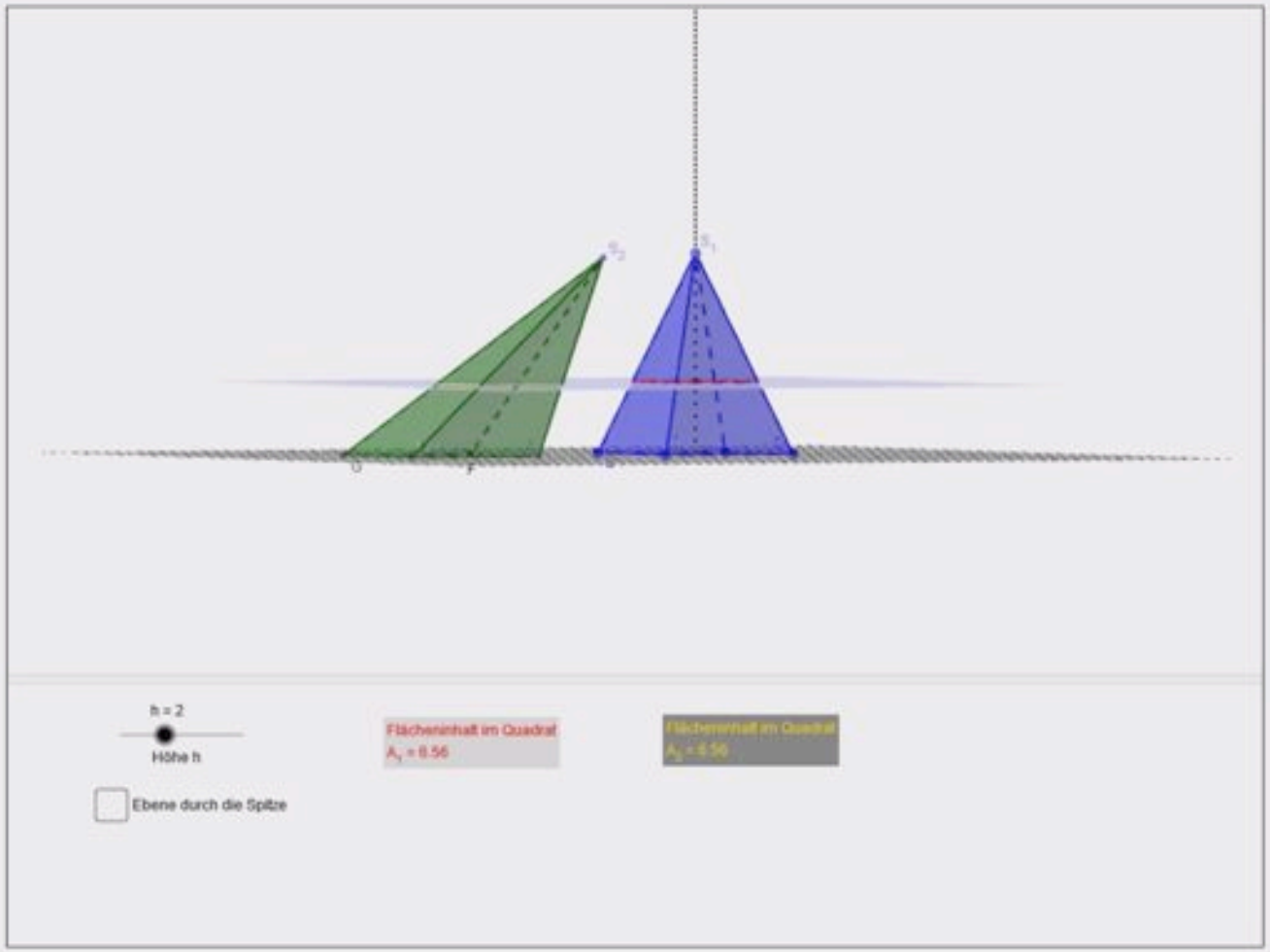
x	NV 1	NV 2	NV 3
-10,00	0,000001	0,000000	0,000000
-9,90	0,000001	0,000000	0,000000
-9,80	0,000001	0,000000	0,000000
-9,70	0,000002	0,000000	0,000000
-9,60	0,000002	0,000000	0,000000
-9,50	0,000003	0,000000	0,000000
-9,40	0,000003	0,000000	0,000000
-9,30	0,000004	0,000000	0,000000
-9,20	0,000005	0,000000	0,000000
-9,10	0,000006	0,000000	0,000000
-9,00	0,000008	0,000000	0,000000
-8,90	0,000010	0,000000	0,000000
-8,80	0,000012	0,000000	0,000000
-8,70	0,000016	0,000000	0,000000
-8,60	0,000019	0,000000	0,000000
-8,50	0,000024	0,000000	0,000000
-8,40	0,000029	0,000000	0,000000
-8,30	0,000036	0,000000	0,000000
-8,20	0,000045	0,000000	0,000000
-8,10	0,000055	0,000000	0,000000
-8,00	0,000067	0,000000	0,000000
-7,90	0,000082	0,000000	0,000000
-7,80	0,000099	0,000000	0,000000
-7,70	0,000121	0,000000	0,000000
-7,60	0,000146	0,000000	0,000000
-7,50	0,000176	0,000000	0,000000
-7,40	0,000212	0,000000	0,000000
-7,30	0,000255	0,000000	0,000000
-7,20	0,000306	0,000000	0,000000
-7,10	0,000366	0,000000	0,000000
-7,00	0,000436	0,000000	0,000000
-6,90	0,000519	0,000000	0,000000



Geogebra Showcase

Geogebra Moodle integration showcase

Unlimited attempts for this activity



6

Applying software, which is used for teaching and learning for exams as well

Assessment is a huge influencer of learning processes. Thus, the way we examine students is responsible for the way students learn.

7

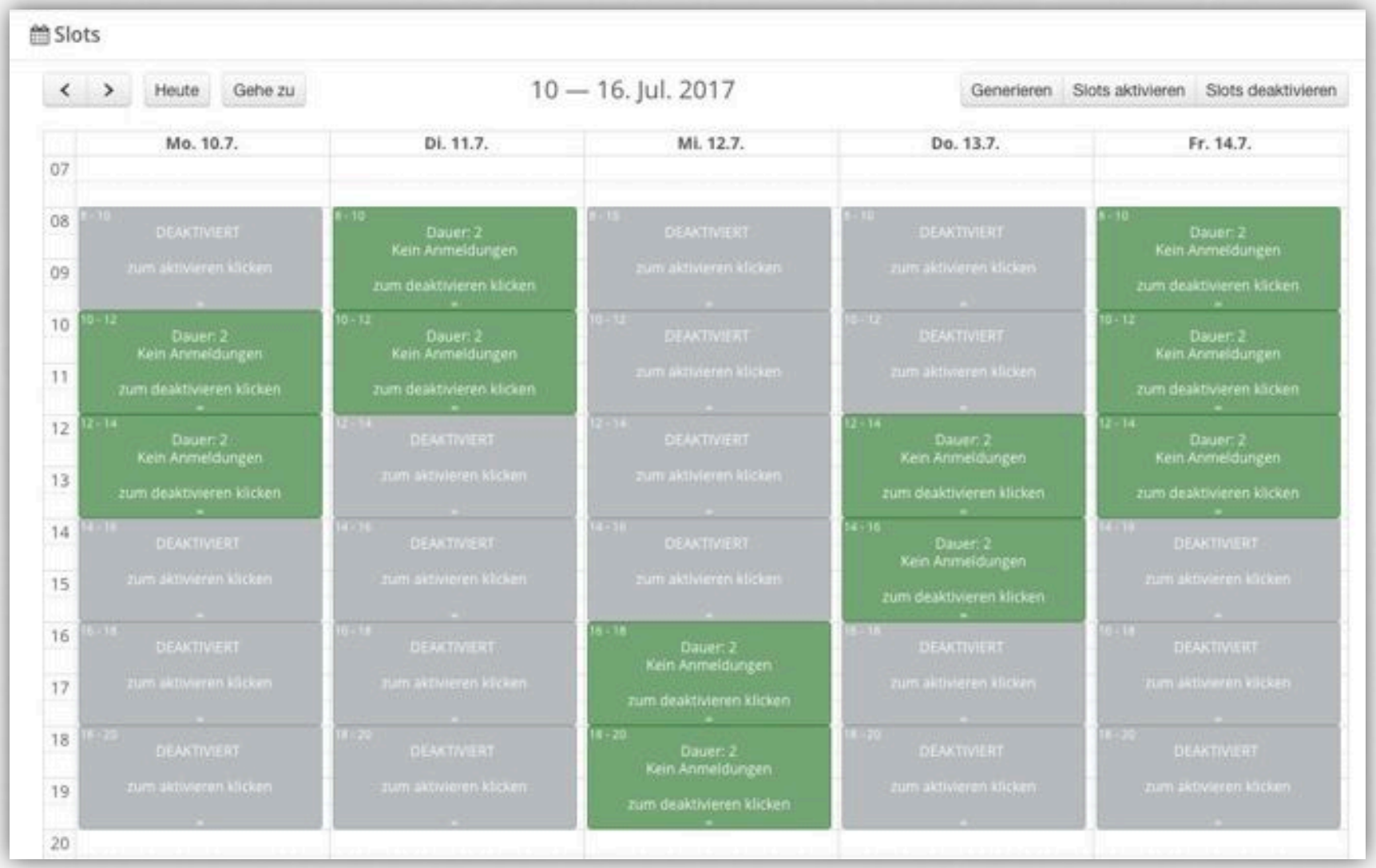
Well-designed e-Exams foster

7.1 **constructive alignment** (see Biggs & Tang 1999/2011)

7.2 **hands-on learning** as well as

7.3 **deep learning**

What if students are able to choose their exam-time freely?



Slotted exams

- Three slotted-exam weeks during an academic year
- Students can choose the time of their exam freely
- Various exams of various courses in the same lecture hall at the same time
- Question pools have to be sufficiently large enough, due to the need of sampling questions as well as test items (with standardized question types)

8

e-Exams offer flexibility

9++

- synchronous correction of exams with colleagues
- mobile correction is easier
- exams do not get lost
- no need to copy exams
- no waste of paper
- cheating is more difficult
- statistics are available much easier...

Plus several advantages for students

- faster results
- automated and individual feedback is easier to access
- no hand-pains
- ... (to be continued)

Why we started with e-Exams

Obstacles for e-Exams in the past

Obstacles for e-Exams

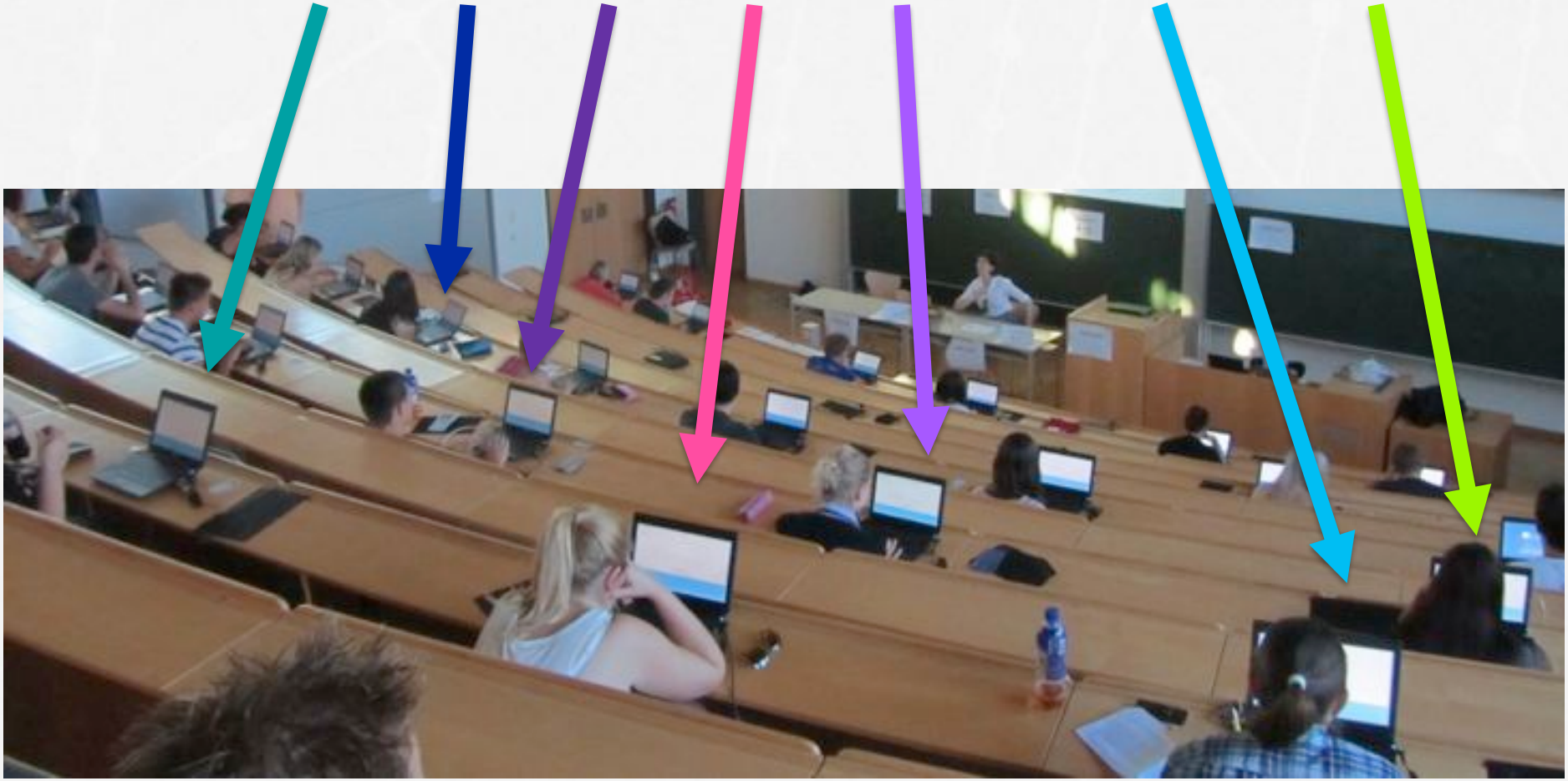
- Too small computer labs
- Acquisition of a sufficient large amount of loan devices (not affordable and not environment-friendly)
- Fast technical obsolescence of these devices
- Missing security concepts

That’s why we developed the „Secure Exam Environment“ (SEE)

What does it look like, when we conduct e-Exams?

