

# THE JOURNEY OF UCAN

# EXPERIENCE EXPERTISE ENGAGEMENT

**Assessing together since 15 years** 

GREETINGS

Konstantin Brass 6

John Norcini & Ara Tekian 8

German Medical Students' Association 10

German Veterinary Students' Association 11

**DEVELOPMENT OF THE UCAN NETWORK** Editorial: Klaus-Dieter Freund 15

History of the Umbrella Consortium for Assessment Networks 16

Overview of UCAN's key figures 18

Overview of UCAN Software Tools 22

Implementation of the General Data Protection Regulation (GDPR) of the Institute for Communication and Assessment Research 28

Implementation of tablet-based written examinations at the Faculty of Medicine at Kiel University 42

2

The way to successful tablet-based examinations at the Medical Faculty Carl Gustav Carus of the TU Dresden 44



**QUALITY-ASSURED EXAMINATIONS** Editorial: Andreas Möltner 51

Comprehensive examination programme: optimally combining teaching and examinations 52

Standardisation of transnational assessments 56

Creating good multiple choice questions 58

Using item-review processes to improve exam quality 60

Test statistical analysis and its importance in the evaluation of test items 62

Quality indicators in exams 64

Legal problems in answer-choice examinations 66

**EXPERIENCE REPORTS ON** THE OPTIMISATION OF ASSESSMENT WORKFLOWS Editorial: Konstantin Brass 33

Design of an efficient assessment workflow at the Faculties of Medicine and Veterinary Medicine at the University of Leipzig 34

> Desktop-based assessment at the University Medical Centre Göttingen 38

**MEASURE, ASSESS AND IDENTIFY COMPETENCES** Editorial: Jana Jünger 70

Design of competence-oriented assessments in medicine 72

Sharing synergies in the MERlin project: competency orientation in medical education 76

The Master of Medical Education (MME) programme -Innovative concepts for teaching and testing 78

Importance of interprofessional competences in medical education 82

Strengthening communicative competences with video annotation 84

The Swiss professional role model - How are professional, communicative and interprofessional competences assessed? 88

Promoting health literacy in childhood and adolescence 92

**ALWAYS ONE STEP AHEAD: DIGITALISATION** IN THE ASSESSMENT SECTOR Editorial: Stefan Titz 96

Digital teaching and examination of medicine 98

Innovative question types enable image marking items in assessments 100

Home-based online exams during the Corona Pandemic 104

Making state examinations in veterinary medicine digital 106

Digital Assessment of Nurses in Canada (tOSCE) 108

Record examinations completely electronically 110

MASTERING THE FUTURE TOGETHER Editorial: Gabriele Döller 116 Quo vadis Master Plan Medical Studies 2020? 118

> Standardised examinations in the Physician Assistant course of study 124



Teaching, learning and assessments in a digitised world 126

Our vision for the common future 128







**IMPRINT 167** 



# Dear Ladies and Gentlemen, dear UCAN partners,

steadily. While paper-based, of examinatio

t is with great pride and pleasure that I look back on the 15-year success story of our UCAN network. Since 2006, the initiative founded by three medical faculties has grown to 77 partners with 12,6000 colleagues from 20 different disciplines and fields of study.

Exactly five years ago, our team, which has now grown to 17 employees, spun off from the project-like environment of University Hospital into an independent institute. This was not an easy step for the UCAN team: the change of name, the transfer of staff from university hospital, the renovation and moving into our own office space, the establishment of new structures in the areas of financial accounting, legal advice and auditing, and finally the new working environment of personal responsibility have challenged the entire UCAN team over the last five years. Thanks to the strong unity and the extraordinary willingness to help within the team, the goals we set together could ultimately be successfully implemented. The spin-off not only brought us closer as a team, but was above all an important and right step to enable a stable framework for the further development of our UCAN network. So, this year we are not only celebrating the 15th anniversary of the UCAN network, but also the 5th anniversary of our institute.

Many challenges have been overcome together since UCAN was founded: in several large and countless small projects, we evaluated innovative examination formats, designed and adapted standards and workflows, further developed the UCAN tools and shared our resources in the preparation, quality assurance, implementation and follow-up of examinations.

Together, 700,000 items have been created and successfully used in more than 40,000 exams with 12 million participants. The types of questions supported have developed from pure multiple-choice to complex formats such as Long Menu or Region of Interest. The options for conducting examinations have also grown steadily. While examinations were initially only possible paper-based, the reliable and justifiable administration of examinations has gradually become possible using scanners, computers, tablets and, most recently, browsers with integrated proctoring. All UCAN tools are currently being redeveloped - more functionality, greater flexibility and a stronger orientation towards the end user are the three guiding principles.

All these successes were only possible in close cooperation with you, dear UCAN partners, and form a good starting point for cooperation in the coming years. Worldwide, the examination culture in education, training and further education is increasingly oriented towards the professional competence requirements for the corresponding occupational branches. These current developments bring new challenges, but also opportunities: the working drafts of the new licensing regulations in human and dental medicine, the redesign of the state examinations, the Master Plan for Medical Studies 2020, the academisation of other health professions and the expansion of the UCAN network to include craft professions require an expansion of our cooperation and stabilisation of our examination network, but also open up opportunities for new interprofessional projects and cooperation. Digitalisation in the field of examinations is also progressing: the number of electronic examinations in the UCAN network has tripled within the last five years.

Dipl.-Inform. Med. Konstantin Brass

Managing director of the Institute for Communication and Assessment Research This growth and also the new requirements for electronic examinations will have a lasting impact on the way we assess knowledge, skills and competences.

On behalf of the entire network, I would like to take this opportunity to thank you all for your extraordinary commitment. We maintain a friendly yet professional relationship with many of our partners and we are pleased that the "UCAN family" sticks together even in times of crisis. I would also like to thank each and every member of our UCAN team who support our partners every day in conducting fair, valid and reliable assessments.

On the following pages we look back together on the last 15 years of our successful cooperation and give an initial prospect on the path of our common future in the UCAN network.

# Dear UCAN partners,

e have had the privilege of being associated with UCAN throughout the 15 years of its existence. Over this time, we have watched the consortium grow from an idea to 77 partners in seven countries and more than 12,600 users. This notable growth speaks to the power of collaboration and the importance of vision.

One impetus for the growth of UCAN has been significant change in the field of medical education. The traditional focus on the process of education has given way to an emphasis on the competencies that students must acquire to be good doctors. Central to this new model of education is the ability, through assessment, to establish that students have acquired the knowledge, skills, and attitudes necessary for the safe and effective practice of medicine. The UCAN partnership has taken a central role in supporting the development of assessment for this purpose.

In this context, UCAN's focus on good assessment fills a critical need in three way. First, assessment drives learning so it guides and motivates what students study. Second, through the feedback it offers, assessment creates and supports learning. Third, and perhaps most importantly, assessment protects patients by ensuring that students are ready to move to the next step in training and to provide safe and effective care. UCAN addresses these three important roles of assessment by sharing test material and research results among the partners.

Of course, good assessment requires considerable resources, both financial and human. Through the cooperation and collaboration among partners, a central tenet of UCAN, partners have found that they can reduce the resources they need while improving the quality of assessment. The item bank currently contains more than 700,000 questions and over 120,000 of them are



John Norcini, PhD President Emeritus of FAIMER Research Professor, SUNY Upstate Medical School shared. This offers the potential to significantly reduce the costs to institutions while improving the guality of the material available to them.

A partnership such as this cannot function well without superb leadership, expertise, and a committed and highly motivated team. UCAN has these critical resources and they have supported the development of the infrastructure, served the ongoing needs of the partners, sought opportunities for growth, and carried out the vision for the future.

Finally, the partners have created a unique and collaborative environment that blends research in medical education with developments in assessment and information technology. The combination of these powerful forces has contributed significantly to the success of the endeavor and produced meaningful advances that inform the broader field of education in the health professions.

In its brief history, UCAN has created the basis for tremendous success and a model for other collaborations. In addition, it has improved the quality of assessment in the partner institutions and, through research, in other institutions as well. These developments will undoubtedly result in improvements in the quality of care available to patients.

We congratulate all the UCAN partners on an amazingly successful fifteen years and we are certain that the next fifteen will be even more successful and prosperous.



9

#### Ara Tekian, PhD, MHPE

Professor, Department for Medical Education Director of International Programs Associate Dean, International Education College of Medicine University of Illinois at Chicago

## **Dear UCAN partners**,



s a result of the COVID-19 pandemic, not only the German health care system but also the medical education landscape has experienced an enormous change in the need for the

rapid application of digital technologies - as students, we have experienced teaching and examinations, that have often been very limited in recent months. We all are even more pleased about those highly motivated lecturers, who have quickly recognised the possibilities of digital teaching and implemented innovative solutions. Admittedly, it is questionable why existing digital solutions are only being implemented in times of a pandemic. But we want to look ahead and especially focus on the great potential of digital examinations.

Digital exams can provide benefits in two ways. On the one hand, the sole transformation of the methodology, from analogue to digital: Taking the exam on tablets or computers offers teachers, exam developers and the UCAN network a much more comprehensive basis for analyses and future development processes through the acquisition of a lot of cross-centre data. And students also benefit from the possibility of individual evaluation and feedback, whether in terms of subject discipline, area of competence or question format. Both in written and practical assessments.

But not only in terms of methodology, digital assessment formats offer also new didactic concepts with further developed content of exam questions and thus the opportunity to test examination objectives in an even more targeted and competence-oriented way. For example, by means of audio or visual support - be it listening to heart sounds, watching a seizure or an ECG on interactive charts. There is huge potential to evolve from pure multiple choice and the OSCE checklist. The digital infrastructure and sufficient training at the universities must be established as soon as possible.

The bymd appreciates the UCAN network as an important platform, especially due to the close interface between technical development and university implementation. We hope that existing applications will be proactively transferred to the faculties, that innovati-



Aurica Ritter President German Medical Students' Association (bvmd) 2020



Jeremy Schmidt National Officer on Medical Education 2018/19 Support Person "Masterplan for Medical Studies" 2020

German Medical Students'

Association (bymd) 2020

ve projects will be openly evaluated and, if findings are positive, quickly implemented across the board. Not only for faculty exams, but also for state exams.

The new national competence-based catalogue of learning objectives, which has been developed together with the subject catalogues in a major process for the new German licensing regulations, offers a great opportunity to further improve the constructive alignment of learning objectives and examination objectives. Digitalisation of the examination can offer essential added value here. The implementation process of the new catalogue should therefore go hand in hand with the implementation of new examination technologies. We are pleased that the UCAN network is setting an example and sustainably advancing the examination landscape in medicine.

As bymd, we are happy to provide feedback from a student perspective and to contribute to the development of new formats.



# Dear UCAN partners,

he last year's UCAN conference in Leipzig unfortunately had to be cancelled due to the international Corona crisis, but its motto "Designing e-exams in the health professions: Best Practice and Future Development" had more meaning than ever. Although we were forced to isolate ourselves from others to interrupt the

chain of infection, higher education had to continue. On behalf of the German Veterinary Student' Association (bvvd), I would like to give a brief review of the assessment situation in this period and then list important issues from our statement on the further development of teaching.

Our studies depend on the physical presence on the campuses, as the Covid-19 pandemic has shown us. Thus, in all of the five training sites, work had to be done at full speed on the digitalisation of teaching and examination. At all locations, the main priority was the urge to avoid postponing graduation and delaying studies. A virtual form of teaching is one building block here. The digitalisation of examinations, which also fell under the no-contact rule, is the other. Where exams were taken from home, the examiners faced a new challenge, but it also offered a great opportunity. Examiners who could no longer ask for details because they were too easy to "Google" without supervision had to place more emphasis on linking content and asking for fundamental understanding.

