E-Prüfung als Public-Private-Partnership

PD Dr. Dipl.-Psych.Volkhard Fischer

Medizinische Hochschule Hannover

HIS-Workshop Elektronische Prüfungen an Hochschulen
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Anforderungen der MHH an ein elektronisches Prüfungssystem im Jahre 2005...

- technische Realisierung vor Ort durch den Anbieter
- mobiler Einsatz in wechselnden Hörsälen
- bis zu 100 Prüflinge pro Prüfung
- bis zu 30 Prüfungen pro Jahr
- Prüfungsdauer bis zu einer Stunde
- nur MC-Fragen (eine aus fünf)

Gründe für eine Zusammenarbeit mit einem externen Anbieter...

- keine Bindung von Haushaltsmitteln für technische Ressourcen
- keine Aufstockung von Personalressourcen notwendig
- Konzentration auf konzeptionelle Fragen
- Erhalt der Flexibilität

Aufgabenverteilung (Prüfungen)

- Stellung der Hardware
- Stellung der Software
- Verwaltung einer Prüfungsfragendatenbank
- technische Realisierung der Prüfungen vor Ort
- Archivierung der Prüfungsrohdaten
- Programmierung vereinbarter neuer Features

MHH

- Prüfungsorganisation durch das Studiendekanat:
  - Raum- und Terminplanung,
  - Teilnehmerliste,
  - Einlasskontrolle, Aufsicht, Auslasskontrolle,
  - Prüfungsauswertung.
- Verwaltung der Prüfungsergebnisse:
  - Erstellung von Leistungsscheinen,
  - Entwicklung neuer Fragenformate
  - Qualitätsmanagement.
- Wissenschaftliche Begleitung durch:
  - Evaluationsbüro,
  - Medizinische Informatik.

Anforderungen der MHH im Jahre 2007...

- *technische Realisierung vor Ort durch den Anbieter*
- *mobiler Einsatz in wechselnden Hörsälen*
- bis zu 160 Prüflinge pro Prüfung
- bis zu 150 Prüfungen pro Jahr
- Prüfungsdauer bis zu drei Stunden
- verschiedene Fragenformate
- mehrere Prüfungen parallel durchführbar
- Evaluationen
  - unmittelbar nach e-Prüfungen
  - oder als separate Termine,
  - mit anonymisierter Datenübertragung.

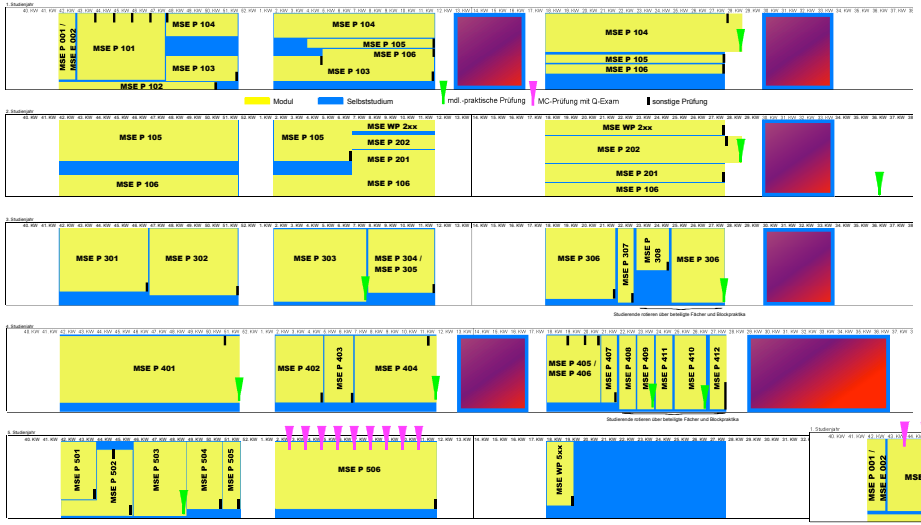
Aufgabenverteilung (Basisevaluation)