2011: The implementation of the SEE at the AAU

All students get different questions at the same time



Registration 2011: Analogue ☺

HS A
elearning

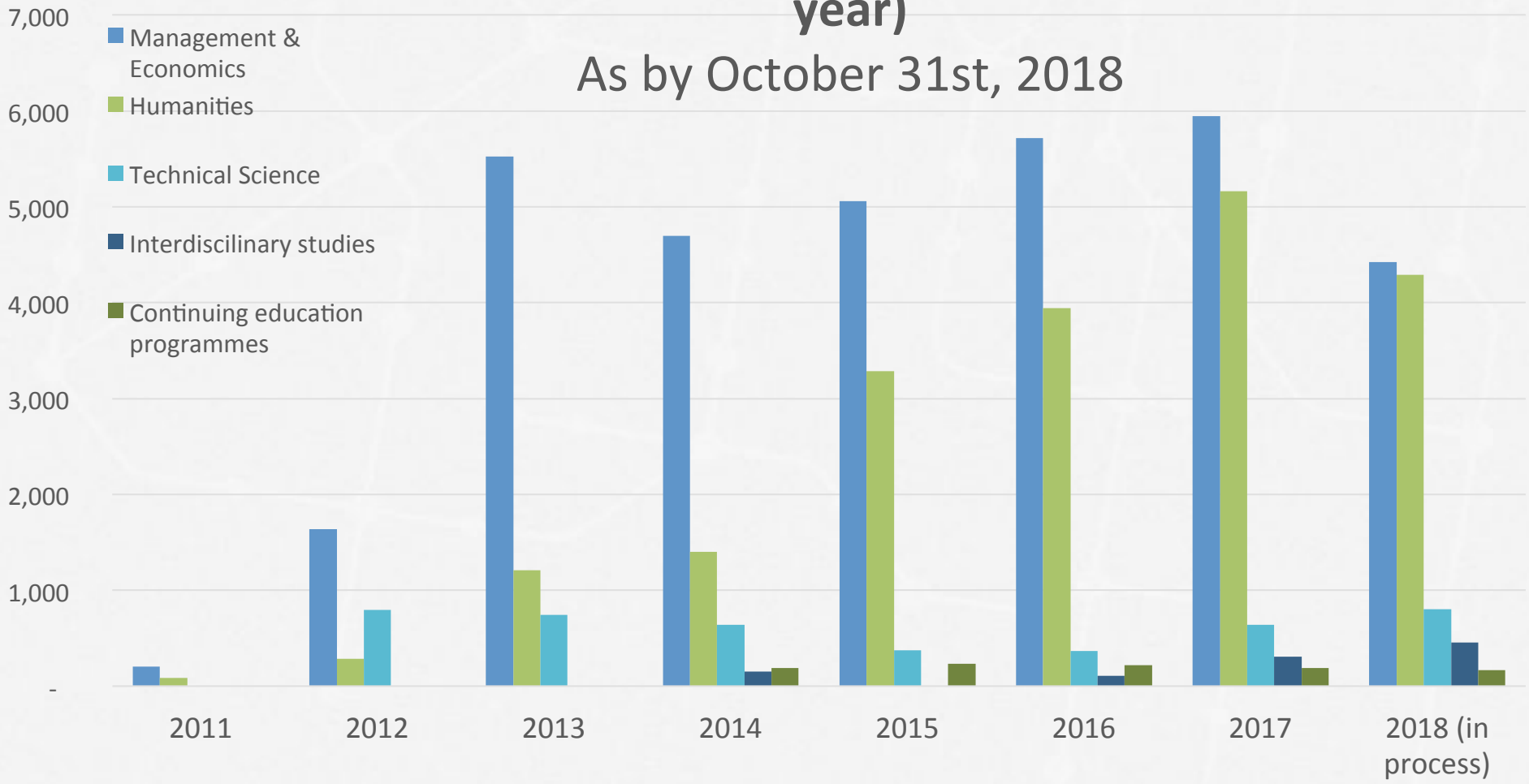
Facts about our e-Exams

SEE

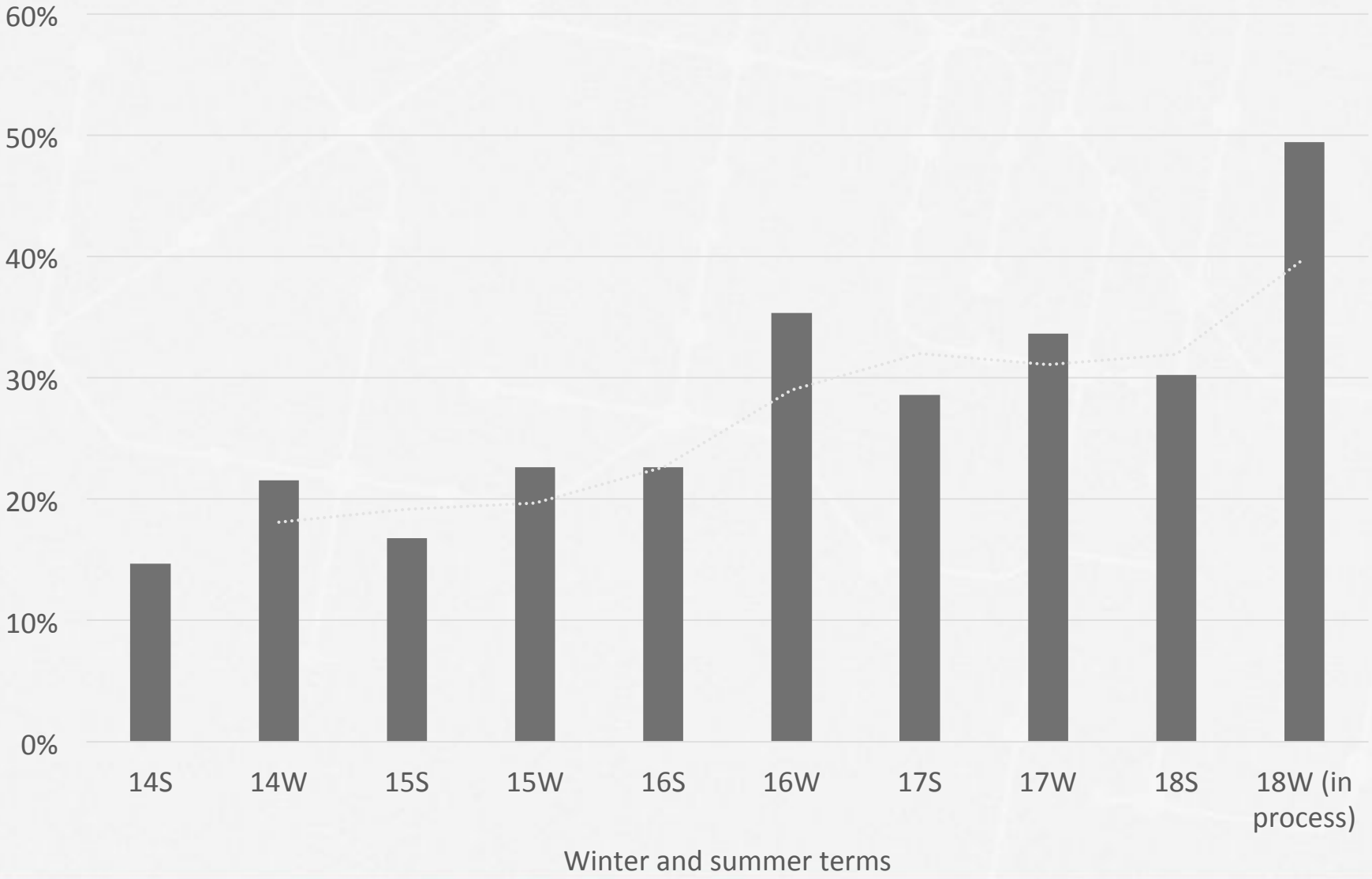
- Using students' resources (plus loan devices if necessary)
- Start June 2011
- Since then 1.678++ conducted online exams
- With over 59.261++ tested students
- Max. 225 students parallel with the same additional software
- Additional software (Excel, Eclipse, GeoGebra etc.)

Students taking online exams (sorted by faculty and year)

As by October 31st, 2018



% of online exams with the SEE
(compared to all written exams)



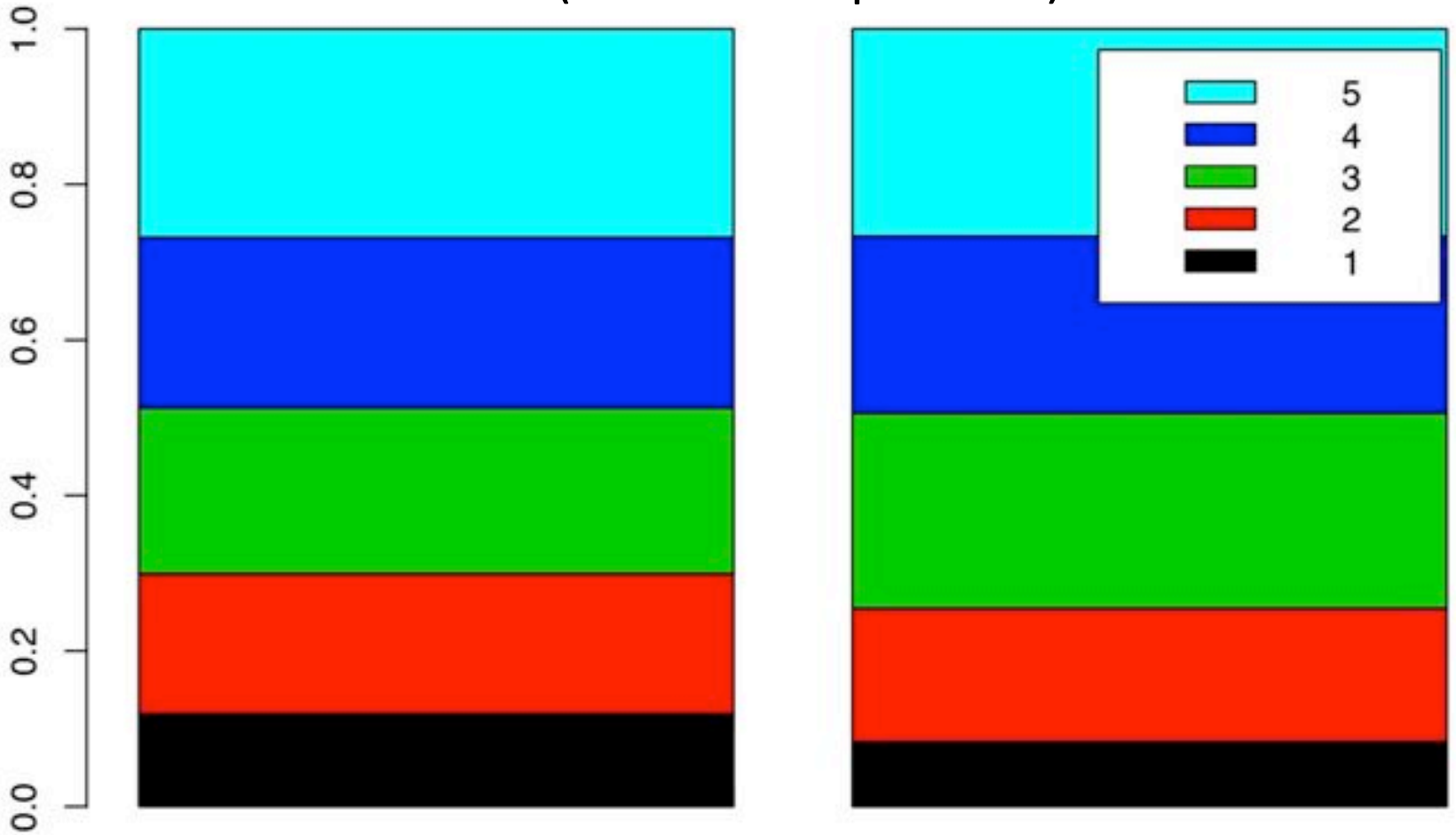
This boost of e-Exams is due to clear benefits for lecturers as well as for students

To trigger this boost...