This is an aspect that applies in our position paper not only to examinations, but also to the orientation of teaching in general: "The exam content must be reviewed for relevance in every case and must be meaningfully limited. The teaching of detailed knowledge is not expedient in view of the constantly increasing amount of content due to the general increase in knowledge in science." The goal of fruitful education must be to give graduates the instruments to acquire knowledge on their own and to ignite the intrinsic drive that makes us strive for new knowledge in the respective fields of specialisation. For this purpose, self-study teaching and cross-cutting teaching in effective small groups, together with examination methods that discuss as uniformly and purposefully as possible the basic body of self-acquired specialised knowledge, would perhaps be more appropriate than full days of lectures. Beyond this point, there are other important aspects of veterinary education that need to be developed further together.

Finally, it has to be said that good teaching and examination design can only be accomplished in collaboration with the students.

In Leipzig, I was able to follow the implementation of the virtual assessment system in the pre-clinical semesters and would like to acknowledge the effort to involve students in the development of the assessment methods. The future development of electronic questioning according to "best practice" holds a great opportunity, which I hope will be understood by all teachers as an effective way to test practice-relevant knowledge.

#### 11



Lennart Lieberum President German Veterinary Students' Association (bvvd) 2020





# **Editorial**

n 2003, the medical faculties in Germany were faced with a major challenge with the adoption of a new Medical Licensing Regulation (ÄApprO). This required a restructuring of medical

training with a focus on clinical, practical and communicative competences, which should gualify future physicians to practise medicine. The additional performance assessments required a resource-intensive restructuring of the assessments to be taken and also of the associated teaching, in order to be able to teach and examine competences, skills and abilities in addition to pure specialist knowledge.

To respond to these tasks not only with individual solutions within the university, cross-faculty cooperation was necessary in order to be able to jointly discuss the challenges in the field of examination and to develop solutions.

Based on this problem analysis, the Heidelberg Competence Centre for Examinations in Medicine in Baden-Württemberg initiated a project in which, in close cooperative collaboration with the medical faculties of the Ludwig Maximilian University of Munich and the Charité Berlin, an ideal-typical examination workflow should be developed for the most efficient and quality-assured performance of examinations. The guiding goals of the founding members, named the "Berlin-Heidelberg-Munich Group", were the centralisation, standardisation and quality assurance of exam content as well as the optimal support of the workflow in preparing, conducting and evaluating exams by means of a jointly used assessment platform. After defining the requirements for such a platform, the first version of the ItemManagementSystem in Medicine (IMSm) was developed in 2006 and the Medical Assessment Alliance (MAA) was founded. How this assessment network, formerly consisting of three founding members based in Germany, developed into our international network with 77 partners from



#### Klaus-Dieter Freund

Supervisory Board member of the Institute for Communication and Assessment Research

8 countries and, after being spun off from Heidelberg University Hospital, grew into an independent institute is described in more detail on pages 16-17. However, not only the assessment network, but also the joint assessment platform (IMS) has grown continuously over the past 15 years. This is illustrated on pages 18-21 with the help of various key figures.

Then as now, it is of central importance that the expansion as well as the development of (new) tools are created in close cooperation with the UCAN partners. This trademark distinguishes UCAN from commercial providers and has proven itself over the years. In this way, the portfolio of assessment tools available in the UCAN network has been steadily expanded, so that 14 assessment tools are available now, which cover the entire workflow from preparation, implementation to evaluation. A detailed description of the assessment tools of the UCAN network can be found on pages 22-27. All assessment tools are compatible with each other. It is of great importance to UCAN that the tools are developed in such a way that legally compliant and fail-safe examinations can be carried out without any effort.

The data protection requirements must also be ensured in all work steps, which is why UCAN works closely with external data protection officers to achieve this goal. A description of the procedure for implementing the General Data Protection Regulation of the Institute for Communication and Assessment Research is outlined on pages 28-29. ♦



# **History of the Umbrella** Consortium for Assessment Networks

edical training is in a constant state of change to prepare medical students in the best way possible for the challenges and requirements of their future professional activity. A restructuring from purely factual knowledge to competence orientation in medical studies

has thus been observed for some years. The basis for this change were the amendments to the Medical Licensing Regulations (ÄApprO) in 2003. In addition to teaching and the assessment of declarative knowledge, procedural knowledge was also given greater importance and the focus was increasingly placed on competence-oriented assessments to test clinical-practical, communicative and interprofessional competences. This change in assessment culture proved to be the driving force behind the founding of the Medical Assessment Alliance (MAA) in 2006. This network was set up by the Competence Centre for Examinations in Medicine Baden-Württemberg in Heidelberg which initially was financed by the State Ministry of Baden-Wuerttemberg for Sciences, Research and Arts and realised in cooperation with the medical faculties of the Charité Berlin and the Ludwig Maximilian University of Munich. The aim was to optimise resources through inter-faculty cooperation for the centralisation, standardisation and quality assurance of assessments. In addition, the workflow in the preparation, execution and evaluation of assessments should be optimally supported.

Based on the principle of inter-faculty cooperation through the exchange of question items, the network could revolutionise the entire examination workflow with the development of the ItemManagement-System (IMS). As part of the Quality Pact for Teaching, the expansion of the IMS was funded as one of the sub-projects by the Federal Ministry of Education and Research from 2012 to 2020 within the project "Medical Education Research - Teaching Research in the BW Network" (MERlin).

After more and more faculties and institutions became aware of the IMS, recognised its potential and wanted to use the system, Medical Assessment Alliance (MAA) at Heidelberg University Hospital was renamed to "Umbrella Consortium for Assessment Networks (UCAN)" in 2013, which serves as a non-profit umbrella organisation for various assessment networks.

However, UCAN's former organisational form as a dependent project-based unit of Heidelberg University Hospital reached its limits in view of the longterm, cross-faculty and cross-institutional tasks. In order to be able to continue to offer the UCAN partners a consistent quality of the UCAN portfolio and also to fulfil the obligation of reliable and long-term personnel planning, UCAN was spun off in the summer of 2016 in close cooperation with and under the constructive advice and support of Mr. K.-D. Freund (lawyer), the hospital board and the former Dean of the Heidelberg Medical Faculty, Prof. Dr. med. Prof. W. Herzog. Together, a model could be worked out that continued to enable sustainable and reliable support and further development of assessments. The non-profit Institute for Communication and Assessment Research (IKPF), founded for this purpose, has been supporting, managing and advising the UCAN project since its spin-off. Now as before, UCAN has a close cooperation with Heidelberg University Hospital. Figure 1 shows the corporate structure of the IKPF in more detail.

The Institute's research activities cover the two central research areas of communication and assessment research, which are based on the three fixed building blocks of network, technology and education. Our network today consists of a total of 77 faculties, professional societies, medical associations and other institutions from eight different countries (see pages 138-154 for partner profiles), which support each other in the planning, preparation, implementation, evaluation, quality assurance and feedback of assessments. These phases of the examination workflow are supported by various technological tools (see pages 22-27), which the Institute designs, develops and evaluates in close cooperation with the UCAN partners. In the field of education, it offers internal and external training



and education courses to UCAN partners and interested parties and supports examination staff and examiners in their daily work (e.g., training on tablet-based assessments or the creation of exam questions).

Regarding communication research, the Institute explores the scientific basis for understanding communication processes as well as developing curricula and training programmes across faculties and institutions in education, further education and training. In the field of assessment research, it addresses scientific questions that arise from all phases of the examination workflow - from preparation to implementation and evaluation - to feedback (e.g. adequate item and examination formats or ideal workflows).

The harmonious interplay of the three essential basic elements of ANNA MUTSCHLER, SASKIA EGARTER, our Institute is based primarily on the productive, open and trusting **KONSTANTIN BRASS** cooperation within the entire UCAN network, which has been optimi-Institute for Communication and Assessment sed, expanded and deepened over the years. Our assessment network Research, Heidelberg, Germany

thrives on joint exchange, so that in accordance with the motto "TEAM - Together Everyone Achieves More" the opportunities of the joint network structure are consciously used, lived, and thus make a decisive contribution to the successful development of UCAN.

# **Overview of UCAN's key figures**

he UCAN network has grown steadily over the past 15 years. The positive development can be tracked by various key figures. Within 15 years, our assessment network has grown from three founding members to a considerable 77 UCAN partners with a total of 12,622 users of the ItemManagementSystem (IMS)

[1] (see also pages 16-17 and pages 138-154). Since 2006, a total of 703,426 items have been stored on this common platform and this number is growing continuously (see Figure 1). Due to the constant growth of newly generated examination content, 18 times as many items/questions were created last year than in 2007.

In order to achieve a high item quality, an item review can be carried out in the IMS for each item by using standardised checklists. The use of this feature has increased considerably in recent years. In total, almost 225,000 item reviews have been conducted by IMS users over the last 15 years (see Figure 2).

As the creation of high quality exam content can be time consuming and costly, the IMS offers the possibility to share exam content with other IMS users and to publish it in the community and/or private item pool. Almost 125,000 items have been shared in this way by UCAN partners over the last 15 years (see Figure 2, blue line). This corresponds to 18% of all items stored in the IMS. These published (foreign) items can be used by IMS users from other partner institutions and incorporated into their own exams (see Figure 2, green line). A total of 125,000 third-party questions were used, 25% of which had already been quality-assured using the IMS. As a result of the exchange, our network has already saved a total of over 70 working years in total.

In addition to releasing the items, IMS users can upload test statistics of exams into the IMS, and thus difficulties and discriminatory power of the associated items (see Figure 4). For nearly 42% of the examinations carried out, the test statistics were transferred back to the IMS from the EXaminator.

Due to the annually growing number of stored items, the number of examinations carried out with the IMS also shows a positive dynamic. There has been an increase from 132 examinations in the initial year to approximately 5,500 examinations delivered annually (see Figure 5). In the past 15 years, almost 40,000 assessments have been delivered.

The proportion of electronic assessments, which has risen steadily over the years, deserves particular mention. The first electronic exam in the UCAN network was a computer-based exam using the CAMPUS >



Figure 2 Item reviews carried out.



40000





Figure 4 Uploaded test statistics of performed exams.



#### Figure 5

Examinations delivered in the UCAN network. The examinations are categorised into the following types: (1) written paper-based examination, (2) written computer-based examination, (3) written tablet-based examination and (4) clinical practical tablet-based examination.



> software [2], which was conducted in Heidelberg in 2010. From that point on, electronic examination formats (computer- and tablet-based) gained more and more popularity and replaced many paper-based examinations. In the meantime, one third of written examinations are delivered electronically. The assessment of objective structured clinical examinations (OSCEs) now also takes place in the UCAN network exclusively electronically using the tOSCE app on iPads [3]. ◆

#### **KERSTIN LUBIK & SASKIA EGARTER**

Institute for Communication and Assessment Research, Heidelberg, Germany

[1] Hochlehnert A, Brass K, Möltner A, Schultz JH, Norcini J, Tekian A, Jünger J. Good exams made easy: The item management system for multiple examination formats. BMC Med Educ. 2012;12:63. doi: 10.1186/1472-6920-12-63

[2] Ruderich F, Bauch M, Haag M, Heid J, Leven FJ, Singer R, Geiss HK, Jünger J, Tönshoff B. CAMPUS--a flexible, interactive system for web-based, problem-based learning in health care. Stud Health Technol Inform. 2004;107(Pt 2):921-5. PMID: 15360947.

[3] Hochlehnert A, Schultz JH, Möltner A, Timbil S, Brass K, Jünger J. Electronic acquisition of OSCE performance using tablets. GMS Z Med Ausbild. 2015 Oct 15;32(4):Doc41. doi: 10.3205/zma000983



# **Overview of UCAN Software Tools**



s a joint assessment network, cooperation, exchange of experience and knowledge as well as optimisation of resources are a key element for our success. In close cooperation with our UCAN partners, we have therefore jointly developed and continue to expand tools for preparing, delivering and

evaluating examinations. Over the last 15 years, UCAN has developed a comprehensive portfolio of 14 different assessment tools to cover the entire examination workflow.