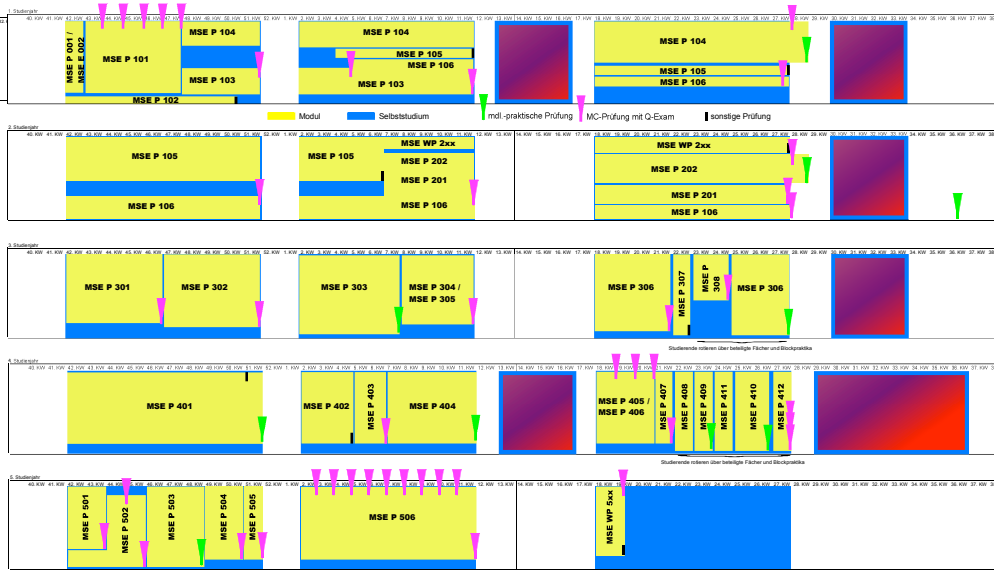
- Stellung der Hardware
- Stellung der Software
- Verwaltung einer Evaluationsfragendatenbank
- technische Realisierung der Basisevaluation vor Ort
- Archivierung der Rohdaten
- Programmierung vereinbarter neuer Features

- Organisation der Evaluation durch das Evaluationsbüro:
  - Raum- und Terminplanung,
  - Teilnehmerliste bei separaten Terminen,
  - Aufsicht bei separaten Terminen,
  - Auswertung.
- Verwaltung der Evaluationsergebnisse:
  - Aushang der Ergebnisse,
  - Erstellung von Berichten,
  - Fragebogen(weiter)entwicklung,
  - Auswertung für Lehr-LOM.
- Wissenschaftliche Begleitung durch:
  - Evaluationsbüro,
  - Medizinische Informatik.

Entwicklung der e-Prüfungen

WS 05/06 vs. WS 08/09





27 (von 138) vs. 102 (von 140) Prüfungstermine allein im Studiengang Medizin

Medizinische Hochschule Hannover

Fazit

- sehr schnelle Akzeptanz der e-Prüfungen als Standardprüfung
- sehr geringe Anzahl an technischen Pannen
- Kosten für Hochschule kalkulierbar
- Entlastung der wissenschaftlichen Abteilungen
- Erfolgreiche Verzahnung von Lehrveranstaltungen, Prüfungen und Basisevaluation.

DANKE FÜR IHRE AUFMERKSAMKEIT!

A comparison of the assets and drawbacks of three different written assessment systems.

V. Fischer[1], D. Möbs[2], J. vor dem Esche[2], H. Haller[3]

1:= Hannover Medical School, President's Office; 2:= Codiplan GmbH, Bergisch Gladbach; 3:= Hannover Medical School, Nephrology

I. Background

A. Our curriculum separates each academic year into three terms. Within each term the lessons and courses are blocked in subject-oriented modules with varying duration. Each module has at least one assessment. The total number of assessments is more than 120.

B. Because more than 80% of these assessments were written exams we were searching for an economic utilisation of resources.

C. Most of the written exams consist of (at the moment) multiple choice questions (MCQ): one-best-answer (A-type). Restricting ourselves on MCQ we compared three systems:

1. Traditionally written exams with a manual analysis of the answers (T).
2. Written exams with scanned answer sheets and a computer-based reporting (S) (See the homepage of electric paper for one possible solution).
3. Server-based exams in a Citrix environment with tablet-PCs as keyboards (C) (Matthies, Fischer, & Haller (2007)).

D. The criteria for the evaluation of the economic utilisation of resources are

1. total time needed per exam from the development to the analysis of the results (not considering how many people are involved simultaneously),
2. needed human and other resources (costs),
3. and two special aspects:
   a) the possibility to use other question formats,
   b) the assessment quality for all possible question formats.