- **generate benefits and talk about these benefits**
- **provide a trustworthy infrastructure**
- **organize organization** (low entry level for lecturers)
- **start with early adopters**
- **reach a critical mass**
  - students started to ask lecturers for e-Exams)
  - Lecturers wanted to be part of this

Changes in grading before and after implementing the SEE

(relative frequencies)

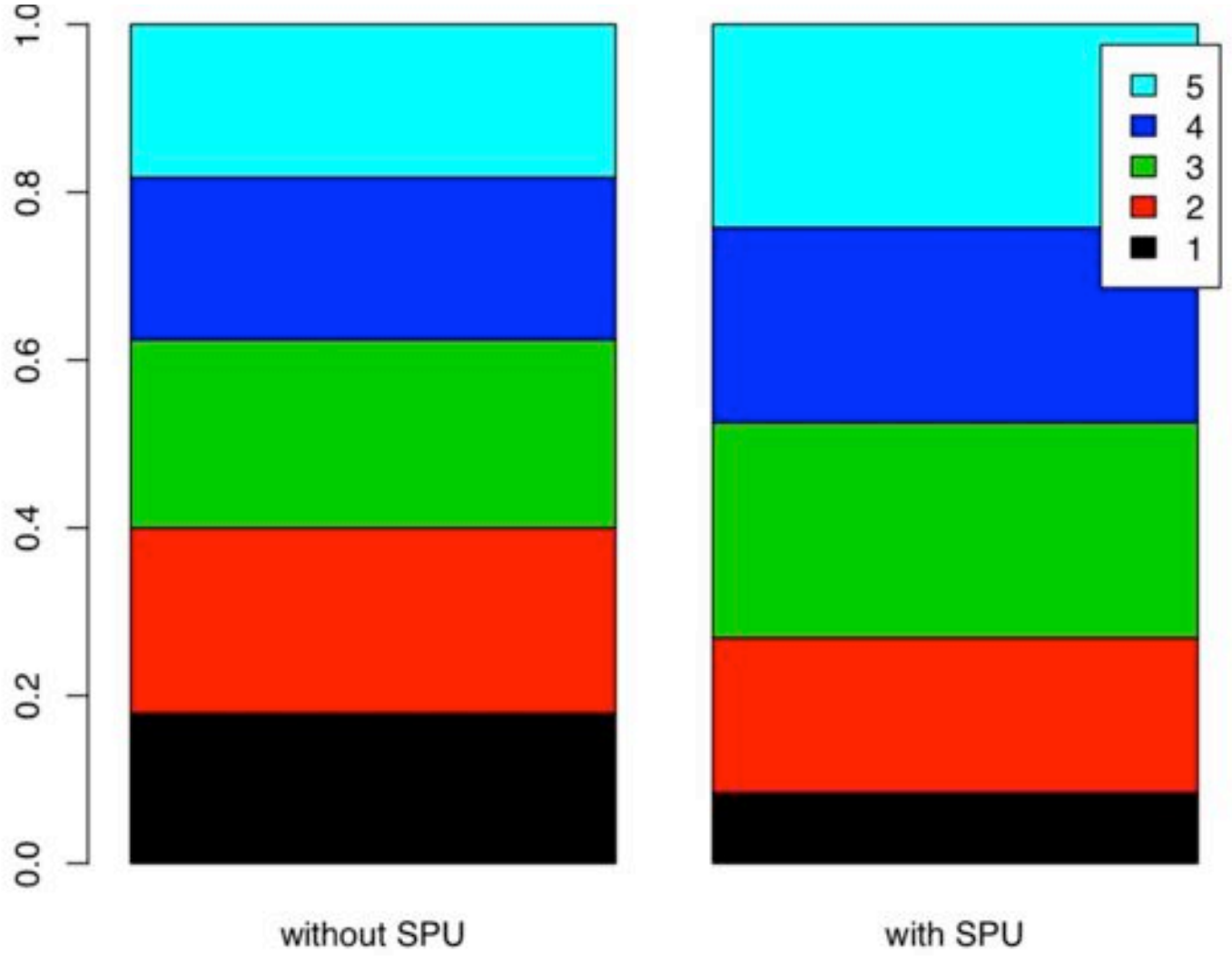


Grading distribution
BEFORE implementing the SEE

Grading distribution
AFTER implementing the SEE

Differences in grading for exams (lectures only) not using the SEE compared to exams using the SEE

(relative frequencies)

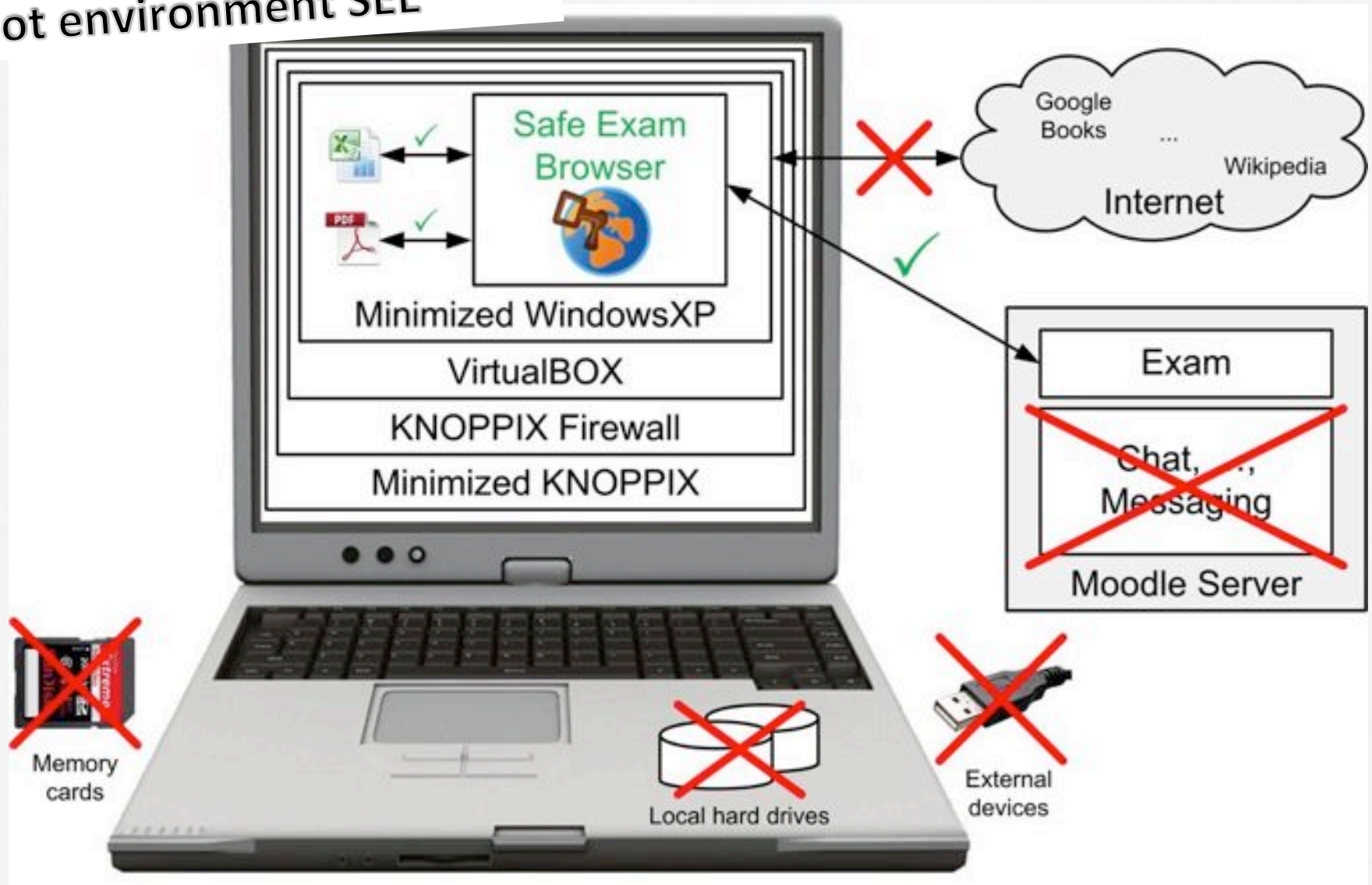


Exams **NOT using** the SEE

Exams **using** the SEE

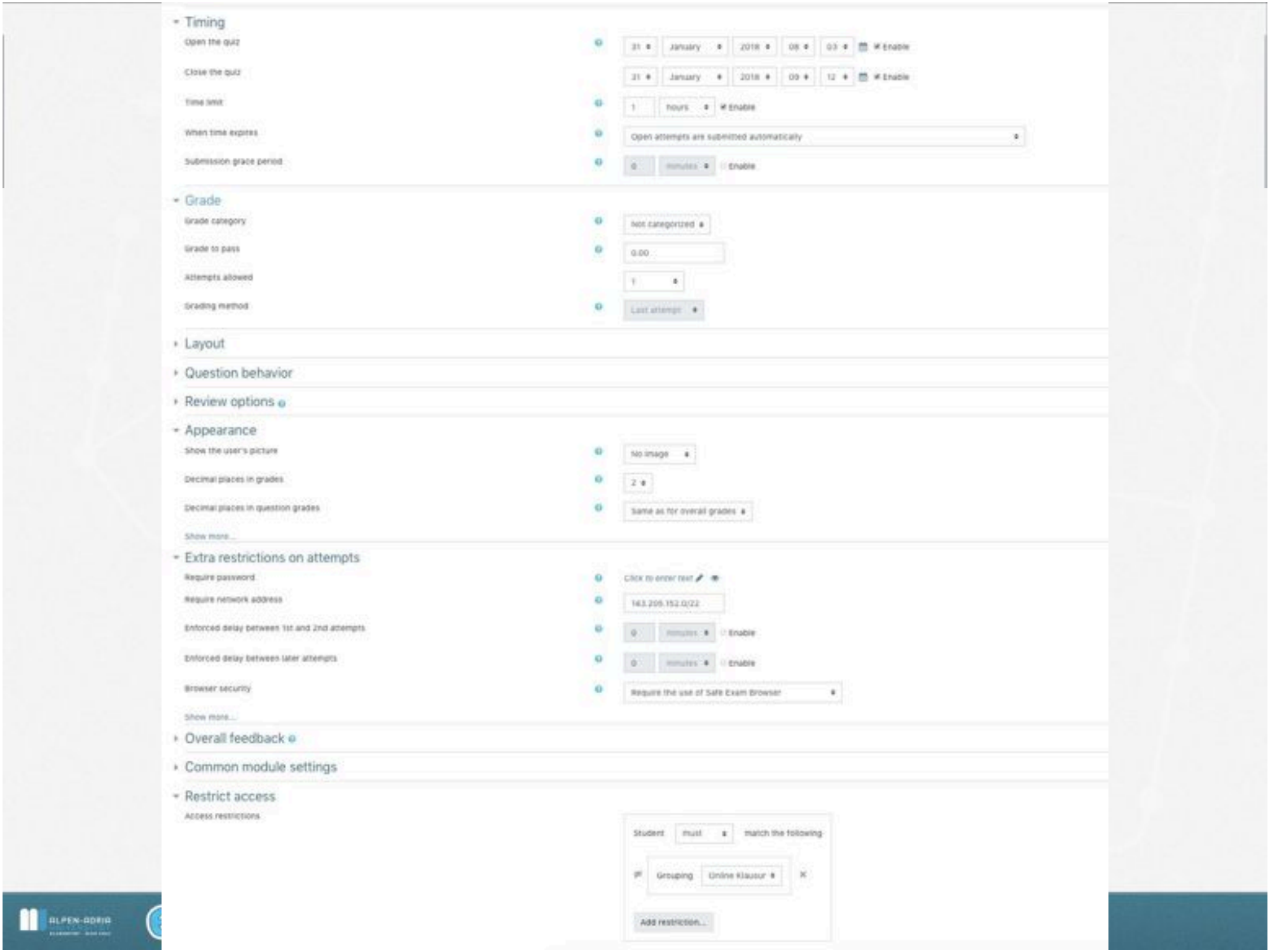
Technical challenges
or:
Why is the Secure Exam Environment (SEE) secure?