For each step of the examination workflow, we offer appropriate tools (see Figure 1). Our ItemManagementSystem (IMS), which acts as the backbone of the UCAN module system, is used for designing and compiling exams. With this online platform, examination questions can be created, managed, reviewed and also exchanged with each other. Within a quality-assuring pre-review, examination questions are checked for their accuracy in terms of content and formal structure. The fully adaptive review checklists can be individually customised to the respective institution. A special feature of the IMS is, that it not only serves to create and manage exam content, but can also be used as a common question pool by all IMS users. Items, reviews and test statistics can be made available to other IMS users and exchanged

with the overall aim of achieving the greatest possible optimisation of resources.

UCAN supports the delivery of various examination formats and provides various tools for written, oral and practical examinations. Oral and practical examinations can be assessed with the tablet-based apps tORAL and tOSCE respectively. Written examinations can be carried out either scanner-based (Klaus), computer-based (Campus), tablet-based (tEXAM) or browser-based (ProgressTest, ProgressTest-Wrapper), so that UCAN partners have a wide range of individual application options at their disposal. Following the examination, the results can be calculated quickly, automatically and securely using our evaluation tool EXaminator, and a test-statistical analysis can be carried out at item and examination level. After the test statistical analysis has been carried out, examination questions can be adapted within a post-review in order to optimise the quality of the questions.

When developing assessment tools, our fundamental idea is that the tools should be as simple as

#### IMS

### 🗹 I М S

- Backbone of the UCAN modular system
- Collaboratively create, manage, review and share items and exams with other IMS users
- Quality assurance through item review and upload of test statistics
- Blueprinting as an aid to exam preparation
- Overall examination programme for optimal planning of examinations
- Interfaces to other systems (e.g. export to document reading systems, electronic verification systems, import of existing data)

#### ACTORS EXPERT

### 🖅 A C E

- · Comprehensive management of simulation persons, their roles, appointments and accounts
- Coordination of the entire workflow from accounting to time recording
- · System flexibly adjustable according to local conditions
- Linking acting role with associated OSCE station
- Use for both examinations and teaching



#### Klaus



- Scanner system of the company Blubbsoft GmbH
- System for automated evaluation of paper-based exams via scanner
- Easy export of exam data from the IMS to scanner-readable paper sheets
- Transparent correction processes with revision functions
- Further processing of the raw data with the EXaminator
- Compatibility with IMS and EXaminator

### CAMPUS

#### Conduct written examinations on desktop computers

- Use on established desktop operating systems
- · Fault-tolerant and fail-safe client/server architecture
- Barrier-free use



#### **tEXAM**



- Maximum flexibility through tablet-based delivery of written exams
- No permanent Wi-Fi connection required (offline mode)
- Simple integration of a wide range of media types
- Supports a variety of item and question types such as Type A, Pick-N, Long Menu, Key Feature, Interval, KPrime, Free Text, Region of Interest or Hot-Spot
- Coupling to the faculty's own authentication systems (e.g. LDAP) possible

#### **tOSCE**



- Evaluation of oral practical skills (OSCE)
- · Possibility to enter comments by keyboard, predefined comment fields, audio recording or by handwriting
- Image recording of notes etc. (e.g. lab notes, drawings)
- Fully customisable rating options (e.g. checklist, global rating, rating scales)
- · stopwatch function assists with time management through integrated
- Compatibility with tPRESENTER

#### **tPRESENTER**



- Display of media (e.g. videos, audio files or images) from the examiners' tablet on a second tablet in kiosk mode
- Quick and convenient remote control of media via Bluetooth to the device of the examinee
- By pressing a button, the screen on the second tablet can be locked and media can be displayed or hidden
- Media view in full screen mode possible
- Parallel use of the tOSCE checklist by examiners

### tORAL



- Evaluation of oral examinations
- Possibility for several examiners to assess the performance of up to four candidates simultaneously in one examination.
- Insight of the assessment of the other examiners by the chairperson and final assessment
- Help with time management through integrated stopwatch function
- Fully customisable rating list with horizon of expectation

#### **tCAPTURE**



- Recording videos with the tablet (e.g. a role play)
- Simultaneous transfer to the server
- Video annotation within a few seconds

### PROGRESSTEST



- Longitudinal examination of students' knowledge growth
- Web-based implementation at the end of each year
- Test level is oriented towards the level of knowledge of licensed doctors
- Contains 120 MC questions and 10 SJT questions covering topics from all semester levels
- Developed by qualified students for students under the supervision of medical experts
- Feedback to students and participating faculties on the level of knowledge compared to the previous year, students from the same academic year and other participating medical faculties



> possible and self-explanatory to use. Furthermore, we always develop the tools in a way that they are interoperable with each other, which ensures smooth use in the various steps of the examination workflow. We focus on a high degree of legal certainty and fail-safety, as the latter is of enormous importance, especially for the electronic delivery of examinations. During electronic examination, screenshots of the answers given are saved for each examinee, thus documenting the answer behaviour in a legally secure way, independent of the automated examination evaluation. In order to make our systems as fail-safe as possible, our desktop and tablet-based tools do not require a permanent internet connection during the examination and can be carried out in offline mode. The exams or OSCE rating sheets are loaded onto the respective devices before starting the exam. As soon as a connection is available, the data is automatically synchronised with the respective server. For tablet-based examinations, examinees can be conveniently registered using QR codes. In addition, when using the tOSCE app, the individual OSCE stations as well as the corresponding examiner assignments can be scanned quickly using QR codes to avoid errors. Our tools for the electronic recording of written examinations support a variety of item and question types such as TypeA, Pick-N, Long Menu, Key Feature, KPrime, Interval, Free Text, Region of Interest or Hot-Spot. In addition, different media types (image, video and sound files) can be integrated into the question stem.  $\blacklozenge$ 

#### aPORTFOLIO

📋 A 🛛 P 🖉 O

- Platform for carrying out workplace-based examinations
   NEW:
- Module for annotating videos: Deposit of self-selected video time points taking into account predefined rating categories
   PLANNED:
- Assessment and evaluation of patient reports, encounter cards, MiniCEX, DOPS, 360° feedback, multisource feedback, presentations

#### CUSTODIAN

### 🕻 C U S

- Central management programme for UCAN tools, login and authentication, faculty hierarchies, UCAN tool users and their roles and rights
- Matching login data of linked tools (EXaminator, ItemManagementSystem, ACTORS EXPERT)
- Easier management of faculty and associated accounts and groups for administrators.
- Comprehensive settings to configure linked tools and adapt them to individual users without having to manage each tool separately
- Complete control through highly customisable possibility to distribute and/or restrict roles and rights

#### **PROGRESSTEST-WRAPPER**

- Conducting distance online examinations
- Web-based implementation
- Definition of blacklists of non-permitted programmes (e.g. WhatsApp, Teamviewer)
- Monitoring of the progress of examinees

#### **EXaminator**

📶 E 🛛 3

- Automated test-statistical evaluation of individual items and entire examinations
- Quality assurance for examinations
- Calculation of the difficulty, the discrimination index and the discriminatory power of an item
- Exporting the data and displaying it in the item overview of the IMS
- Feedback on items with conspicuous test statistic values
- Seamless integration with UCAN tools
   NEW:
- Automated upload of statistical parameters to the IMS
- Post-evaluation for question types that cannot be evaluated automatically by several examiners
- Examination viewing for students via QR code
- Individually customisable pass marks and mark schemes
- OSCE items with K.O. rating

#### JÖRN HEID, LARS FEISTNER, WINFRIED KURTZ, KLAUS YAN

Institute for Communication and Assessment Research, Heidelberg, Germany



# Implementation of the General Data Protection Regulation (GDPR) of the Institute for Communication and Assessment Research

e, the Datenschutz im Quadrat GmbH, are a young and dynamic company from the Rhine-Neckar region. Our customers are represented in the Rhine-Neckar metropolitan region as well as in the south and north of Germany.

We have made it our business to meet the challenges of the GDPR for every company and to implement the data protection requirements in the best possible way, without hindering operational processes or minimizing productivity.

For companies, the question often arises as to whether the vacant position of data protection officer should be filled internally or externally. From our point of view, it is usually not expedient to entrust an internal employee with this role, since the high expenditure of training and time and the necessary release from the actual activity of the employee often means lost time for the prioritized company goals.

#### A SMALL EXCERPT FROM EVERYDAY DATA PROTECTION

In the first step of the so-called "initial phase", we conducted a basic audit together with the Institute for Communication and Assessment Research to determine the current status of operational data protection. In this first stocktaking, interviews were conducted with all those responsible for the company's divisions. The business premises and the IT environment were also inspected and assessed.

After this first stocktaking, our daily work as external data protection officers begin. A major focus is the compilation of the list of processing activities in accordance with Article 30 GDPR. All internal company "processes" in which personal data are processed are recorded in the list of processing activities. It serves as an essential basis for structured data protection documentation and is thus an essential element in establishing a comprehensive data protection concept.

As external data protectors, we are particularly dependent on receiving input and information from the company we support. Thanks to the courageous and motivated cooperation of the employees and managers of the Institute for Communication and Assessment Research, there is always a lively exchange of information, which proves a great willingness and acceptance for the topic of data protection. The implementation of



the GDPR is a constantly ongoing process, and thanks to this exchange we are making great strides forward.

In our opinion, the heart of a company is always its employees. They also play a key role in data protection, if not the most important one. That's why we pay so much attention to training employees and raising their awareness of the comprehensive topic of data protection. The training courses are particularly practical in drawing attention to everyday office life and possible "pitfalls" in handling personal data, and provide appropriate solutions and orientation. The employee training courses take place at regular intervals and are concluded with a short examination by the employees.

For new, ongoing and future projects, there is a constant flow of communication with the Institute as well as the UCAN network, so that we are involved from the very beginning and can provide advice and support to ensure data protection requirements are met at all stages of the work. Of course, there are still some challenges to overcome in this regard, but we are very confident that full data protection compliance will be achieved over time.

We would like to take this opportunity to express our gratitude for the trusting cooperation and look forward to the next steps together.  $\blacklozenge$ 

PHILIPP SCHUSTER Datenschutz im Quadrat GmbH, Mannheim, Deutschland







# **Editorial**



s described in the previous chapter, our network is a consortium of faculties, professional societies, medical associations and other institutions from different countries that support each other in the planning, preparation, implementation, evaluation, quality assurance and feedback of exami-

nations. These phases of the examination workflow are supported by various technologies and tools that are designed, developed, operated and evaluated in close cooperation with the UCAN partners. The network supports its UCAN partners through internal and external training measures and offers, for example, training on tablet-based examinations or on the creation of examination questions. In the training courses, our partners are prepared well enough so that after a short familiarization period they are able to prepare, deliver and evaluate their exams independently and to pass on their expertise to others (train-the-trainer concept).

In the age of digitalisation, the re-

flective handling and experienced use of digital technologies in the education sector serves in particular to support teaching and performance recording examinations and to establish corresponding workflows. The use of examination tools helps in particular to facilitate examination workflows and to optimise time- and resource-consuming examination preparations. This requires qualitatively designed, highly reliable examination systems and tools that meet the day-to-day requirements of different educational contexts. It is precisely this spectrum of software solutions that the Institute for Communication and Assessment Research offers within the UCAN network.

Our examination systems and tools contribute in particular to optimising the respective examination workflows. This frees up time for examination staff, which in turn can be invested in the quality of teaching, for example, in order to continue to provide excellent practical and theoretical education, further education and training. Within this chapter, four UCAN partners describe their experiences of switching to the UCAN tools and using the ItemManagementSystem (IMS). All UCAN partners have been successful in optimising their examination workflows and adapting these to local conditions.

On pages 34-37 it is shown that not only interfaculty but also intrafaculty use of the UCAN network can contribute to conducting high-quality examinations. At the University of Leipzig, the Faculty of Medicine

and the Faculty of Veterinary Medicine support each other in improving their respective examination workflows through the joint exchange of experience.