II. Comparisons

A. There are no significant differences between the three systems concerning the question development.

Need for time per system	„T"	„S"	„C"
Exam development	20 hours	21 hours	22 hours
Exam layout	3 hours	5 hours	1 hour
Exam execution	2 hours	2 hours	2 hours
Exam analysis	< 13,5 hours	≤ 3,5 hours	0,5 hours

B. The differences come up with the preparation of the exam:

1. The investment costs for the traditional exam (T) are very low, while the laptop-based exam (C) has very high investment costs.
2. The answer-sheet for the scanner exam (S) has to be designed with a special software, the laptop-based exam (C) needs an SQL-database and a special program for the presentation of the questions on the tablet-PCs. When these preparations are established, every new exam is at least as easy to realize as a traditional exam.
3. While the traditional exam (T) and the scanner exam (S) can be held up in any adequate room, the laptop-based exam (C) needs the installation of a WLAN and a secure connection to the Citrix server. This can be realized as a mobile solution or in one special room.
4. While the traditional exam (T) usually has one or two different versions and the scanner exam (S) has up to six different versions, the server in the laptop-based exam (C) randomizes questions and answers in a way that you have as many versions as examinees. These differences lead to a slightly increasing effort for the question development.
5. Depending on the number of pictures in the exam, costs the printing of 40 questions for 150 students between 100 and 240 €. The scanner-prepared answer-sheet can be printed for all exams in advance.

Cost approximation per system	„T"	„S"	„C"
Investment costs	3.150 €	16.900 €	263.450 €
Human resources per year	122.300 €	83.000 €	79.800 €
Printing per year	14.300 €	14.300 €	0 €
… for three years	412.900 €	308.900 €	502.800 €
… per exam	1.434 €	1.072 €	1.746 €

C. There are also differences in the exam itself:

1. The more parallel versions you have the less rooms you need, because you can seat the examinees closer.
2. The more parallel versions you have the less personnel is needed for the exam as invigilators.
3. The laptop-based exam (C) is able to integrate corrections of the questions up to ten minutes before the exam.

D. Last but not least there are significant differences in the generating of the results:

1. The more time you invest into an computer assisted exam the faster you get the results. While the laptop-based exam (C) offers individual results some seconds after the exam, you have to wait some hours with a scanner-based analysis (S) answer-sheet and up to several days in a traditional exam (T).
2. The laptop-based exam (C) needs no personnel for the analysis, while the traditional exam (T) is the most resource demanding in this aspect.
3. Analysis errors in the laptop-based exam (C) are always systematic programming errors. Analysis errors in the scanner exam (S) can be a consequence of the manual correction of inaccurately answered questions or due to programming errors. Analysis errors in the traditional exam (T) are always a consequence of the manual analysis.
4. Error detection is easy within the laptop-based exam (C) and complex within the other systems.

Assessment quality	„T"	„S"	„C"
flexibility	+++	-	++
objectivity	+	++	+++
reliability	+	++	+++
validity	++	+	++

G. If one considers other question formats, the easiest way to realize them is the traditional written exam (T).

1. Other question formats often lead to shorter development time in all systems. On the other hand increases the time for the analysis of the exam in the traditional exam (T) dramatically.
2. Short essay questions (SEQ) need always a time-extensive manual reanalysis within the scanner exam (S) or an extra programming in the laptop-based exam (C).
3. Key feature questions (KFQ) get the best reliabilities within the laptop-based exam (C).
4. The analysis of pictures (PAQ) isn't possible within the scanner exam (S) and has a low objectivity and reliability within the traditional exam (T), while they need only extensive programming within the laptop-based exam (C).

Possible question formats	„T"	„S"	„C"
MCQ	+	++	+++
SEQ	++	+	++
KFQ	++	++	+++
PAQ	+	--	++

III. Conclusions

A. The laptop-based exam (C) has the highest investment costs, a moderate need for human resources, is flexible and has the best test parameters.

B. The exam with an answer-sheet for a scanner (S) has moderate investment costs, a moderate need for human resources and moderate test parameters. But the system is too inflexible for other question formats.

C. The traditional written exam (T) has no reasonable investment costs and is very flexible. But it needs dramatically more human resources for the analysis than the other systems and has only moderate test parameters.

V. Literature

- http://www.electricpaper.de/startseite/produkte/evaexam.html
- MATTHIES, H.K., FISCHER, V., HALLER, H. *eLearning-Angebote an der Medizinischen Hochschule Hannover* In: Herbold, I., von Holdt, U., Krüger, M., Phan Tan, T.: Tagungsband zur eTeaching und eScience-Tagung 2006, Shaker Verlag, Aachen, 2007, S. 81-90

V. Take Home Messages

A. The laptop-based exam (C) has the greatest potential for development and outclasses the other two in the classical test criteria.

B. If one wants to restrict his exams to MCQ, the scanner exam (S) is also a very good choice.

Correspondence to: PD Dr. Volkhard Fischer, Hannover Medical School, President's Office, Carl-Neuberg-Str. 1, D-30623 Hannover, Germany;
e-mail to: fischer.volkhard@mh-hannover.de