Boot environment SEE



Additional security settings

- IP-range of the lecture hall
- Only a specified group is allowed to open the exam – the group is activated AFTER the check-in with the student ID-card in the lecture hall
- By checking-out in the lecture hall, students are removed from this group
- Only in the lecture hall, the exam is turned visible
- Max. one attempt
- Time limit


Timing
Open the quiz
31 January 2018 08 03 Enable
Close the quiz
31 January 2018 09 12 Enable
Time limit
1 hours Enable
When time expires
Open attempts are submitted automatically
Submission grace period
0 minutes Enable
Grade
Grade category
Not categorized
Grade to pass
0.00
Attempts allowed
1
Grading method
Last attempt
Layout
Question behavior
Review options
Appearance
Show the user's picture
No image
Decimal places in grades
2
Decimal places in question grades
Same as for overall grades
Show more...
Extra restrictions on attempts
Require password
Click to enter text
Require network address
143.205.152.0/22
Enforced delay between 1st and 2nd attempts
0 minutes Enable
Enforced delay between later attempts
0 minutes Enable
Browser security
Require the use of Safe Exam Browser
Show more...
Overall feedback
Common module settings
Restrict access
Access restrictions
Student must match the following
Grouping Online Klausur
Add restriction...

Extra restrictions on attempts

Require password — *Click to enter text*

Require network address — 143.205.152.0/22

Enforced delay between 1st and 2nd attempts — 0 minutes Enable

Enforced delay between later attempts — 0 minutes Enable

Browser security — Require the use of Safe Exam Browser

Show more...

Overall feedback

Common module settings

Restrict access

Access restrictions

Student must match the following

Grouping Online Klausur

Add restriction...

Disadvantages of e-Exams

Disadvantages

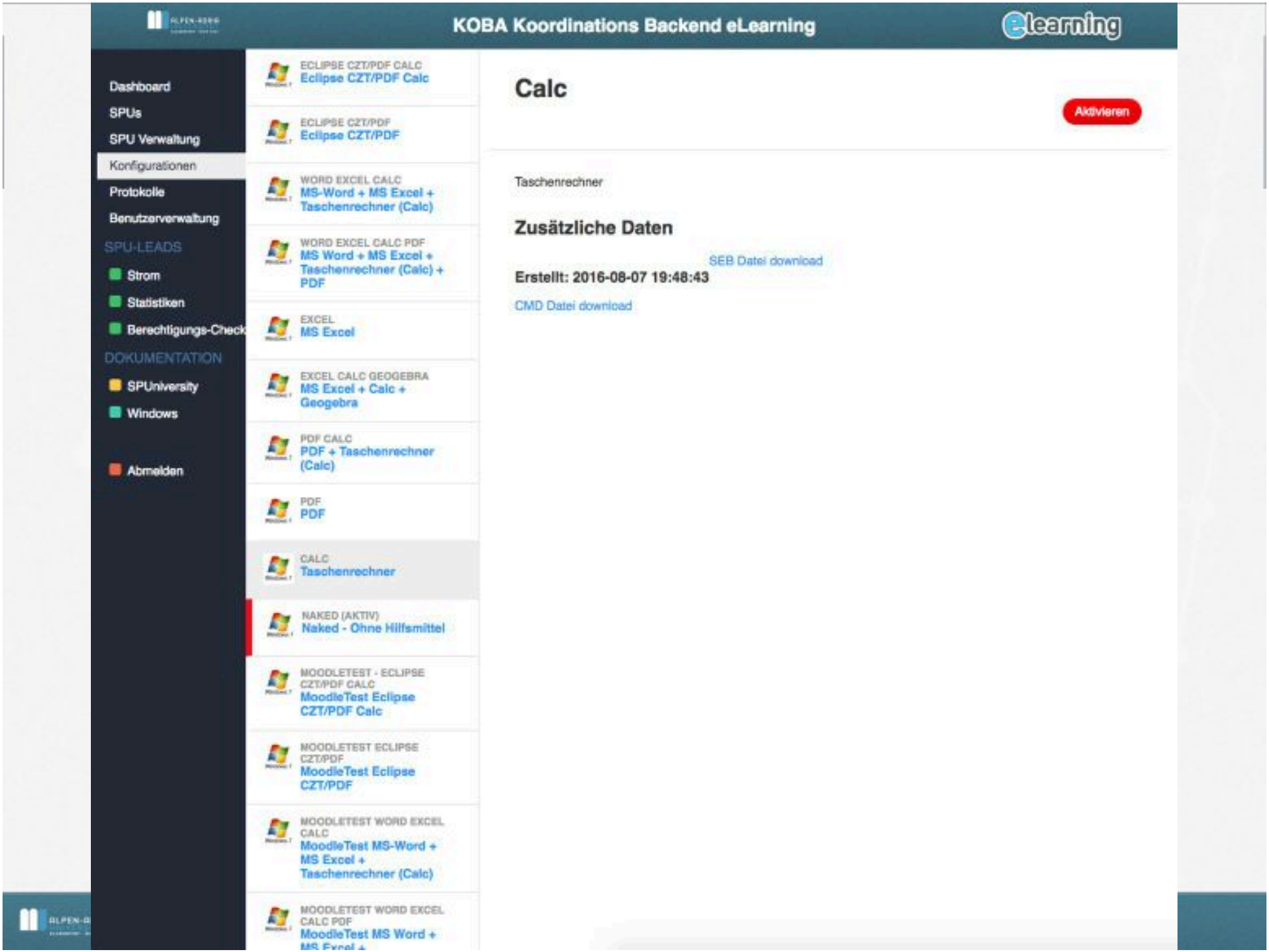
- Continuous adaption of the Secure Exam Environment (SEE) to new hardware requirements (e.g., UEFI boot, devices without Ethernet-port)
- Network has to work properly
- Network and power sockets need to be installed in the exam rooms (WLAN-solution is possible, but error-prone)
- Technical support is necessary
- Dependence from energy and technology

Organization, the poor cousin of technology

Organization is quite often underestimated

Staff & e-Tutors (students) for support

- e-Exams
- Videos
- Tools etc.


KOBA Koordinations Backend eLearning
eLearning
Dashboard
SPUs
SPU Verwaltung
Konfigurationen
Protokolle
Benutzerverwaltung
SPU-LEADS
Strom
Statistiken
Berechtigungs-Check
DOKUMENTATION
SPUniversity
Windows
Abmelden
ECLIPSE CZT/PDF CALC
Eclipse CZT/PDF Calc
ECLIPSE CZT/PDF
Eclipse CZT/PDF
WORD EXCEL CALC
MS-Word + MS Excel + Taschenrechner (Calc)
WORD EXCEL CALC PDF
MS Word + MS Excel + Taschenrechner (Calc) + PDF
EXCEL
MS Excel
EXCEL CALC GEOGEBRA
MS Excel + Calc + Geogebra
PDF CALC
PDF + Taschenrechner (Calc)
PDF
PDF
CALC
Taschenrechner
NAKED (AKTIV)
Naked - Ohne Hilfsmittel
MOODLETEST - ECLIPSE CZT/PDF CALC
MoodleTest Eclipse CZT/PDF Calc
MOODLETEST ECLIPSE CZT/PDF
MoodleTest Eclipse CZT/PDF
MOODLETEST WORD EXCEL CALC
MoodleTest MS-Word + MS Excel + Taschenrechner (Calc)
MOODLETEST WORD EXCEL CALC PDF
MoodleTest MS Word +
Calc
Aktivieren
Taschenrechner
Zusätzliche Daten
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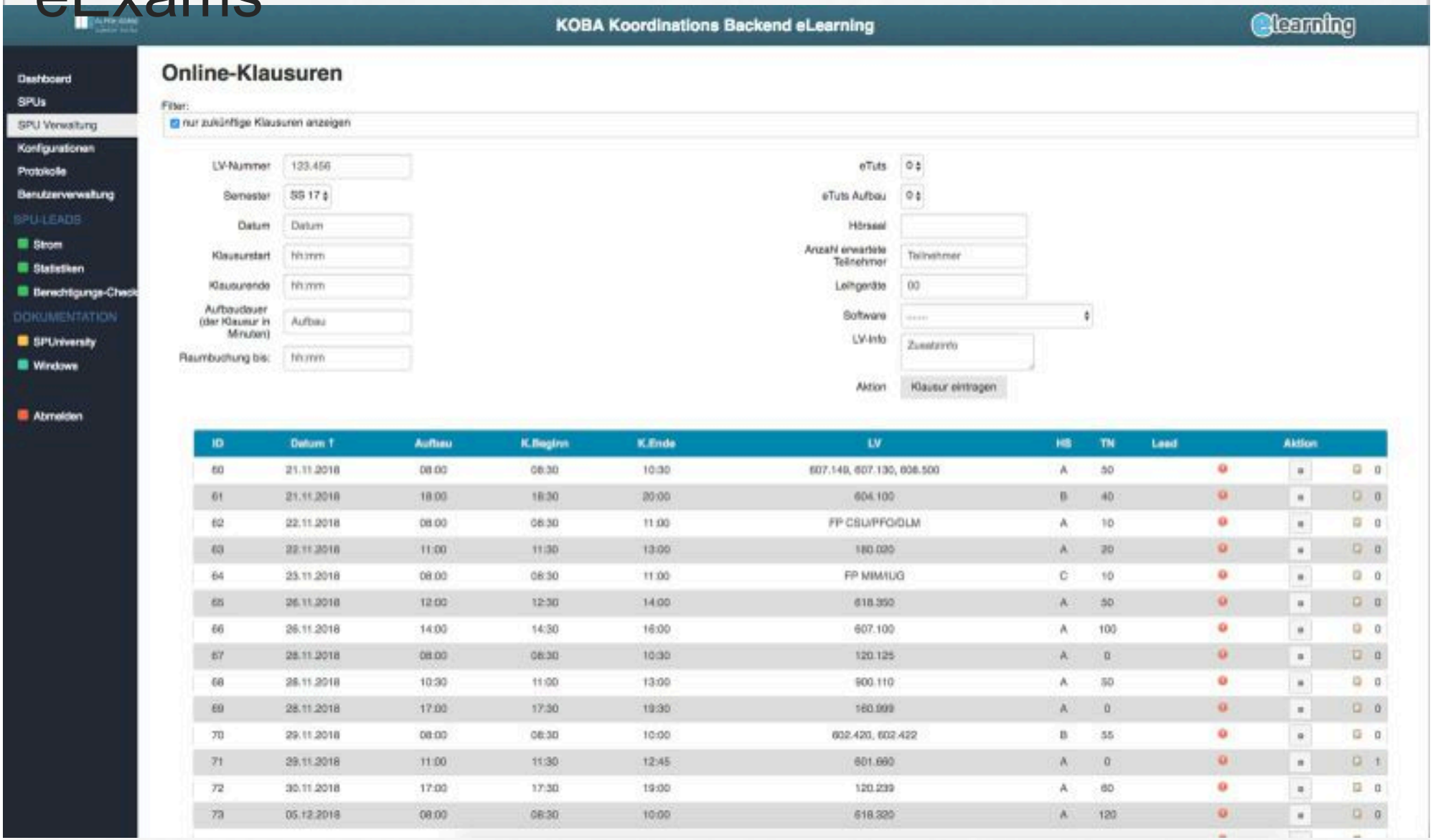
Erstellt: 2016-08-07 19:48:43
CMD Datei download