Within the portfolio of examination tools, UCAN offers various tools for the electronic administration of examinations. Examinations previously organised in the IMS can be conducted on paper as well as on computer or tablet. A large number of our partners have converted analogue examinations to digital examinations as part of their UCAN membership. The contributions described in this chapter illustrate the opportunities offered by the transition to electronic examination formats, but also the challenges faced. The successful conversion to computer-based examinations via campus is described on the pages 38-41 by a UCAN partner, which we would like **Konstantin Brass** to call a pioneer in Managing director of the e-examinations, since by Institute for Communication and far the most electronic exami-Assessment Research nations are conducted at this location. Pages 42-47 describe a successful conversion from analogue written examinations to tablet-based examinations with the tEXAM app. Both medical faculties report on the positive introduction of tablet-based written examinations, but also describe the hurdles and limitations of their use.  $\blacklozenge$ 



# **Design of an efficient assessment** workflow at the Faculties of Medicine and Veterinary Medicine at the University of Leipzig



n 2016, the Medical Faculty of the University of Leipzig joined the UCAN assessment network, as there was a need and a high demand for new, modern assessment software that met the requirements and framework conditions of the faculty. One year later, the Faculty of Veterinary Medicine (VMF) of the University of Leipzig also joined the network. Today, both faculties use the UCAN tools to prepare, conduct and evaluate their examinations and have been able to efficiently redesign and optimise their internal examination workflows as part of their membership in the network.

The first paper-based examination at the Faculty of Medicine took place in January 2016 with the ItemManagementSystem (IMS), the Klaus scanner system and the Examinator. The IMS offers various interface programmes to learning platforms (Moodle/ILIAS), for example, and its online capability enables asynchronous exchange between the people organising an examination, which was an argument in favour of membership with UCAN at the time. In addition, through the use of a joint assessment pool, reviewed examination content, questions and examinations from other locations and faculties can be used for the faculty's own internal examinations. The active use of the IMS at the Faculty of Medicine facilitates the daily clinical routine of the examiners in the preparation of questions and examinations and also brings didactic advantages outside the taught curriculum.

The output of question/answer sheets from the previously used software are comparable to the result from IMS/Klaus. However, this software was not online-capable, which meant that the central person in charge of exam administration had to carry out considerably more working steps. In the past, for example, the questions/items were sent in any form (digital, analogue, text document, PowerPoint, etc.) to the central contact person, who then manually transferred and formatted each item in the programme. The creation of the grades and the results report were also done manually. With the introduction of the IMS, some of the procedures could now be handed over to the responsible teaching staff. Furthermore,

Figure 1

Medicine and Veterinary Medicine Leipzig categorised by the exam type.



the scanner-based examination system Klaus enables the creation of non-personalised answer sheets, which greatly facilitates the efficiency of the workload involved in actually administering the examinations. The grading and test-statistical evaluation is now carried out by EXaminator in a predominantly automated, more specific and less error-prone manner.

In addition to paper-based written exams, the tOSCE application is used in Medicine since 2017. In the past, the two "Objective structured clinical examinations (OSCE)" held at the Medical Faculty were collected completely analogue and manually. With the help of printed checklists, the students' performance was recorded at the stations, the summed evaluation points - no small sub-points were recorded - were then manually transferred to an Excel file and the final performance results were calculated. It was not possible for students to view the OSCE checklists. >

Illustration of the examinations created using the IMS at the Faculties of

> In January 2018, the first paper-based performance review was carried out at the Faculty of Veterinary Medicine as a semester-accompanying test in the subject "Anatomy" with the help of IMS and Klaus. From the summer semester 2018. all partial examinations relevant to the state examination and organised in so-called "foci" in the clinical study section (also paper-based) followed (see pages 106-107 for further information on the veterinary state examination). An overview of all examinations created using the IMS at the Faculty of Veterinary Medicine and the Faculty of Medicine at the University of Leipzig is shown in Figure 1. In the foci, almost all subjects of the clinical training from the 5<sup>th</sup> to the 8<sup>th</sup> semester (FS) are involved in a total of 19 block courses, each on a defined topic. At the end of each series of courses, there is a written exam with questions from all the subjects involved. The points achieved in the examinations are then added up at the end of the 8<sup>th</sup> FS to a written partial score for each subject, which in turn is included in the final score of the state examination. The multidisciplinary teaching organised in this way at the VMF is challenging in many respects: The lecturers responsible for the respective focus must ensure that all questions are received by the deadline in order to be able to go through a review process first. Before joining UCAN, a complicated "five-folder system" was used, in which Word files with questions from individual lecturers were filed and, depending on the review status, pushed through to the last folder. It was hard to keep track of the actual status of the questions or to be able to check immediately which questions were still missing or had not been reviewed. In addition, there were often difficulties with the access rights to these folders - due to the frequently changing teachers, an up-to-date status could not always be guaranteed.

Using the IMS, it is now possible to design the foci in groups and to provide the corresponding teachers with access authorisation. A significant increase in acceptance among teaching staff is the possibility of being able to enter and review questions in the IMS from any location and at any time. An overview of the number of all item reviews conducted by using the IMS can be found in Figure 2. (The graph includes item reviews of both the Faculty of Veterinary Medicine and the Faculty of Medicine). The part-time staff position created in 2018 and thus the UCAN coordination of the VMF takes over the central task of creating all profiles, groups, exams including their export and printing via Klaus, as well as the evaluation of the exams with the help of the evaluation tool EXaminator and the result transmission to the lecturers. This is a great relief for everyone involved. In addition, one person can record the status quo and forward it to those responsible (including the examination board and study office).

When it came to the introduction of iPad-based examinations using tEXAM, the subject "Anatomy" was also allowed to take on the role of pioneer. Before the first state examination-relevant tablet-based examination was conducted in November 2019, the students of the 2<sup>nd</sup> and 3<sup>rd</sup> semester used tEXAM to take a total of five partial examinations (plus three make-up examinations) on iPads since the winter semester 2018/19. During this time, the processes, which were new for all those involved (students, teachers, coordinators, etc.), were tested, optimised together with the UCAN team and optimally prepared for the first serious case on 12.11.2020 (block examination in general pharmacology). Since the winter semester 2020/21, six examinations relevant to the state examination have been administered using tablets. The entire technical support for the tablets lies centrally in the hands of the UCAN coordination.

In particular, the security of being able to conduct the examination offline, as well as the possibility of more question formats with the use of e.g. video material and the significantly faster evaluation of the results compared to paper-based examinations, are leading to an ever-increasing demand for this examination format among teachers. Nevertheless, it will still take some time before the desired focus examinations can also be carried out with tEXAM, as this requires a fundamental change in the examination regulations at the two Saxon ministries responsible.

The reorganisation of the workflow by using the UCAN tools and the communication exchange between the faculties and within the UCAN-network has made it possible for both faculties to record student's performance much more efficiently, quickly and transparently, with considerably greater user-friendliness of the assessment software. As a result, the process of planning, conducting and evaluating examinations has been centralised and sustainably optimised. Due to the review system implemented in the IMS, we are continuously improving the quality of the examination questions. With the same amount of personnel as with the former/analogue processes, more assessments can be realised today.

The membership with UCAN has connected our faculties even more closely. Thus, we regularly exchange information about the current challenges and opportunities in the field of examinations and support each other in this regard. In addition, the VMF would like to use the strength of the UCAN network to further expand the question pools in the IMS together with the Faculty of Veterinary Medicine of Munich in order to benefit from the mutual exchange of items.  $\blacklozenge$ 



800

600

400

0

2013

2016

Item

e

ę 200

Number

**DORA BERNIGAU<sup>2</sup>** 

#### Figure 2

55

2017



### ALEXANDER LACHKY<sup>1</sup>, MATTHIAS HENZE<sup>1</sup>,

<sup>1</sup> University of Leipzig, Faculty of Medicine, Leipzig, Germany <sup>2</sup> University of Leipzig, Faculty of Veterinary Medicine, Leipzig, Germany

# **Desktop-based assessment** at the University Medical Centre Göttingen



Figure 1 Assessment room for 77 participants with retractable screens and storage compartments for mouse and keyboard.

mester after all.



Iready in 2009, first considerations were made regarding a room for e-assessments and corresponding funds were applied for from the State of Lower Saxony. After approval in 2011, former PC classrooms were merged and two assessment rooms with 77 workplaces each were created. It

39

was clear from the beginning that these rooms should be equipped with fixed computers, but should also be available for other training courses. In order to ensure optimal maintenance of the equipment while minimizing noise, the choice fell on retractable screens and zero clients that can be configured remotely (see Figure 1).

Now all that was left to do was to find an appropriate examination software. As a member of the UCAN network, the CAMPUS exam software was of course a first candidate for us. So, in 2012 Jörn Heid arrived in Göttingen and presented his software to us. A question still well remembered is whether exam guestions could only be processed in the given order and not be called up again for corrections. Jörn Heid's comment that this would require major changes and was therefore unintended for now, would have led to a complete rejection of such an e-examination by the students. Scepticism spread among us. But this apparently impassable obstacle was then solved seemingly within a week. Today it would be unimaginable that this option would be missing. The proximity to the developer led to the fact that within the next years many practical requirements could be implemented quickly and purposefully. One example is the PIN number for starting the exam, which initially had to be written manually on PowerPoint slides in order to project them into the exam rooms via LAN-connected beamers. Today the list is done automatically and web-based directly from the CAMPUS software.

But how was the possibility of e-examinations received by students? At the beginning we were faced with the greatest scepticism. Some students rejected e-exams with the comment: "Should I now take a PC course so that I can take an exam? Others feared that it would take more time to process them. Initially, lecturers were sought who were willing to switch their exams from paper- to desktop-based. Since the volunteers included lecturers from the last clinical semester, there was a prompt protest that these experiments should not be carried out in the last se-

What happened next? One-hour obligatory introductory courses for all students taking e-exams and voluntary practice times twice a semester increased acceptance quickly.

In the summer semester 2013, five e-exams were conducted in the pilot phase. Modules from the second and third clinical semester and one module from the last clinical semester were involved. Due to the module structure of the clinical study phase in Göttingen, up to 10 individual subjects were involved in a single exam, which demonstrates that good cooperation between the subjects is a requirement for a successful e-exam. The following table is an example of the question composition of an exam in the third clinical semester (see Figure 2). >

> One and a half years later, all final 25 module examinations in the clinic were converted in the winter semester 2014/15. Initial scepticism on the part of the lecturers turned into surprise that everything was now much simpler. Of course, this may also be due to the service, because now the lecturers receive the participant lists and examination protocols in printed form, examination printouts no longer have to be produced, the number of necessary supervisors in the manageable examination rooms has fallen and the evaluation is much faster. In addition, it is also possible to use other question types.

Subject	Number of Questions
Internal Medicine	25
Surgery	8
Paediatrics	8
Occupational Medicine	4
Clinical Pharmacology	8
Clinical-pathological Conference	6
Medicine of old age	3
Rehabilitation	2
Prevention	2
Human Genetics	3

#### Figure 2

Composition of an exam from the third clinical semester (human medicine) with a number of questions from different subjects (status at introduction of the e-exam SoSe 2013)

In this respect, the teachers' opinions are quite different. While some lecturers stick firmly to Type A questions, others do not want to miss out on KPrim or PickN questions. Many consider Key feature questions to be a good question type, but hardly anyone has time to develop them. Specially conducted training courses for the selection and design of alternative questions are often not accepted due to lack of time. Unfortunately, question and exam design seem to be one of the most unpleasant topics in the professional life of most lecturers.

In the meantime, we have set up a third e-assessment room with a further 50 places. Nevertheless, the total number of places (200) is not sufficient to examine the students of the pre-clinic at once. Our concerns that there could be logistical problems if we work with two cohorts and sometimes have to park the students in one lecture hall to avoid contact between the first and second cohorts have proved to be unfounded. After the first lecturers from the pre-clinic had gained experience with e-exams, we no longer had to advertise and were also able to convert all pre-clinic examinations completely to e-exams earlier than expected, so that paper examinations seemed to be a thing of the past since summer semester 2019 (see Figure 3)

The hygiene measures due to the corona pandemic have shown us the opposite. Due to the distances to be maintained, we can only use 60 of the 200 places for e-exams. Smaller courses of study, such as dentistry or the bachelor/master's degree courses in molecular medicine and cardiovascular science, continue to use the e-exam rooms as before, while all clinical and pre-clinical modules now switch to paper examinations in up to 7 lecture halls simultaneously due to the large number of participants. Especially now, both students and lecturers miss the e-exams, which can guarantee an optimal workflow. Thousands of pages of printed paper and unclearly marked answer sheets demonstrate that e-exams work better.