Internal organisation and coordination of eExams



Statistics

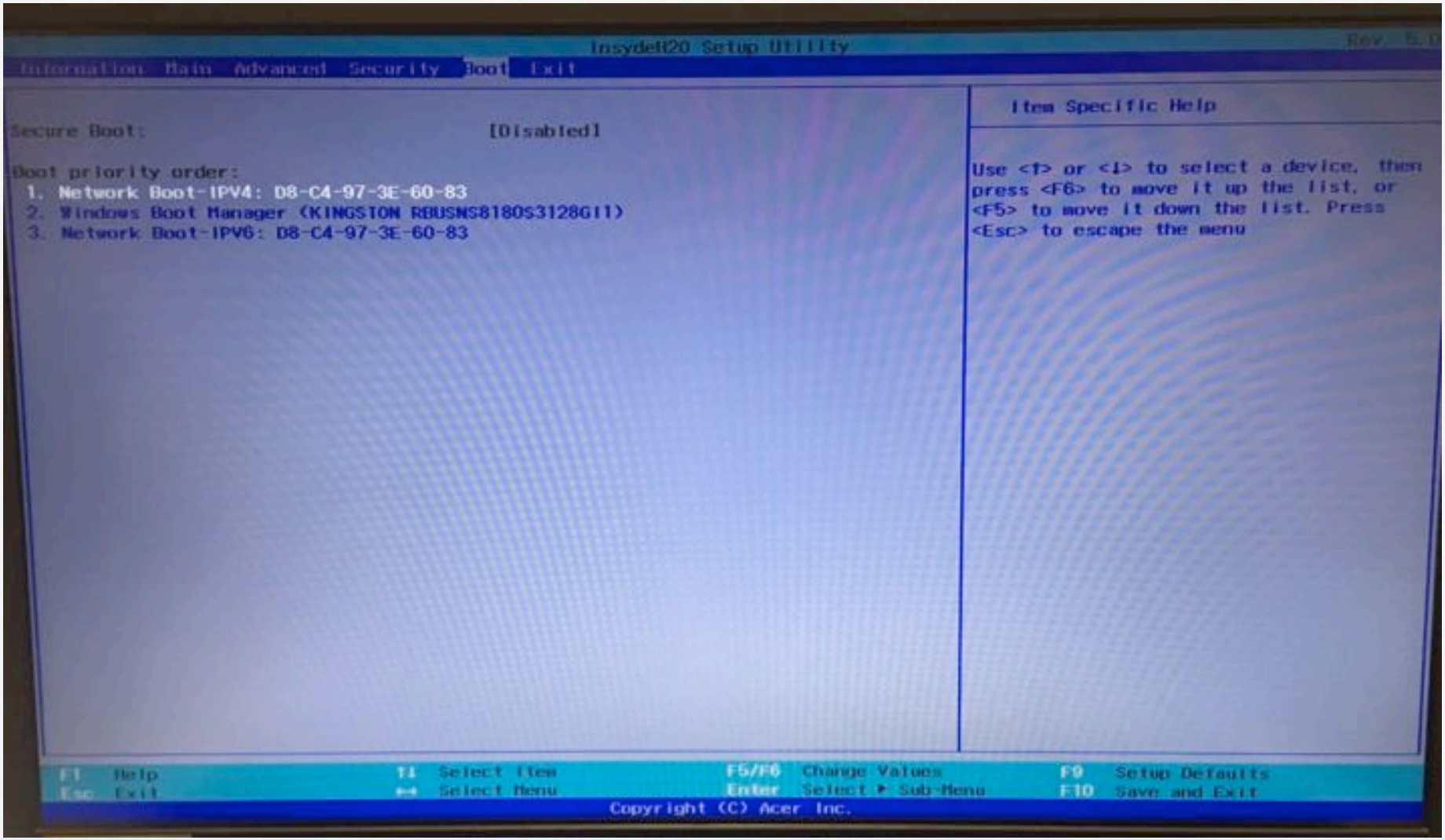
LV	Se	S	P	T	DG	F	Datum	Zeit	D	#A	#S	%	FT	SW	L	#e
620.000	18W			3	1	TEWI	19.11.2018	18:30	40'	13	10	77%	1	Naked	Kerstin	2
601.610	18W			2	1	WIWI	15.11.2018	08:30	60'	56	52	93%	1	Naked	Kerstin	1+2
160.621	18S			3	1	KUWI	14.11.2018	13:30	60'	42	35	83%	1	Naked	Nadine	2
311.950	18W			3	1	WIWI	12.11.2018	18:00	120'	39	16	41%	1 2 3		Chiara	2
620.000	18W			2	1	TEWI	12.11.2018	16:15	40'	24	18	75%	1	Naked	Chiara	1+1
602.302	18S			3	1	WIWI	12.11.2018	13:00	50'	7	5	71%	1		Nadine	1
120.235	18S			3	1	KUWI	08.11.2018	18:30	60'	19	14	74%	1 3	Naked	Michael	2
552.000	18W			2	1	KUWI	08.11.2018	10:30	50'	31	29	94%	1 2	Naked	Sofie	3+1
601.660	18W			1	1	WIWI	08.11.2018	08:45	45'	70	54	77%	1 2		Nadine	3
607.100	18W			1	1	WIWI	06.11.2018	12:45	60'	78	72	92%	1	Naked	Nadine	3

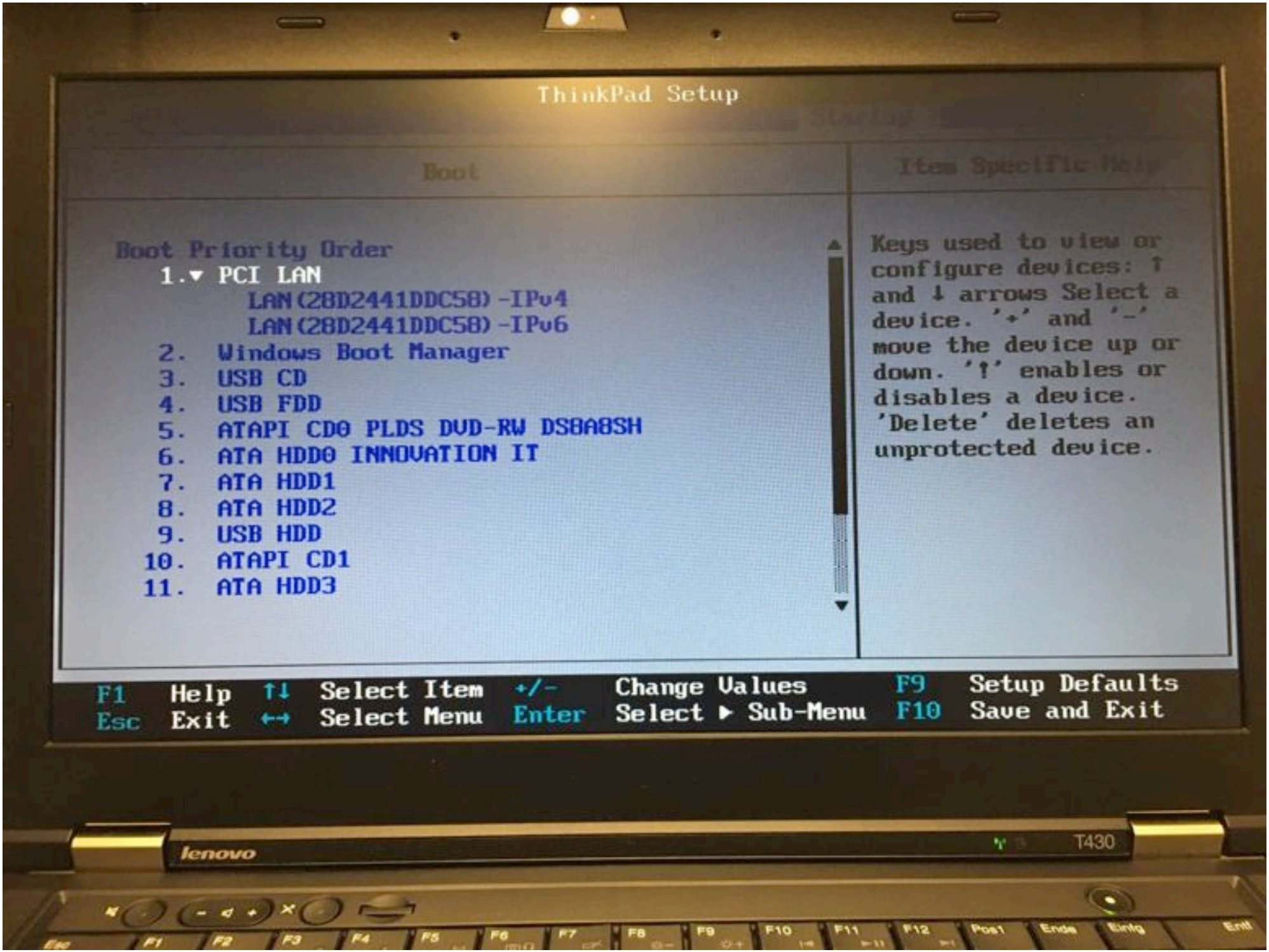
Before an e-Exam...

Before an e-Exam: Testing students‘ devices

- Information days for students – support by e-Tutors
- Changing the boot order and entry in our internal database
- If necessary, internal note in database that student needs a loan device

Changing the boot order and testing students‘ own devices




ThinkPad Setup
Boot
Item Specific Help
Boot Priority Order
1.▼ PCI LAN
LAN(28D2441DDC58)-IPv4
LAN(28D2441DDC58)-IPv6
2. Windows Boot Manager
3. USB CD
4. USB FDD
5. ATAPI CD0 PLDS DVD-RW DS8A8SH
6. ATA HDD0 INNOVATION IT
7. ATA HDD1
8. ATA HDD2
9. USB HDD
10. ATAPI CD1
11. ATA HDD3
Keys used to view or configure devices: ↑ and ↓ arrows Select a device. '+' and '-' move the device up or down. 'f' enables or disables a device. 'Delete' deletes an unprotected device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ↔ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit
lenovo
T430

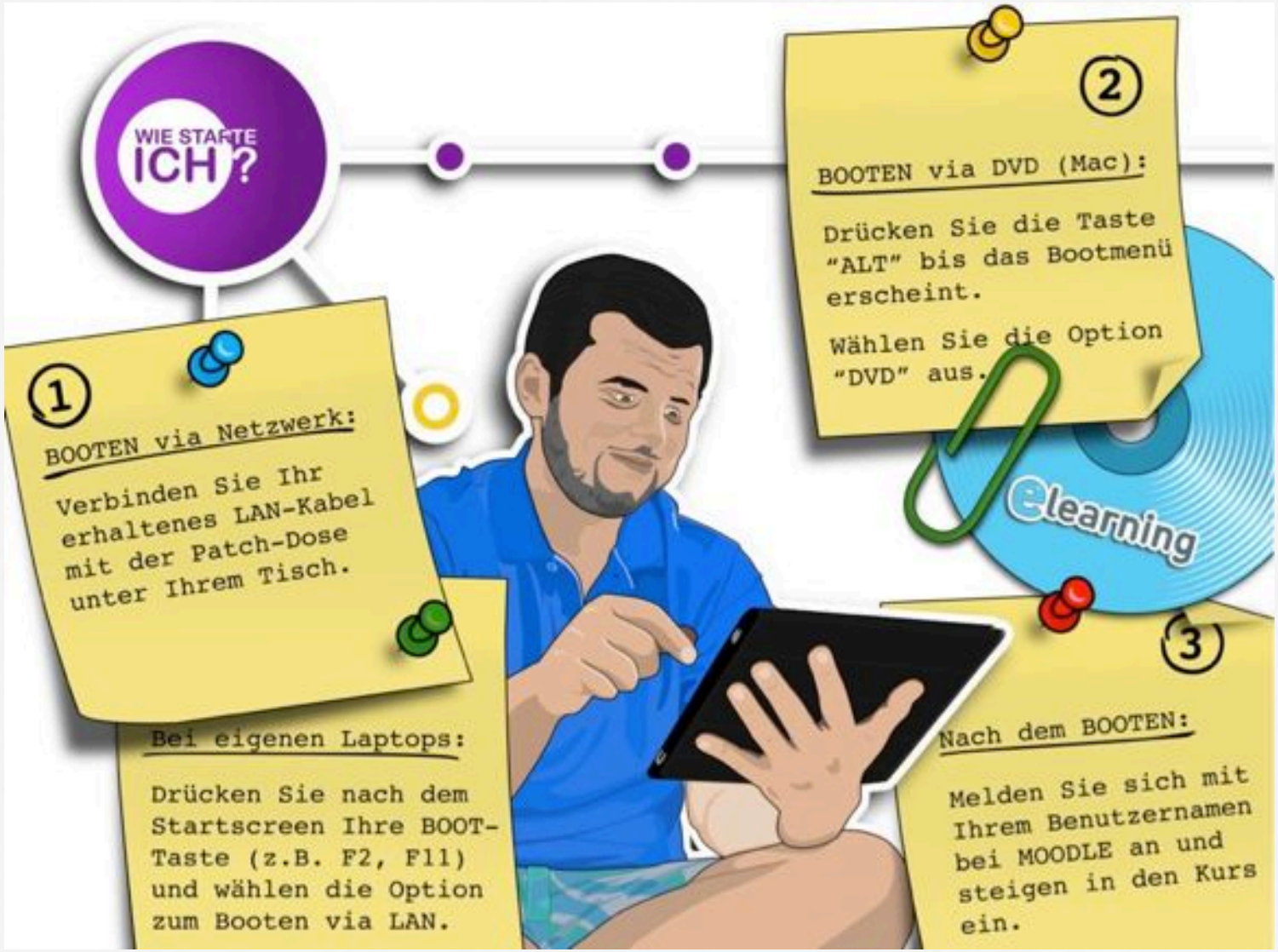
Supporting lecturers in advance

- Supporting the creation of questions and exams
- Checklist for the creation of MC questions
- Support with the execution of online exams

During an e-Exam...