#### **MANFRED HERRMANN &** CHRISTIAN MÜNSCHER

Georg-August-Universität Göttingen, University Medical Centre Göttingen, Study Deanery, Göttingen, Germany



Figure 3 Development of summative e-exams with periods from the beginning to the end of individual phases

# Implementation of tablet-based written examinations at the Faculty of Medicine at Kiel University

ince summer semester 2018, the Medical Faculty of Kiel University has successively converted the written multiple-choice examinations of the second study phase in medical studies from paper-based to tablet-based implementation with the tEXAM app. Since summer semester 2019, all of the approx. 40 exams are perfor-

med tablet-based in a central exam week that takes place at the end of each lecture period (Apple iPad 9.7, 5<sup>th</sup> generation, see Figure 1 and, 2). Reasons for the rearrangement were (I.) application possibility of new question formats, e.g., key feature questions, (II.) better display quality and zoom function for figures and graphics, (III.) use of further media, e.g., videos, (IV.) time saving in preparation and content evaluation, and (V.) use of test-statistics via the UCAN program EXaminator as within paper-based examinations.

Before the first tablet-based exam was performed, a specific Wi-Fi was installed in the lecture halls for the exam. an exam server and 160 iPads were set up. After successful internal testing, the first six tablet-based exams were performed in July 2018, each with about 120 students in parallel in two lecture halls. To familiarize themselves with and practice the handling of tablets and examination software, the students were offered practice exams ca. two weeks before the exams. In addition, they received instructions on the e-learning platform. The practice exam also served as a test under real conditions. Minor technical problems could be solved by adjusting the software until the last practice exam, so that the final decision could be made to conduct the six selected exams tablet-based. A few days before the week of the exams, the exams were uploaded onto the tablet PCs in order to ensure the offline function in case of a possible Wi-Fi failure. Paper-based versions were kept ready as a backup. These were not needed, as minor technical problems could be solved at short notice without affecting or even jeopardizing the examination process.

The experiences from this pilot project were used to improve the organization and performance of 19 tablet-based exams in winter semester 2018/2019. In this second step, three student semester cohorts

wrote their exams with tEXAM. Since summer semester 2019, all of the approx. 40 exams in the second study phase are performed tablet-based. Since winter semester 2019/2020, paper-based backup versions were not prepared any more. However, to be on the safe side, a time slot is planned as an alternative date in the exam week in case of a technical problem that cannot be solved immediately.

Technical problems which arose over the semesters in the course of the further development of the software, have been eliminated and the software has been made more convenient to use. In summer semester 2019, the examinee's wish to optionally receive their preliminary exam results on the tablet PC directly after finishing the exam was fulfilled. Students' evaluations in Kiel revealed that this feature ranks first among the features that students appreciate about the tablet-based exams (see also pages 44-47 for view of students of the University of Dresden). Other appreciated features that are regularly mentioned in evaluations are the marking function, the clarity and ease of use, and the avoidance of paper which among other things means that the background noise in the exams is almost silent and potential transfer errors to an answer sheet are avoided. The most frequently mentioned suggestions for improvement made by the examinees refer to (I.) a function that prevents unintentional changing of an answer option by accidental tapping, (II.) further marking functions as known from other MC learning programs, (III.) further development of the note function, (IV.) at the end of the exam not only the indication of the preliminary score but also a display of which guestions were answered correctly or incorrectly, and (V.) more functions on the calculator.



Figure 1
Tablet PCs for exams with protective cover



Figure 2 Tablet PCs in a rollable storage and transport case, where they can be loaded.

Our conclusion is that it is possible to conduct tablet PC based exams for a larger number of exams. However, at least in the initial phase, thorough planning and sufficient time have to be allowed for in order to identify and eliminate problems that may arise during preparation and in the exams. Overall, the system proved to be technically secure and reliable. The overall balance is positive. With regard to our objectives for the implementation of tablet-based exams, most of them have already been reached: The display quality and the zoom function of figures and graphics are an improvement especially for disciplines with a focus thereon, e.g., pathology. Time could be saved in the evaluation phase of the exams. It is planned to acquire a mobile device management system in 2021 in order to optimise the time for preparing the tablet PCs for the exams. The implementation of the new question format "key feature", which includes among others training courses for exam authors and test exams for students, is paused due to reorganisations evoked by the covid-19-pandemic, but will be continued as soon as the situation permits. In future, implementation of audio or video files in exam questions will be addressed, as well as the implementation of the tOSCE app. Due to the pandemic related hygiene measures, tablet-based exams are currently not possible in the exam phase of winter semester 2020/2021. Therefore, the 40 exams will be performed as online (home) exams using the Progress Test platform (see also pages 104-105). This poses a new challenge.  $\blacklozenge$ 



GUDRUN KARSTEN<sup>1</sup>, STEFANIE GERULL<sup>1</sup>, INGA EBERMANN<sup>1</sup>, INGOLF CASCORBI<sup>2</sup>

<sup>1</sup> Kiel University, Medical Faculty, Dean's Office, Kiel, Germany

<sup>2</sup> University Medical Center Schleswig-Holstein, Campus Kiel, Institute of Experimental and Clinical Pharmacology, Kiel, Germany

# The way to successful tablet-based examinations at the Medical Faculty **Carl Gustav Carus** of the TU Dresden

he use of tablet PCs in teaching has a long tradition at the Carl Gustav Carus Medical Faculty of the TU Dresden (see Figure 1). After joining UCAN in 2009, tablets have been successfully used for effective paperless recording of results, e.g. during the annual selection interviews, for the evaluation of courses and for OSCE examinations in the clinical study section several years now.

On July 16 2018, for the first time at the TU Dresden, a complete written exam was conducted exclusively electronically on tablets. The exam in the pre-clinical subject Medical Psychology and Medical Sociology was no longer a "classic" paper exam but a digital exam for 220 students of the 2<sup>nd</sup> semester. The students registered on the tablet on the day of the exam using a QR code and had to answer 30 multiple-choice questions in 45 minutes. The faculty's own iPads, the ItemManagementSystem (IMS) and the tEXAM app from UCAN were used.

The pilot project was preceded by a 6-month preparatory phase in which the teaching staff of the Medical Psychology and Medical Sociology departments, together with specialists from the IT and teaching depart-

ments of the Medical Faculty and staff of the Medical Interprofessional Training Center MITZ, analyzed the range of applications and, above all, possible sources of error. Furthermore, the workflow had to be defined and tested on the day of the exam. Which operating errors might the students encounter? Is the capacity of the Wi-Fi sufficient? Will the batteries last? These and other aspects were tested on the one hand in a ...small" exam in the elective subject Disaster Medicine with a few students and later in a simulated lecture hall exam with staff in the role of the students. The operational experiences, which were made in the last years with tablets in the context of the OSCE examinations and with the selection procedure, were likewise enormously helpful thereby.

Nevertheless, there was a certain amount of nervousness among the students and examiners on the exam day (see Figure 2).

Unjustly, as it turned out. The conclusion of all participants was very pilot phase, a lot of time. positive: The students showed themselves to be satisfied in the subse-Of course, as generally true for electronic examiquent evaluation, especially because modern examination formats were nations, there is an additional personnel requirement used (see Figure 3). Just under 60% of the students surveyed (N=97) for technical maintenance, software updates,



Figure 1 Photography of the Carl Gustav Carus Medical Faculty of the TU Dresden



would give the tablet-based exam a school grade of 1 and 2, and well over three-quarters of respondents did very well to well with the tablet-based exam. The examiners were particularly pleased with the almost complete smooth technical process.

The successful pilot test will open up wide range of new possibilities for exam design in the future, for example by integrating pictures or videos in exams. For identical questions, the exams can be generated in a large number of variants. The electronic examination is forgery and fraud-proof. The feedback of the examination results to the students is faster. The use of tablets in exams can save a lot of paper and, after the





Figure 2 Students at the exam

> training, support of the data server, etc., which should not be neglected for routine use. However, this expenditure cannot be quantified reliably at this point in time and further examinations to gain experience are needed.

In order to be able to carry out further tablet-based examinations, however, the legal framework must first be created at the faculty. Only when the electronic examination procedure is anchored in the study regulations, such an examination can be conducted justifiably. 🔶

#### MAIKE LINKE<sup>1, 3</sup>, HENDRIK BERTH<sup>1</sup>, MATTHIAS HINZ<sup>2</sup>

<sup>1</sup> Technical University Dresden, Medical Faculty Carl Gustav Carus, Department of Psychosocial Medicine and Developmental Neuroscience, Dresden, Germany <sup>2</sup> Technical University Dresden, Medical Faculty Carl Gustav Carus, Teaching Department, Dresden, Germany <sup>3</sup> Technical University Dresden, Medical Faculty Carl Gustav Carus, Staff Unit Didactics and Teaching Research, Dresden, Germany



04 Design of standardised, quality-assured examinations

A.

 $\diamondsuit$ 

4 8 0

\*\*



# **Editorial**



he experience reports of individual UCAN partners presented in the previous chapter show how the conversion to

electronic assessments and the introduction of the ItemManagementSystem (IMS) can optimise assessment workflows and improve the quality of examinations.

Assessments, as fundamental elements of education, play a central role in the management of learning processes. One of the steering functions of assessments is that they set the direction of learning, since students often link their learning process to the assessment requirements and not to the course content designed by the lecturers. The concept of constructive alignment takes this into account by already optimally coordinating learning objectives, teaching and learning methods as well as examination formats and -structure (written, practical, oral ... /formative, summative) during course planning. To support this concept, a longitudinal overall assessment programme was integrated into the IMS. How this feature can already be used for goal-oriented curriculum planning in order to better synchronise teaching and assessment with each other is explained clearly on the pages 52-55.

Constructive interplay between teaching and assessment is achieved through the creation of blueprints. A blueprint is used for performance assessment and a method for translating learning objectives into assessment practices. It usually lists in table form what assessment content is to be assessed and to what extent (e.g. individual tasks, curriculum components or assessment methods). The most common version is a one- or two-dimensional table or matrix that facilitates the identification of assessed learning content. How a blueprint can be used to standardise high-quality assessments across coun-



Andreas Möltner Supervisory Board member of the Institute for Communication and Assessment Research



tries is described on the pages 56-57. The Creation of a blueprint is one of the first steps to improve assessment quality, even before the development of exam questions. On the pages 58-59 is explained how the quality of exam questions can already be improved during the creation by taking some criteria into account. Another method for quality optimisation is the implementation of pre-review processes of exam questions, carried out directly after their creation. The next article (see pages 60-61) illustrates the high relevance of review processes and shows which different options are available and how reviews are conducted at the State Medical Chamber of Hesse for the training of medical assistants. The assessment should be followed by so-called post-reviews. In contrast to pre-reviews, these take place after an examination has been completed and are conducted using test statistics and student comments, which may allow conspicuous exam questions to be re-scored or changed for use in subsequent examinations. While the next article (see pages 62-63) addresses the test-statistical analysis of examination questions, the following describes the quality indicators for the assessment of examinations (see pages 64-65). In general, reliable and valid medical assessments ultimately serve to protect patients by setting and verifying quality standards for medical care. Why quality standards also play a role in the legally secure handling of examinations is discussed by lawyer Philipp Verenkotte with the help of two examples (see pages 66-67). ◆

# **Comprehensive examination** programme: optimally combining teaching and examinations



ime and content complexity of the medical curriculum is also reflected in the approximately 60 examinations to be taken in medical studies in Germany.

Challenges in the areas of quality assurance, technology, security and data protection have largely been solved centrally at university or faculty level for these examinations.

A coordination of the teaching content of individual subjects also occurs via standardised procedures such as curricular mapping [1]. However, thematic coordination of examinations often is insufficient, which is why it can be that identical contents are examined in different examinations or important subject areas of the learning objectives catalogue are not examined at all during the entire study programme [2,3].