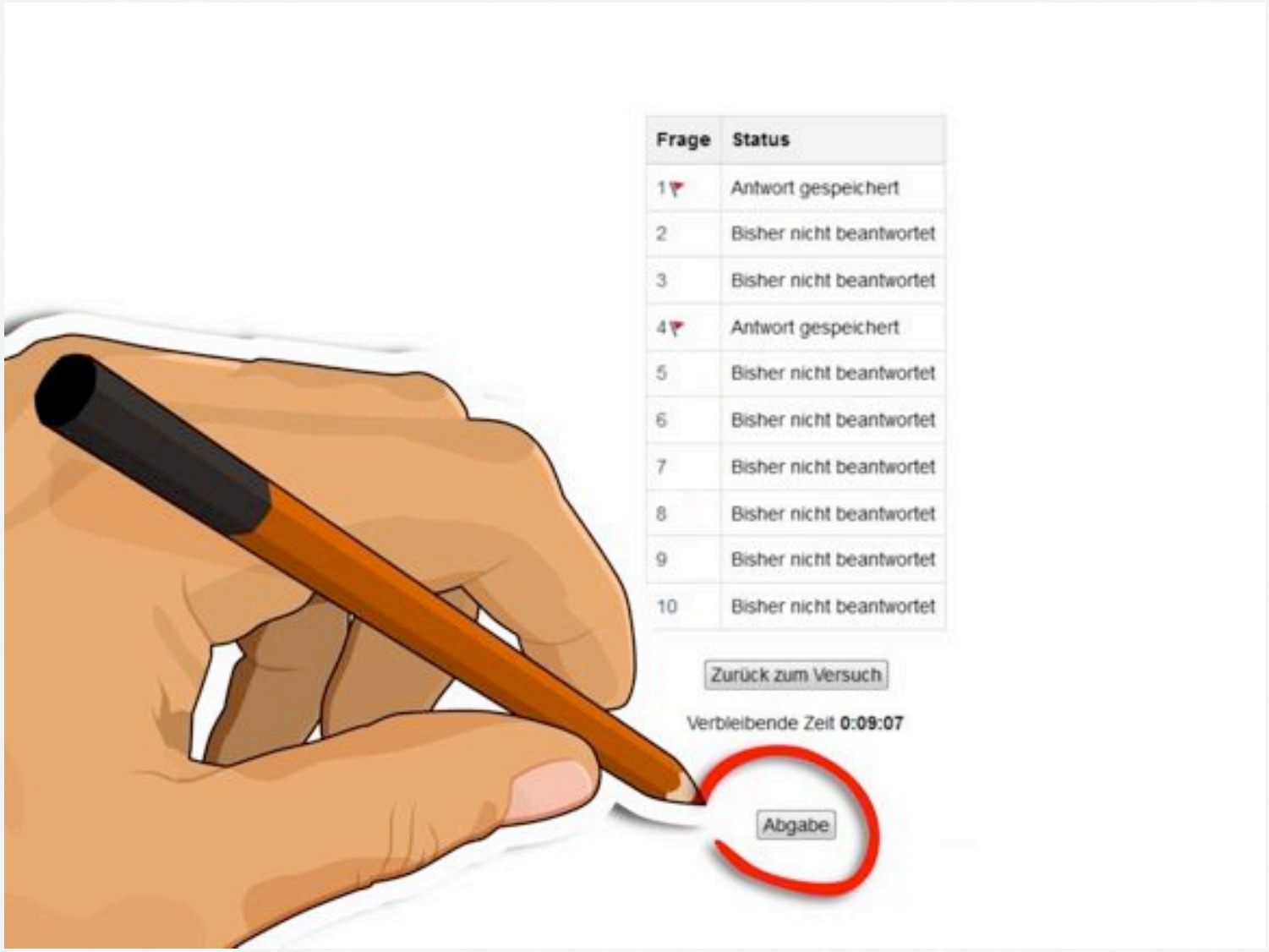
Video with clear organisational conditions

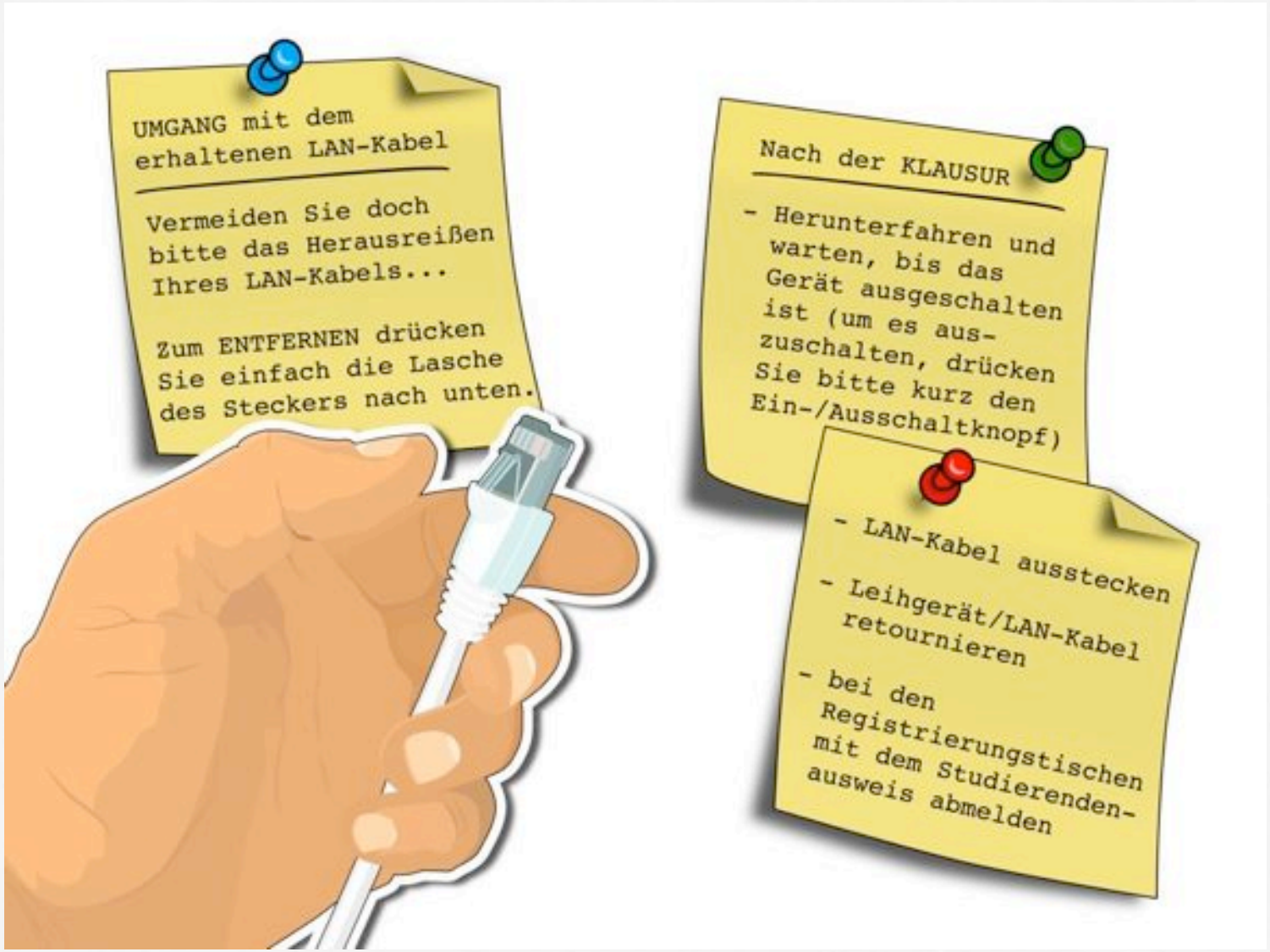
1
Melden Sie sich bei den Anmeldetischen und halten Sie Ihren Studienausweis bereit.
SPU
SICHERE PRÜFUNGSUMGEBUNG
Musterfrau
01.04.1990
Matrikelnummer: 0123456
2
Nehmen Sie nach Ihrer Registrierung Platz.
3
Folgen Sie in exakter Reihenfolge der Anleitung auf der nächsten Folie ...


WIE STARTE ICH?
1
BOOTEN via Netzwerk:
Verbinden Sie Ihr erhaltenes LAN-Kabel mit der Patch-Dose unter Ihrem Tisch.
2
BOOTEN via DVD (Mac):
Drücken Sie die Taste "ALT" bis das Bootmenü erscheint.
Wählen Sie die Option "DVD" aus.
elearning
Bei eigenen Laptops:
Drücken Sie nach dem Startscreen Ihre BOOT-Taste (z.B. F2, F11) und wählen die Option zum Booten via LAN.
3
Nach dem BOOTEN:
Melden Sie sich mit Ihrem Benutzernamen bei MOODLE an und steigen in den Kurs ein.

Finden auch Sie die 5 Fehler* auf ihrem Sitzplatz?!
*FEHLER
Tasche, Jacke, Pulli, Ordner, Unterlagen, Smartphone, Lexikon, (Zweit-)Handy, Tablet, Filofax, MP3-Player, unerlaubte Bücher, etc.

ALPEN-ADRIA UNIVERSITÄT
Frage 5
Bisher nicht beantwortet
Erreichbare Punkte: 3,00
Frage markieren
Wofür stehen die folgenden Abkürzungen?
WWF, UNESCO und UNICEF
Antwort:
Vorherige Seite
Nächste Seite
TEST-NAVIGATION
1 2 3 4 5
6 7 8 9 10
Versuch beenden ...
Verbleibende Zeit 0:59:07
ACHTUNG
Werfen Sie ab und dann einen Blick auf die (noch) verbleibende Zeit !!!


Frage
Status
1
Antwort gespeichert
2
Bisher nicht beantwortet
3
Bisher nicht beantwortet
4
Antwort gespeichert
5
Bisher nicht beantwortet
6
Bisher nicht beantwortet
7
Bisher nicht beantwortet
8
Bisher nicht beantwortet
9
Bisher nicht beantwortet
10
Bisher nicht beantwortet
Zurück zum Versuch
Verbleibende Zeit 0:09:07
Abgabe


UMGANG mit dem erhaltenen LAN-Kabel
Vermeiden Sie doch bitte das Herausreißen Ihres LAN-Kabels...
Zum ENTFERNEN drücken Sie einfach die Lasche des Steckers nach unten.
Nach der KLAUSUR
- Herunterfahren und warten, bis das Gerät ausgeschalten ist (um es auszuschalten, drücken Sie bitte kurz den Ein-/Ausschaltknopf)
- LAN-Kabel ausstecken
- Leihgerät/LAN-Kabel retournieren
- bei den Registrierungstischen mit dem Studierendenausweis abmelden

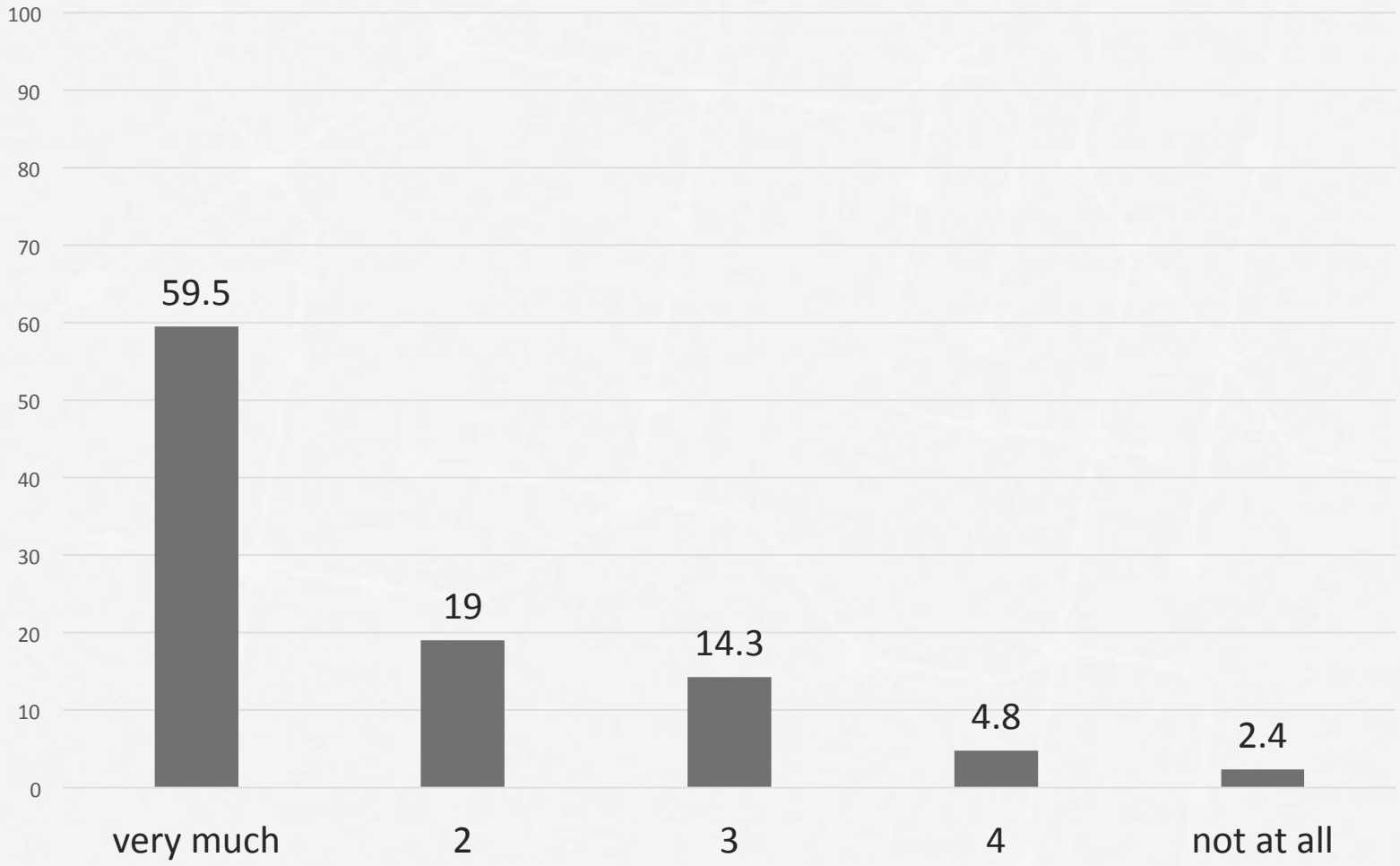
elearning
Überprüfen Sie noch einmal die korrekte Stromversorgung des Laptops und ...
... Viel Erfolg ;-)