In order to support the faculties in coordinating the content of their examinations, the module "comprehensive examination programme" was integrated into the ItemManagementSystem (IMS). The aim of the comprehensive examination programme is to coordinate the individual examinations in the best possible way so that learning objectives that have been examined more than once or not at all can be identified easily. This applies not only to the format and content, but also in particular to the number of individual examinations, the scope and the time schedule.

In a first step, the National Competence-Based Catalogue of Learning Objectives in Medicine (Nationale Kompetenzbasierte Lernz talog Medizin; NKLM) [4] was integrated into the IMS and the cl fication system was extensively expanded. Thus, individual ques can be assigned to several learning objectives and other classification

In a second step, the IMS was adapted so that the following par ters can be defined for each institution and for each study program

- Examination regulations
- Examination results
- Periods of study (e.g. semester)

Thus, each individual examination compiled in the IMS can be gned to an examination performance. Through these assignments individual exams are placed in a structured correlation to each Looking at the examinations of a cohort, it is immediately recogni which learning objectives have been examined when and how ofte

#### Figure 1

Assignment of individual examinations to an examination performance at the Medical Faculty of RWTH Aachen University using the examples "Blood/Defence", "Respiration" and "Nervous System"

Leis	tungsnachweise				
Prüf	ungsleistung †	Datum	Fragenz	Punkte	FS4
* I	04 - Systemblock Blut / Abwehr				x
	SS 2019 - Klausur SB Blut und Abwehr	30.04.2019	45/45	45	n=266 p=0,76
	SS 2018 - Klausur SB Blut und Abwehr - V1	11.05.2018	45/45	45	n=273 p=0,71
	2017-06-19 - Klausur SB Blut und Abwehr - V1	19.06.2017	33/33	33	n=256 p=0,78
	SS 2016 - Klausur SB Blut und Abwehr	13.06.2016	33/33	33	n=258 p=0,81
* 1	04 - Systemblock Atmung				x
	SS 2019 - Klausur Systemblock Atmung - V1	03.06.2019	40/40	40	n=259 p=0,75
	SS 2018 - Klausur Systemblock Atmung - V1	18.06.2018	40/40	40	n=272 p=0,75
* E	04 - Systemblock Nervensystem				х
	SS 2016 - Abschlussklausur SB Nervensystem	29.07.2016	40/40	40	n=252 p=0,75
	SS 2017 - Abschlussklausur SB Nervensystem	04.08.2017	40/40	40	n=259 p=0,75
	SS 2018 - Abschlussklausur SB Nervensystem	27.07.2018	40/40	40	n=267 p=0,66
	SS 2019 - Abschlussklausur SB Nervensystem	19.07.2019	40/40	40	n=256 p=0,73

**53** 

ielka- lassi-	play the following as a table or diagram:
stions	• the teaching units as well as the corresponding
tions.	exams including the number of participants
rame-	and the difficulty (see Figure 1)
nme:	• an overview of the discipline classification of the
	items used in the examinations (see Figure 2)
	• a tabular overview of the learning objectives
	assessed
	• a pie chart of the question types used (see
	Figure 3)
assi-	
s, the	Figure 1 shows an example of the assignment
other.	of individual exams to an examination performance
sable	at the Medical Faculty of RWTH Aachen University.
en.	Using the information and statistical parameters $$ $$

Due to the new module, it is now possible to dis-

**>** stored in the IMS for the examinations, changes can be seen here at first glance. For example, the number of questions in the module "Blood and Defence" increased from 33 in the summer semester (SS) 2016 to 45 items in the SS 2019. On the one hand, several sub-performances were combined into one examination and, on the other hand, the curriculum was changed (course sequence + new courses). For module "Nervous System", the statistical characteristic value for the examination is conspicuous in SS 2018 (see arrow in Figure 1). However, the reason why a change occurred is difficult to determine. In many cases, possible factors are curricular or personnel changes, which were insufficiently documented. Therefore, it is necessary to consider which further information on items would be useful and how much additional effort is reasonable for the item authors. Extensive research revealed that, in this particular case, old questions were completely dispensed with in the given semester.

Figure 2 illustrates the possibility of displaying the discipline classifications of the items used in an examination. Both from the exam titles and from the overview of the content classification, it can be noted that a change in the curriculum has occurred and accordingly other subject combinations have been examined. In the before mentioned example, the examinations were moved from the 10th semester to the 7th semester and took place in the winter semester instead of the summer semester. However, a detailed comparison of the items for the examination in the area of " work and social medicine" showed that only three items were different.

Similar to the classification, it would be possible to display the examined learning objectives in this view. If the exams of a student cohort are grouped, the assignment to the NKLM could also be used to identify gaps in the curriculum or learning objectives that have been assessed more than once. For the most possible precise coverage, all examinations within the study programme should be integrated into the IMS and maintained by the responsible persons in the same way as the classification or learning objective assignment.

Using a pie chart (see Figure 3), it is possible to graphically display the distribution of question types used in examinations. This may provide information

Lei	eistungsnachweise														
PR	utungsieistung					Datum	Frag	enzani isi /	SOLL	Punkte	151		128/9	F510	
٧	📴 07 - Kurs Arbeits-, Sozial- und Umweltmedizin									x					
	2016-06-02 Klausur ArSo und	Präventio	n SS 16,	10. Sem.MS	SG	02.05.2016	30/	30		30	n=231 p	=0,77			
	2017-06-22 Klausuren Arbeits	medizin u	nd Präve	ention 10. Se	em. MS(	22.06.2017	30/	30		30	n=236 p=0.84				
	2017-10-30 Klausuren Arbeits	-/ Sozial-	und Umv	veltmedizin	7. Sem.	30.10.2017	40/	40		40	n=198 p=0.80				
	2018-05-07 V1 Arbeits-/Sozial	medizin, k	linische	Umweltme	dizin, Pu	07.05.2018	50/	50		50	n=250 p	0,88			
	2018-10-20 Klausuren Arbeits /Sozialmedizin und Limweltmedizin					50750				n=248 p=0.85					
	2018-10-29 Klausuren Arbeits	-/Sozialm	edizin un	nd Umweltm	edizin	29.10.2018 40/40			40	n=248 p=	0.85				
	2018-10-29 Klausuren Arbeits	-/Sozialm	edizin un	d Umweltm	edizin	29.10.2018	40/	40		40	n=248 p	0.85			
	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits	-/Sozialm -/Sozialm	edizin un edizin un	nd Umweltm nd Umweltm	edizin Iedizin	29.10.2018 28.10.2019	40/	40 40		40 40	n=248 p= n=267 p=	=0,85 =0,85			
Klas	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits ssillikations Auswertung	-/Sozialm -/Sozialm	edizin un edizin un	nd Umweltm nd Umweltm	edizin Iedizin	29.10.2018 28.10.2019	407	40 40		40 40	n=248 p: n=267 p:	=0,85 =0,85			
Klass	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits sliftkations-Auswertung	-/Sozialm -/Sozialm	edizin un edizin un	nd Umweltm nd Umweltm	edizin Iedizin	29.10.2018 28.10.2019	407	40 40		40 40	n=248 p: n=267 p:	=0,85 =0,85			
Klass L Al	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits sillikations Answertung We anzeigen	-/Sozialm -/Sozialm	edizin un edizin un	nd Umweltm nd Umweltm	edizin Iedizin	29.10.2018 28.10.2019	401	40 40		40 40	n=248 p: n=267 p:	=0,85 =0,85			
Klass Lai	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits selffkations-Answertung Meianzeigen	-/Sozialm	edizin un edizin un 2016-06-0 ArSo und	nd Umweltm nd Umweltm 12 Klausur I Prävention	edizin edizin 2017-06- Arbeitsn	29.10.2018 28.10.2019 22 Klausuren redizin und	40 /- 40 /- 2017-10.3 Arbeits-/	40 40 00 Klausuren Sozial- und	2018-05-1 Arbeits /	40 40 67 V1 Sozialmedizin,	n=248 p= n=267 p= 2018-10. Arbeits-1	=0,85 =0,85 29 Klausurer Sozialmedizi	a 2019-10 in Arbeits-	28 Klausuren Sozialmedizin	
Klass E Al	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits aslilikations-Answertung Ute anzeigen	-/Sozialm -/Sozialm Summe	edizin un edizin un 2016-06-0 ArSo und SS 16, 10	nd Umweltm nd Umweltm 12 Klausur Prävention , Sem.MSG	2017-06- Arbeitsm Präventi MSG SS	29.10.2018 28.10.2019 22 Klausuren redizin und on 10. Sem. 2017	40 / - 40 / - 2017-10.3 Arbeits-/ Umwelter MSG, WS	40 40 10 Klausuren Sozial- und eckizin 7. Sem, 17/18	2018-05. Arbeits./ Klinische Umweltn	40 40 17 V1 Sozialnedizin, vedizin, Public	n=248 p: n=267 p: 2018-10. Arbeits-1 und Um	=0,85 =0,85 29 Klausurer Sozialmedizi weltmedizin	a 2019-10 in Arbeits- und Um	28 Klausuren /Sozialmedizin weltmedizin	
Klass () Al	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits stiffkations Answertung Weinzeigen	-/Sozialm -/Sozialm Summe	edizin un edizin un 2016-06-0 ArSo und SS 16, 10	nd Umweitm nd Umweitm 12 Klausur Prävention . Sem.MSG Schelerin	2017-06- Arbeitser Präventi MSG SS	29.10.2018 28.10.2019 22 Klausuren edizin und on 10. Sem. 2017	40 / 40 / 2017-10.3 Arbeits-/ Umwelter MSG, WS	40 40 50 Klausuren Sozial- und edizin 7. Sem, 17/18	2018-054 Arbeits / Klinische Umwelter Health	40 40 87 V1 Sozialmedizin, redizin, Public	n=248 p: n=267 p: 2018-10 Arbeits- und Um	e0,85 e0,85 29 Klausurer Sozialmedizin weltmedizin	n 2019-10 n Arbeits- und Um	28 Klausuren Sozialmedizin weltmedizin	
Klass Al	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits stiffaatione Aoswertung Ule anterigen Klassifikation	-/Sozialm -/Sozialm Summe	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl	nd Umweitm nd Umweitm 12 Klausur 19 Prävention 1, Sem.MSG Schwierig	2017-06- Arbeitsm Präventi MSG SS Anzahl	29.10.2018 28.10.2019 22 Klausuren edizin und on. Sem. 2017 Schwierig	40 / 40 / 2017-10-3 Arbeits / Umwelton MSG, WS Anzabl	40 40 10 Klausuren Sozial- und edzin 7. Sem. 17/18 Schwierig	2018-05-1 Arbeits / Klinische Umwelter Health Anzahl	40 40 87 V1 Sozialnedizin, edizin, Public Schwierig	n=248 p: n=267 p: 2018-10. Arbeits- und Um Anzahl	e0,85 =0,85 29 Klausurer Sozialmedizin weltmedizin Schwierig.	n 2019-10. in Arbeits- und Um	28 Klausuren Sozialmedizin weltmedizin Schwierig	
Klass La	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits stiffkations Auswertung Klassifikation * i Fach * Arbeitsmedizin/Sozialmedizin	-/Sozialm -/Sozialm Summe	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20	nd Umweitm nd Umweitm 12 Klausur 1 Prävention 5. Sem.MSG 5.chwierig 0.75	2017.06- Arbeitsm Präventi MSG SS Anzahl 20	29.10.2018 28.10.2019 22 Klausuren edizin und on Sem. 2017 Schwierig 0.62	40 / 40 / 2017-10-3 Arbeits / Umwelter MSG, WS Anzahl 20	40 40 00 Klausuren Sozial- und edizin 7. Sem, 17/18 Schwierig 0.79	2018.05.1 Arbeits / Klinisch Umwehn Health Anzahl 20	40 40 87 V1 Sozialmedizin, edizin, Public Schwierig 0,91	n=267 p: n=267 p: 2018.10. Arbeits- und Um Anzahl 20	e0,85 =0,85 29 Klausure 5 Sozialmedizin weltmedizin Schwierig.	n 2019-10. Arbeits- und Um Anzahl 20	20 Klausuren (Sozialmedizin wehmedizin Schwierig 0,79	
Klass Man F3	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits selfkations Auswertung tile anzeigen Klassifikation * E Fach * E Arbeitsmedzin/Sozialmedizin Arbeitsmedzin	-/Sozialm -/Sozialm Summe 120 104	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20 19	ad Umweltm ad Umweltm Pravention Sem.MSG Schwierig 0.75 0.75	2017-06- Arbeitsm Präventi MSG SS Anzahl 20 19	29.10.2018 28.10.2019 22 Klausuren edizin und on 10. Sem. 2017 Schwierig 0.82 0.81	40 /- 40 /- 2017-10-3 Arbeits-/ Umweltm MSG, WS Anzahl 20 18	40 40 00 Klausuren Sozial- und edizin 7. Sem. 17/18 Schwierig 0,79 0,81	2018-05-1 Arbeits-/ Klinische Umwehr Health Anzahl 20 17	40 40 57 V1 Sozialmedizin, edizin, Public Schwierig 0,91 0,93	n=248 p: n=267 p: 2018-10. Arbeits- und Um Anzahl 20 15	=0,85 =0,85 29 Klausure 29 Klausure 29 Klausure 20 Kla	n 2019-10. In Arbeits- und Umr Anzahl 20 16	28 Klausuren Sozialmedizin weltmedizin Schwierig 0,79 0,77	
Klass Lan	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits sallfastions Anwertung Weinselikation * E Fach * Arbeitsmedizin/Sozialmedizin Arbeitsmedizin Sozialmedizin	-/Sozialm -/Sozialm Summe 120 104 16	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20 19 1	22 Klausur Prävention 5. Sem.MSG 0.75 0.75 0.83	2017-06- Arbeitsm Präventin MSG SS Anzahl 20 19 1	29.10.2018 28.10.2019 22 Klausuren edizin und on 10. Sem. 2017 Schwierig 0.62 0.61 0.87	40 /- 40 /- 2017-10-3 Arbeits-/ Urnweitim MSG, WS Anzabi 20 18 2	40 40 80 Klausuren Sozial- und edizin 7. Sem, 17/18 Schwierig 0,79 0,81 0,60	2018-05-1 Arbeits-/ Klinische Umweltn Health Anzahl 20 17 3	40 40 77 V1 Sozialmedizin, edizin, Public Schwierig 0,91 0,93 0,82	n=248 p: n=267 p: 2018.10. Arbeits- und Um Anzahl 20 15 5	29 Klausurer Sozialmedizin Schwierig.	n 2019-10 in Arbeits- und Um 20 16 4	28 Klausuren Sozialmedizin veltmedizin 0.79 0.77 0.85	
F3	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits antikations-Answertung tte anzeigen Klassifikation * E Fach * Arbeitsmedizin Sozialmedizin * Cesundheitskonomie, Gesundheit	-/Sozialm -/Sozialm Summe 120 104 16 ± 20	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20 19 1	d Umweltm nd Umweltm 12 Klausur 12 Klausur 19 Pravention 1. Sem.MSG 5. Schwierig 0.75 0.75 0.83	2017-06: Arbeitsm Präventi MSG SS Anzahl 20 19 1	29.10.2018 28.10.2019 22 Klaussuren sedicin und 0.52 0.61 0.67	40 / . 40 / . 2017-10-3 Arbeits -/ Urnweiten MSG, WS Anzahl 20 18 2	40 40 10 Klausuren Soziat- und eedizin 7. Sem. 17/18 Schwierig 0.79 0.81 0.60	2018-05-1 Arbeits / Klinischu Umwelth Health Anzahl 20 17 3 20	40 40 50 cirialmedizin, edizin, Public Schwierig 0,91 0,93 0,93 0,93 0,93	n=248 p: n=267 p: 2018.10. Arbeits- und Um Anzabl 20 15 5	29 Klausurer Sozialmedizin Schwierig. 0,88 0,88 0,88	n 2019-10. Arbeits- und Um - Anzahl 20 16 4	28 Klausaren /Sozialmedizin weitmedizin Schwierig 0,79 0,77 0,85	
F3	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits stiffkations Auswertung Ute entreigen Klassifikation • E Fach • E Arbeitsmedizin Sozialmedizin Sozialmedizin • Gesundhebsikkonomie, Gesundheit Gesundhebsikkonomie, Gesundheit	-/Sozialm -/Sozialm Summe 120 104 16 ± 20 5 20	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20 19 1	d Umweltm d Umweltm 12 Klausar Prävention 5 Sem MSG 5 Schwierig 0,75 0,75 0,83	2017-06- Arbeitan Praventi MSG SS Anzahl 20 19 1	29.10.2018 28.10.2019 22.Klausaton entities 29.Klausaton entities 2017 Schwierig 0.82 0.81 0.87	40 / . 40 / . 2017-10-3 Arbeits-J Urnwelten MSG, WS Anzahl 20 18 2	40 40 10 Klasseuron Sozial- and endin 7. Som, 17/18 Schwierig 0.79 0.81 0.60	2018-05.1 Arbeits / Klinischu Umwehn Health Anzahl 20 17 3 20 20	40 40 77 V1 Socialmedizin, edizin, Public Schwierig 0,91 0,93 0,93 0,93 0,93 0,93 0,93	n=248 p: n=267 p: 2018-10. Arbeits- und Um Anzabl 20 15 5	=0,85 =0,85 29 Klausure 29 Klausure 20 Kla	n 2019-10 Arbeits- und Um - Anzahl 20 16 4	28 Klausuren Sozialmedizin wehmedizin 0.79 0.77 0.95	
Klass (2) Al F3 Q3 Q6	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits 2019-10-28 Klausuren Arbeits selfkations Klassifikation * E Fach * E Arbeitsmedizin Sozialmedizin Arbeitsmedizin * Gesundheitskonmie, Gesundheit * E Kinische Umweltmedizin	-/Sozialm -/Sozialm Summe 120 104 16 20 5 20 70	edizin un edizin un 2016-06-0 ArSo und SS 16, 10 Anzahl 20 19 1	d Umweltm d Umweltm D2 Klausur Pravention Schwierig 0,75 0,75 0,83	2017-06- Arbeitan Präventin MSG SS Anzahl 20 19 1	29.10.2018 28.10.2019 22 Klausuren edeltin auf. 2017 Schwierig 0.62 0.81 0.87	40 / . 40 / . 2017.10.3 Arbeits / Urnswellen MSG, WS Anzahl 20 18 2 2	40 40 90 Klaussuren Sozial- end edkin 7. Sem. 17718 Schwierig 0,79 0,81 0,60	2018-05.1 Arbeits-/ Klinischu Umwehn Health Anzahl 20 17 3 20 20 10	40 40 57 V1 Socialmedizin, edizin, Public Schwierig 0,51 0,82 0,84 0,84 0,84	n=248 p: n=267 p: 2018-10. Arbeits- und Um Anzabl 20 15 5	=0,85 =0,85 29 Klausure 29 Klausure 20 Kla	a 2013-10 Arbeits- und Um - Anzahl 20 16 4 20	28 Klausuren Sozialmedizie weltmedizie 0,79 0,77 0,85 0,91	
F3 Q3 Q6	2018-10-29 Klausuren Arbeits 2019-10-28 Klausuren Arbeits 2019-10-28 Klausuren Arbeits sallikation Weisen Klassifikation * E Fach * Arbeitsmedizin Sozialmedizin * Gesundheitskikonomie, Gesundheit Gesundheitskikonomie, Gesundheit Gesundheitskikonomie, Gesundheit Umveitmedizin	-/Sozialm -/Sozialm Summe 120 104 16 20 20 70 70	edizin un edizin un 2016.06.0 Arso und Ss 16, 10 Anzahl 20 19 1	d Umweltm d Umweltm 12 Klausur Prävention . Sem.MSG Schwierig 0,75 0,75 0,83	2017-06- Arbeitsm Präventi MSG SS Anzahl 20 19 1	29.10.2018 28.10.2019 28.Klauston and 10.5 sen. 2017 Schwierig 0.81 0.81 0.87	40 / . 40 / . 2017.10.3 Arbeits / Urnswellin MSG, WS Anzahl 20 18 2 2 20 20 20	40 40 10 Klausuren Sozial- und edizin 7. Sem. 17/18 Schwierig 0,79 0,81 0,60 0,80 0,80	2018.05 Arbeits / Klinische Umweiter Health Anzahl 20 17 3 20 20 10 10	40 40 57 V1 Schwierig 0,51 0,53 0,52 0,84 0,84 0,84 0,85 0,89 0,89	n=248 p: n=267 p: 2018-10. Arbeits- und Umm Anzahl 20 15 5 20 20 20	=0,85 =0,85 29 Klaussurer 20 Socialmedizi schwierig. 0,85 0,85 0,83 0,83	n 2019-10 Arbeits- und Um 20 16 4 20 20 20	28 Klausaren Sozialmedizin Schwierig 0.79 0.77 0.95	

#### Figure 2

Discipline classifications of items using the example of the subject area " Work and social medicine".

about a shift in the examination system.

There is still a need to optimise the implementation of the comprehensive examination programme in the IMS, in order to simplify the comparability of cohorts, for example. So far, this is only possible by creating a respective group pool for each cohort and assigning the corresponding examinations to this group pool. At this point, it would make sense to be able to create these centrally as well, such as the study programme and examination regulations. Subsequently, when creating exams, they could not only be assigned to a "performance record", but also to a cohort. In the sense of interprofessional teaching, multiple assignments would be desirable in both cases. Such an approach would also make it possible to supplement the comprehensive examination programme with a corresponding report based on the examination regulations and cohort.

From a technical point of view, the multiple classification of an item will be challenging. An example of this would certainly be an item that is assigned to

several subjects. How can this be plausibly listed in a statistical eva tion? Unfortunately, the graphical overviews described here can be displayed for examinations that were created and carried out the IMS, and the authors must provide very specific additional infor tion such as classification and learning objective assignment.

It should also be mentioned that the comprehensive examina programme has so far only depicted the current state of affairs. interpretation of the values is therefore left to the viewer. The ex to which they can be technically supported needs to be investigated

Nevertheless, it can be stated that the comprehensive examina programme provides a complete overview of the current state of assessments and their contents and can therefore be used both curriculum development and the identification of learning object that have been assessed more than once or not at all. It is also pos le to record the entire spectrum of competencies acquired by stude and thus to validly document whether all competencies required practising medicine have been assessed.