During an e-Exam: Organizing technical limitations

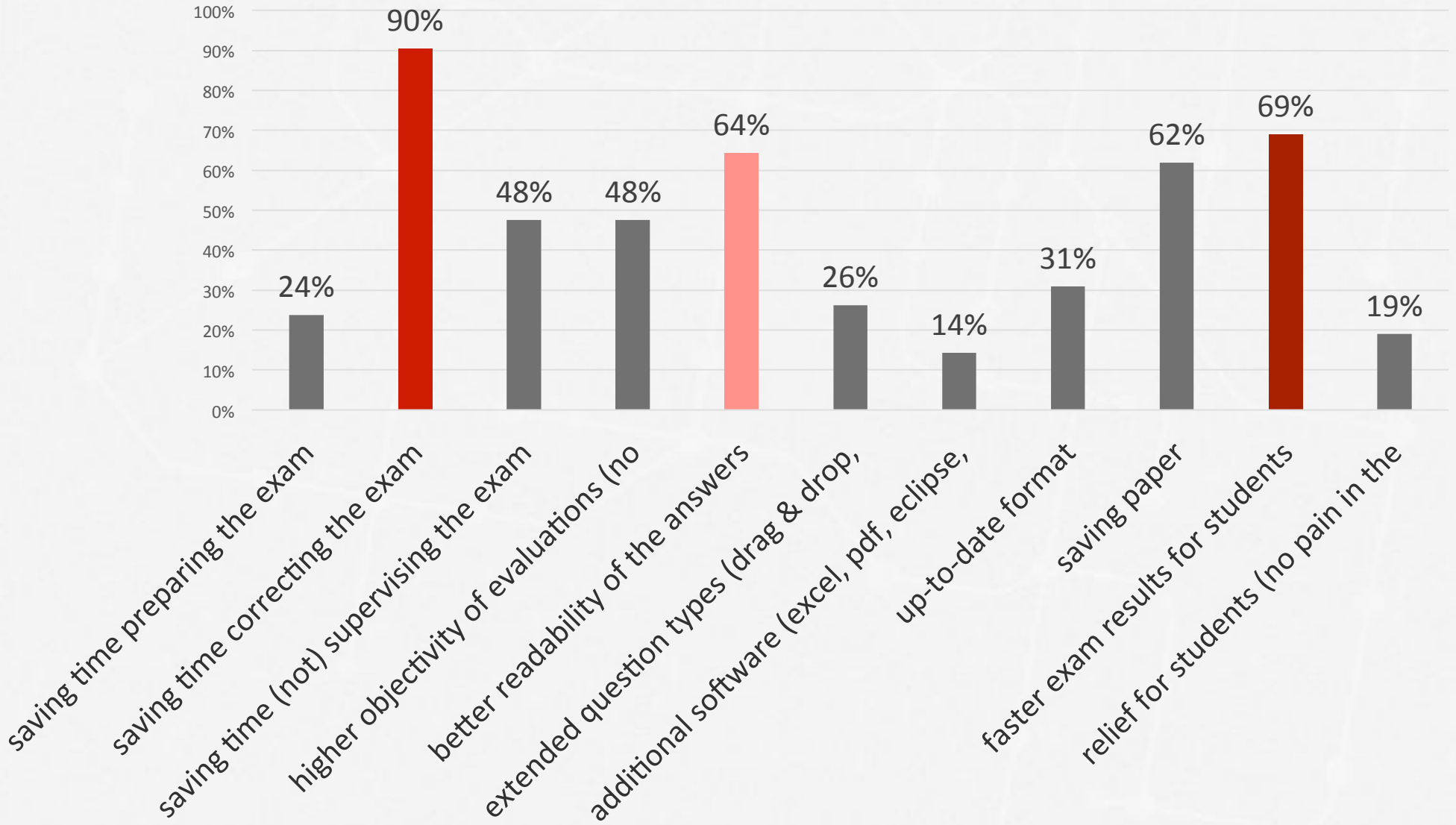
- Face-recognition of students during the registration process and during an e-Exam
- Support with technical issues
- Dealing with technical problems

What lecturers think about e-Exams

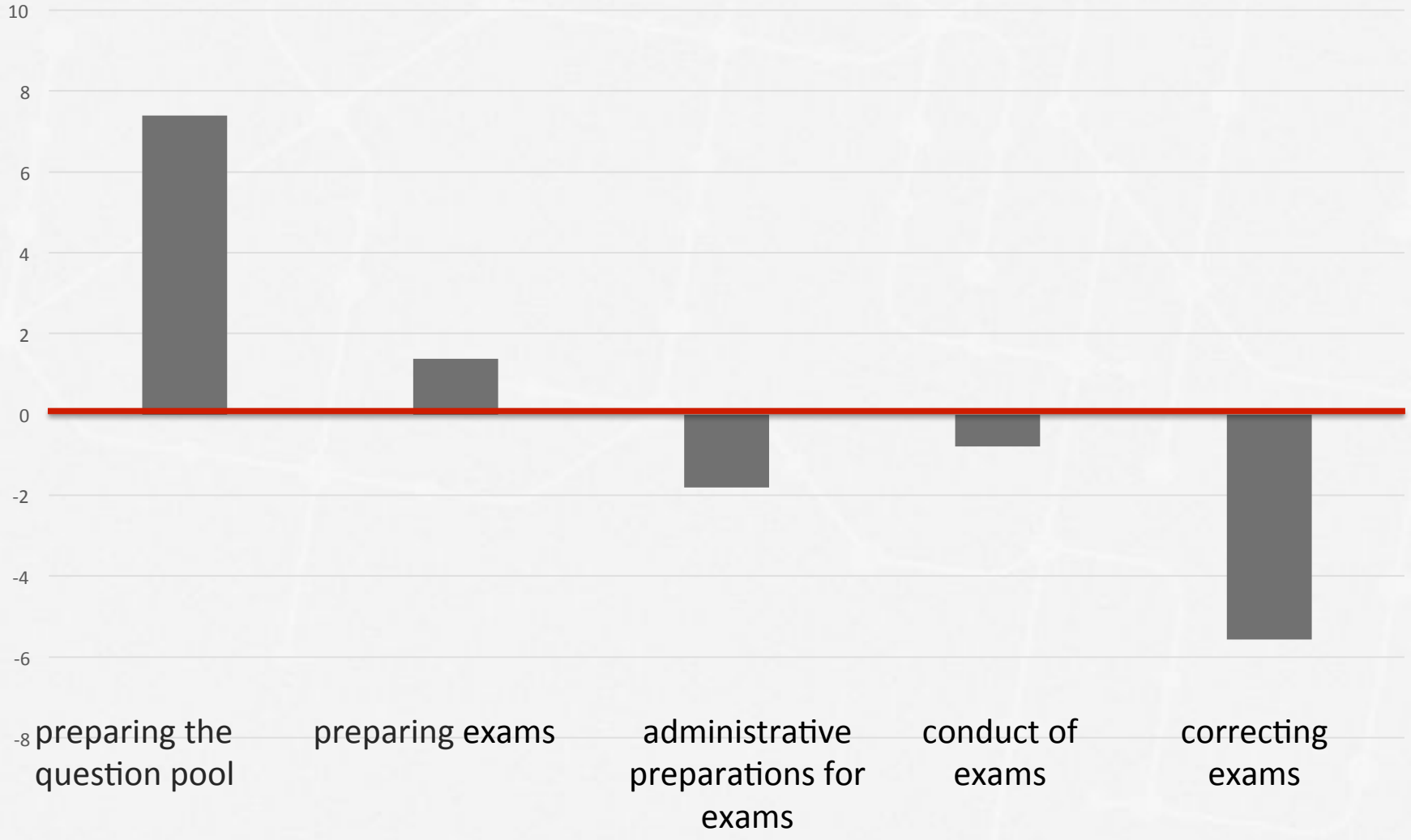
I like online exams ... (in %)



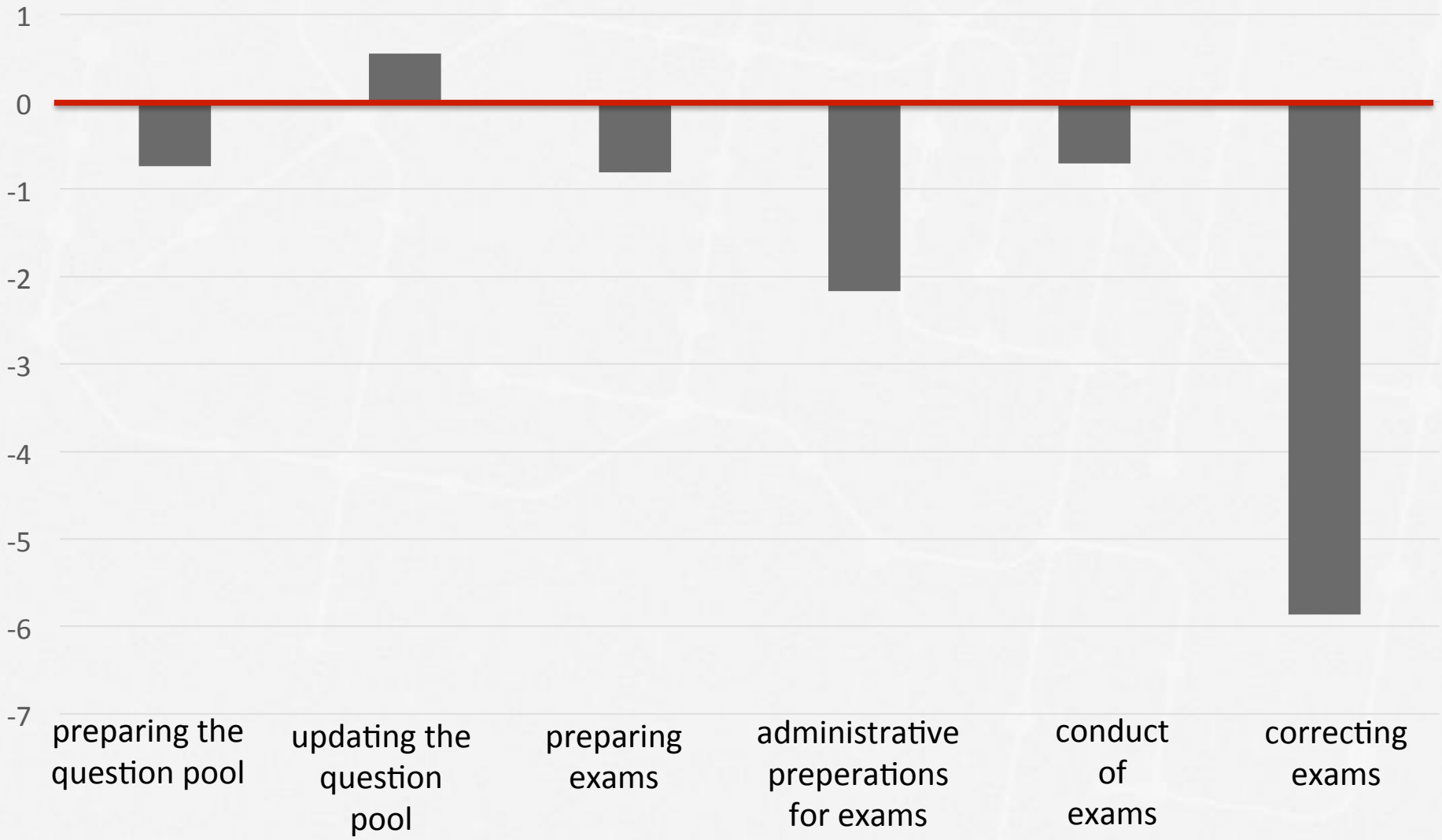
Reasons for conducting online exams



Time efforts/savings: First online exam (in h)



Time efforts/savings: recent online exam (in h)

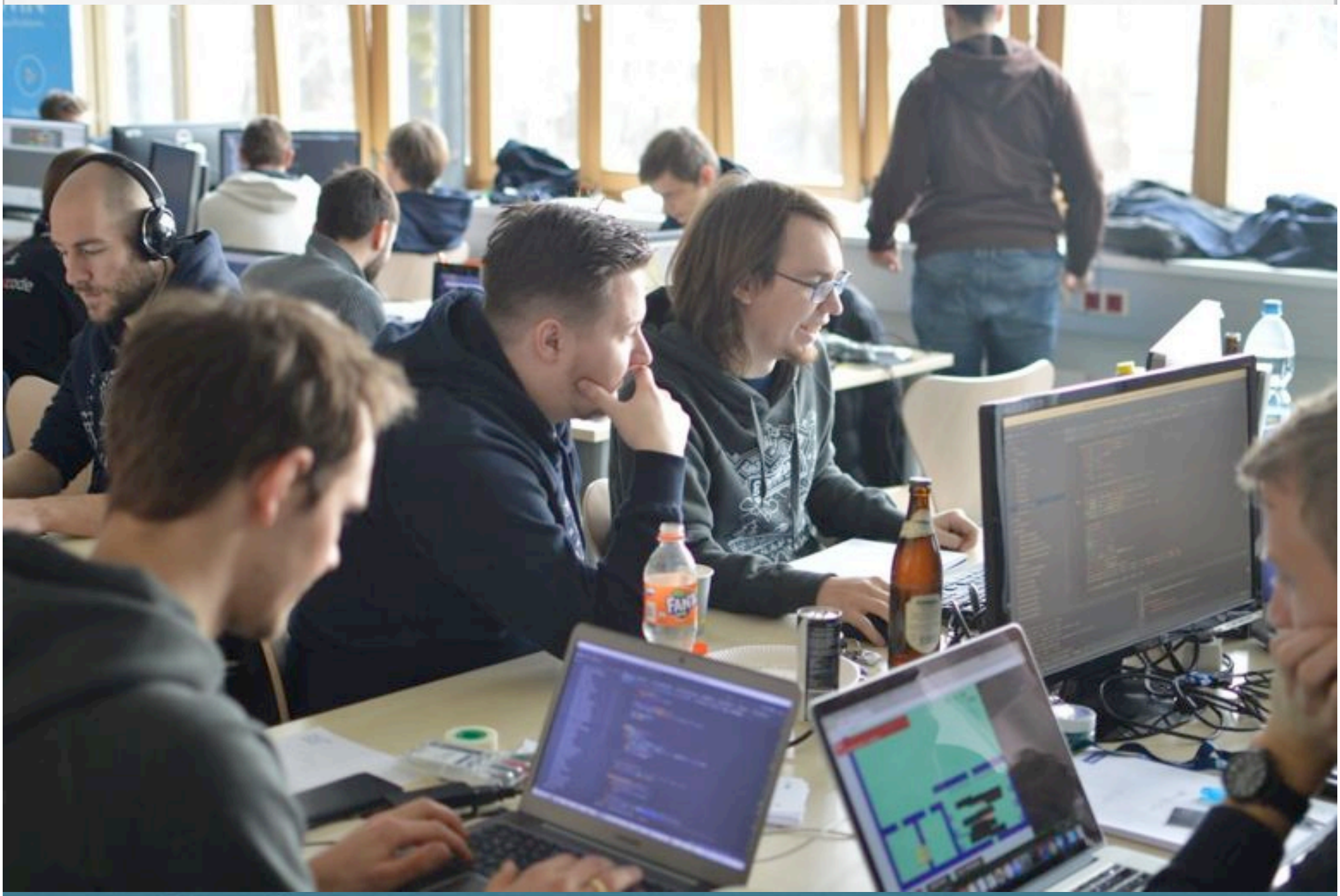


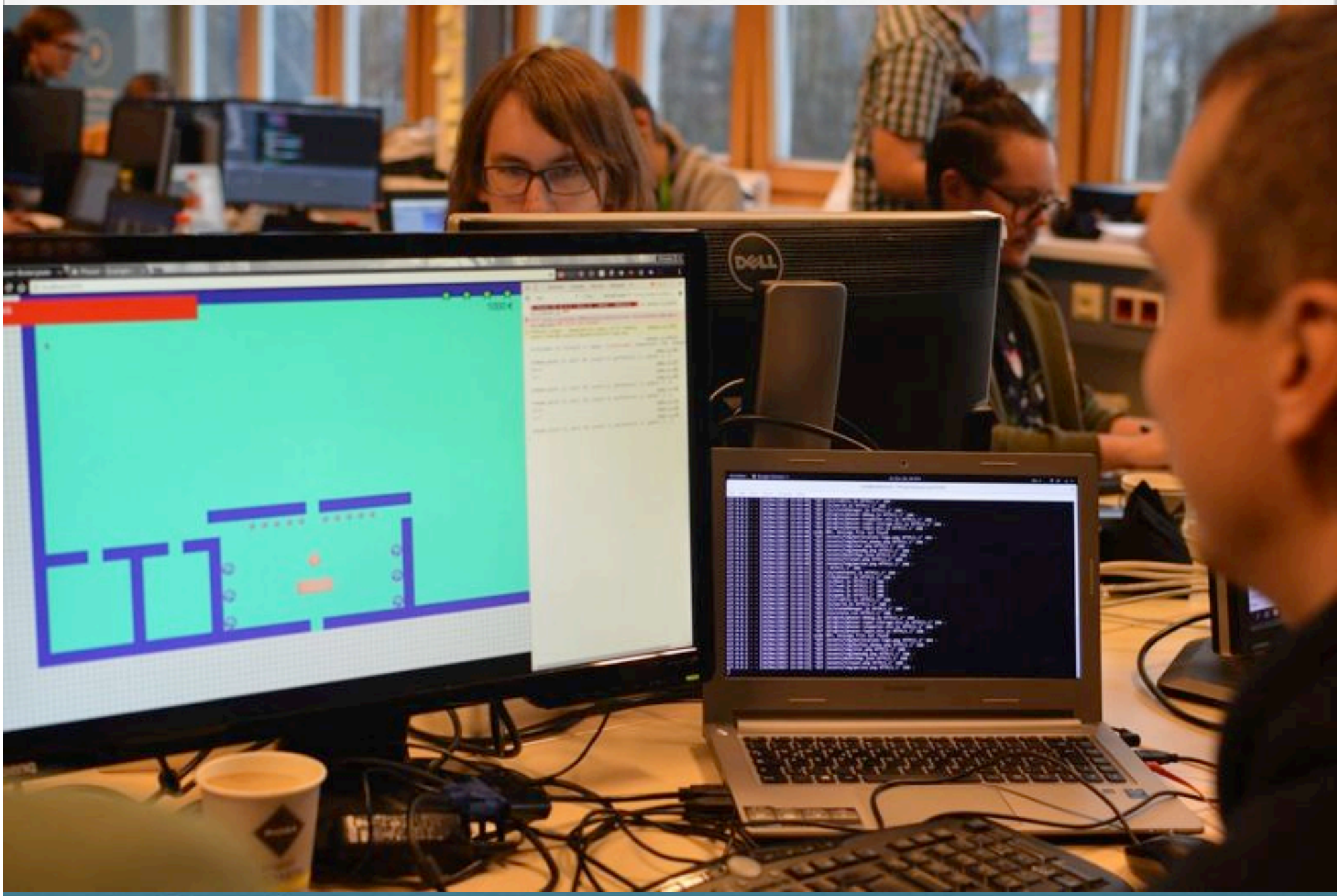
Why e-Exams are better than their reputation

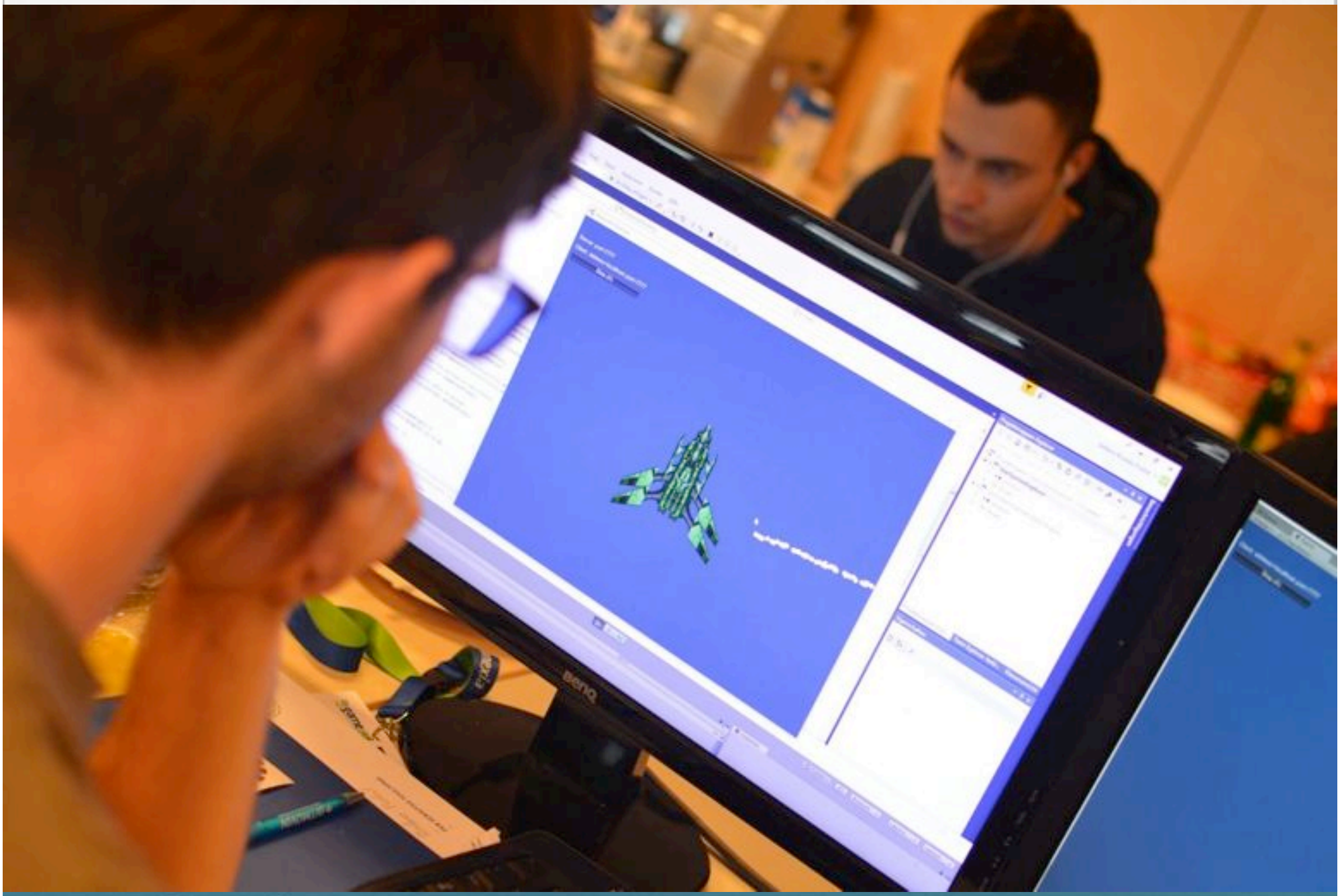
To sum up

- Even MC-questions might assess deeper knowledge if well designed
- Various question types enriche assessment
- Additional software fosters deep learning, hands-on assessment and constructive alignment
- e-Exams save time which **could** be invested in more time-consuming teaching activities

e-Exams offer time for alternative assessment methods

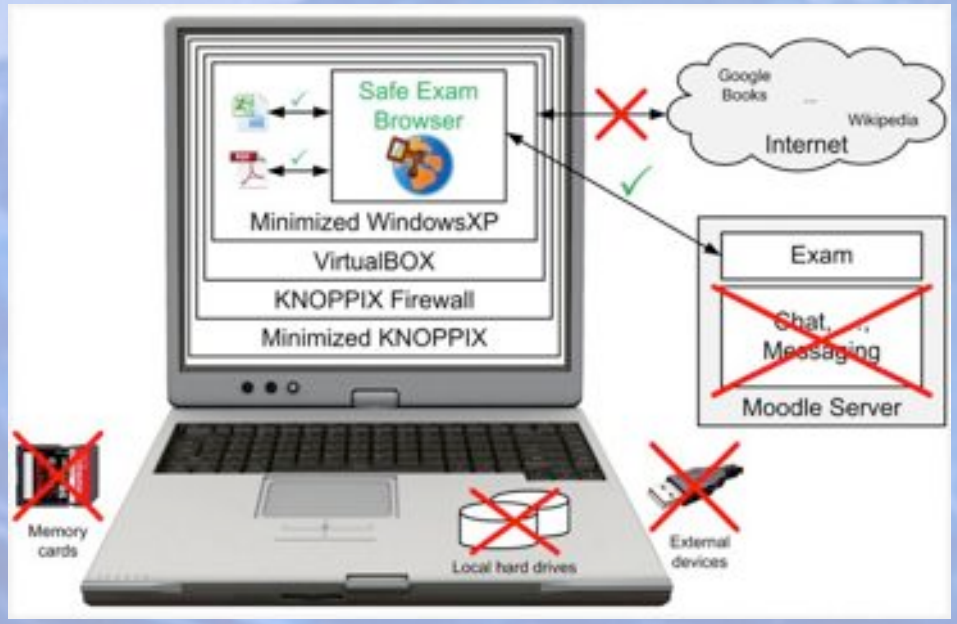

FANTA


DELL


benq

Hotel
Starling

Which questions are left?



The Austrian Experience with e-Exams

Source: www.hallstatt.net

e-Exam Symposium

24 Nov 2018

Monash University Caulfield Campus

Melbourne, Australia

Speaker: **Dr Gabriele Frankl**

Gabriele.Frankl@aau.at

TransformingExams.com

TransformingExams@gmail.com