#### HENNING SCHENKAT

RWTH Aachen University, Medical Faculty, IT Coordination Studies & Teaching & Exam Management, Aachen, Germany



Figure 3

Illustration of question types used in the examinations conducted in the field of "Occupational and Social Medicine"

ilua- only with ma-	[1] Lommer-Steinhoff S. Wird gelehrt, was gelehrt werden soll? Nutzen des Mappings für die Curriculumentwicklung. In: Gemeinsame Jahrestagung der Gesellschaft für Medizinische Ausbildung (GMA), des Arbeitskreises zur Weiterentwicklung der Lehre in der Zahnmedizin (AKWLZ) und der Chirurgischen Arbeitsgemeinschaft Lehre (CAL). Frankfurt am Main, 2528.09.2019. Düsseldorf: German Medical Science GMS Publishing House; 2019. Doc/24-01. DOI: 10.3205/19gma181., URN: urn:nbn:de:0183-19gma1812 Dieser Artikel ist frei verfügbar unter http:// www.egms.de/en/meetings/gma2019/19gma181.shtml
	[2] WOILIEF A, BIUSLE P, Valuer Bekell A, WOIL D, Schullpeiz-Blaurs K, Juli-
ation	ger J. Zuordnung von Prüfungsinhalten zu Lernzielen des deutschen nati- onalen kompetenzbasierten Lernzielkatalogs Medizin: Constructive Align-
An	ment bei der Curriculumsentwicklung. In: Jahrestagung der Gesellschaft
	für Medizinische Aushildung (GMA) Bern 14-17.09.2016 Düsseldorf-
tent	German Medical Science GMS Publishing House 2016 DocV5-154 DOL
	10.2205/16gma151_LIPN, urg.nbn.do.0192_16gma1517_Erai_vorfügbar_unter.
ed.	http://www.acma.do/an/mostings/gmo2016/16cma151.ohtml
	1010://www.eghis.de/en/meetings/gmazo16/10gma151.shtml
ation	[3] GORNOSlayeva M, Gallzsch E, Panle SV, Baessier F, Felstner L, Kurlz W, Junger Entwicklung eines longitudinalen kompetenzorientierten Gesamtnr üfungspro-
foll	gramme an der Medizinischen Fakultät Heidelberg. In: Jahrestagung der Gesell-
i dii	schaft für Medizinische Ausbildung (CMA) Bern 14–17.09.2016 Düsseldorf.
n for	German Medical Science GMS Publishing House; 2016. DocV39-375. DOI:
	10.3205/16gma317, URN: urn:nbn:de:0183-16gma3176 Frei verfügbar unter:
tives	http://www.egms.de/en/meetings/gma2016/16gma317.shtml
ssib-	[4] Fischer MR, Bauer D, Mohn K. Finally finished! National Competence Based Cata-
	logues of Learning Objectives for Undergraduate Medical Education (NKLM) and
ents	Dental Education (NKLZ) ready for trial. GMS Z Med Ausbild. 2015;32:Doc35.
for	1111p3.//d0l.01g/10.3203/211/2000377.
101	

# **Standardisation of** transnational assessments

he ESICM aims to have Intensive Care Medicine as a multidisciplinary specialty, accessible to various medical specialties and focused on the competencies required to ensure high-quality care, regardless of the primary specialty. The purpose of the ESICM examination for the European Diploma in Intensive Care Medicine

(EDIC) is to promote standards in education and training in intensive care medicine in Europe and across the world. This examination is intended as a supplement to specialist training and the taking of the two parts of the assessment should correspond to the levels of experience/training in Intensive Care Medicine. The written examination (EDIC Part I) aims to test the specific theoretical knowledge while the oral part (EDIC Part II) aims to test the competencies, expertise and professional behaviour at the end of the specific training (2-3 years) in intensive care medicine.

The EDIC examination is developed with representative European intensive care medicine specialists to carry out standardised and quality-assured assessments. The ItemManagementSystem (IMS) offers the possibility of ensuring that the EDIC examination is is reliable, valid, educationally impactful, cost-effective and acceptable [1].

One of the measures that can be taken in order to ensure validity is the creation of a so-called blueprint. An assessment blueprint's role is to help ensuring that examination is appropriately matched to the intended learning objectives, a process also known as constructive alignment [2]. In other words, it means that we should assess the topics and tasks that have been taught, in line with the concept of 'assessment drives learning'. A well-executed examination plan ensures that all learning outcomes of the curriculum are assessed. An assessment blueprint is a method of translating learning objectives into assessment practices, usually in a table that lists what is assessed by domains (e.g. individual tasks, curriculum components or assessment methods) [3]. The most common version is a two-dimensional table, which makes it easier to see what is assessed and what is not.

The ItemManagementSystem (IMS) offers the possibility to create individual blueprints. When creating a blueprint you can choose between different disciplines and subdiscipline matching your learning objectives. This IMS feature is used, for example, by The European Society for Intensive Care Medicine (ESICM), which has been a UCAN partner since 2014 and was the first specialist society to use tOSCE for its oral and practical assessments.

This two-step examination is based on a set of competencies for intensive care specialists as defined in the training programme "Competency-Based Training in Intensive Care Medicine in Europe" (CoBaTrICE). This blueprint is based on the 12 competency areas of CoBaTrICE, which comprise 102 competency statements. The CoBaTrICE competencies define the minimum standard of knowledge, skills and attitudes required for a physician to be certified as an intensive care specialist. They have been developed with the intention of being internationally applicable but able to take into account national practices and local constraints. EDIC Part I and Part II share a common blueprint, but the weighting of the exam domains is different and consists of a matrix of 3 sub-blueprints: blueprint 1, 2 and 3 (see table 1).

The two last columns on the right indicate the weighting of each blueprint 1 domain reflecting the emphasis on particular items and subsequently indicates the relative number of questions to be included for each domain. The blueprint has been created in a collaboration between ESICM and the Swiss Society of Intensive Care Medicine (SSICM).

EDIC Part II is a high-quality standard "objective structured clinical examination" (OSCE) for assessing knowledge-related competences in Intensive Care Medicine. Examinees will have to pass several skill stations, including three different clinical scenarios and computer stations. Apart from the standardised blueprint, also the scoring within clinical case scenarios (CCS) and computer-based scenarios (CBS) is standardised. For a given clinical problem or a vignette with e.g. a CT-scan of the abdomen, expected answers are prepared and scored by the Examinations Committee in advance. The standard setting and hence the pass mark of CCS and CBS are calculated using recognised techniques, such as Angoff and Borderline Regression. These most widely used techniques for standard setting, allow adjustment of the pass mark for each assessment, in response to

Blueprint 1	Blu	lepr	int 2	6	Blueprint 3			Weighting %	
Disease management	Pat	Ass	Tre	ICL	Gei	Adu	Pad	50%	Within domain
Cardiovascular disorders	Ы	es	atn	-	ner	1	di		20%
Renal and genito-urinary disorders	3	m	ner	lan	<u>a</u>	pat	atri		10%
Neurological disorders	Sie	len	7	ag	S	ien	0		15%
Gastrointestinal disorders	18			em	N	Its	ati		10%
Respiratory disorders	28	lia		len	ed		en en		15%
Infections	1	gn		-	ge		t,	1	20%
Other disorders (haemato-oncologic; metabolic- toxic; endocrine; peri-partum)		osis a							10%
Therapeutic interventions / Organ system support		nd mo						30%	
Medical treatment	1	Ĭ.							50%
Organ system support	1	9							30%
Peri-operative care	1	Bu						1	20%
Practical procedures	1							10%	
Respiratory system	1								40%
Cardiovascular system	1								40%
Central nervous system	1							1	10%
Patient general care								10%	
Resuscitation & initial management of the critically ill patient									50%
Comfort and recovery	1								20%
End-of-life care	1								10%
Patient safety and health management system	1								20%

#### Table 1 EDIC 1 Blueprint domains and their respective weights.

the difficulty of the examination. All these measures for standardisation ensure that a consistent quality of EDIC exam can be achieved. The EDIC examination has demonstrated consistency and reproducible results with the processing of both EDIC Part I and Part II in the standard setting.

The EDIC examination has established acceptance Europe-wide and internationally with the delivery of EDIC examinations 4 times a year (twice for each part) using the IMS since 2014. ◆

#### JULIE-LYN NOËL

European Society of Intensive Care Medicine (ESICM), Brussels, Belgium



[1] Van Der Vleuten, Cees PM. "The assessment of professional competence: developments, research and practical plications." Advances in Health Sciences Education 1.1 (1996): 41-67. [2] Biggs JB. Verbesserung der Lehre durch konstruktiven Abgleich. Higher Education 1996; 32: 1-18. [3] Havs R. Blueprinting, Clin Teach, 2013 Dec;10(6):413-6, doi: 10.1111/tct.12105 PMID: 24219531

# **Creating good** multiple choice questions

he reservations about multiple choice questions are probably as old as this examination form itself. MC questions are said to be theory-heavy, to ask only detailed knowledge, not to reflect the everyday life of a general practitioner, and the ability to solve them is more often related to knowledge of hidden solution clues in the questions themselves rather than to real medical knowledge. And indeed, unfortunately,

one still frequently finds questions that fit this characterization. Here is an example:

#### **QUESTION 1**

Which statement about membranous glomerulonephritis is true?

- a) Typically, membranous glomerulonephritis is accompanied by RPGN (rapid progressive glomerulonephritis).
- b) PLA2R antibodies are always positive in membranous glomerulonephritis
- c) The MENTOR study investigated whether therapy with rituximab was non-inferior to therapy with ciclosporin over a period of 24 months. Non-inferiority was demonstrated. (correct)
- d) Spontaneous remission occurs in 50% of cases after 6 months.
- e) Histology shows clustered ruptures of the glomerular basement membrane.

Let us now look at a good clinical question:

#### **QUESTION 2**

A 56-year-old patient is referred to you because of increasing leg edema. These have developed over a 14-day period. Creatinine is 0.9mg/dl, proteinuria is 9g/24h. The renal biopsy shows subepithelial spikes in the normocellular glomeruli. Which disease is most likely present?

a) Lupus nephritis WHO III

- b) Membranous glomerulonephritis (correct)
- c) IgA nephropathy
- d) Membranoproliferative glomerulonephirits
- e) Post-infectious glomerulonephritis

Even without nephrology expertise, the differences between the questions can be seen. In fact, we find all the above-mentioned prejudices confirmed in question 1. Detailed knowledge is asked, the task has nothing to do with practice (which physician is presented with statements for evaluation in his daily routine?) and one can find the solution with a certain experience in answering MC questions by hidden solution hints - so-called cueings: On the one hand, answer b) will be wrong, because absolute statements like "always" or "never" are almost never true in medicine. On the other hand, very often the longest answer is the one we are looking for, because the question writers usually put the most effort into it. A further problem with statement evaluations is that the individual statements must always be either certainly wrong or certainly right. For example, with regard to statement d), there must be no population or study in which the 50% would be true.

Question 2 is different: The case described can occur at any time in a clinic or in an outpatient clinic. It is a common clinical problem, insofar as a diagnosis must be found for the patient. You can also tell the guality of the question by the fact that you can answer it without knowing the answer alternatives. Note also that the answer alternatives are all possible differential diagnoses, but the correct answer is the most likely diagnosis. Again, this reflects everyday clinical practice. And hidden solution clues are also not found due to the simplicity and brevity of the answer alternatives.

Now, how can one quickly determine for oneself whether a question that has just been laboriously developed is qualitatively good? For this purpose, it is recommended to ask oneself the question: "Would I ask this question to a young resident?" or: "Would I also ask this question in an oral exam? It quickly becomes clear that in test items analogous to question 1, the answer would be "No", whereas the answer to question 2 is clearly "Yes".

All these criteria were integrated into the question review tool of UCAN's item management system at an early stage. This offers the possibility of both checking questions for cueing, which would lead to a warning. On the other hand, the criterion "Answerable without knowledge of answer options", for example, indicates that this question is more likely not to be asked in an oral exam and thus cannot be counted among the highest quality items. From my own experience I can also say that through the regular review of questions, one's



**59** 

In order to pass on experience regarding the creation of good MC questions to the UCAN network, the first virtual training on this topic took place on 26 January 2021 with 34 participants. The two-hour examiner training consisted of 3 modules: (1) "What is a good question or exam" (2) Planning exams and (3) "Evaluation and interpretation of statistical parameters of an exam". Due to the very positive feedback, a continuation and development of a training series is planned.  $\blacklozenge$ 



#### MARKUS KRAUTTER

Klinikum Stuttgart, Klinik für Nieren-, Hochdruck- und Autoimmunerkrankungen, Stuttgart, Deutschland

# Using item-review processes to improve exam quality



ssuring high examination quality is of central importance within the design of examinations. The previous articles in this chapter have explained how an overall examination programme can optimise the examination system (see pages 52-55) and how the use of blueprints in cross-national

OSCE examinations (see pages 56-57) can optimise examination quality. From the first moment of conception of an item, over feedback of the examination, to the item review by all persons involved, numerous processes have to be performed and coordinated. Standardised item review processes of examination questions can be used as a quality management tool before the actual examination is conducted. The items of an examination can thus be checked for inconsistencies in form and content. This should not be done by the item creator, but additionally by independent reviewers. If the items are created using the ItemManagementSystem (IMS), the platform offers the author the option of granting other IMS users access to the item. In general, the review within the IMS can be carried out by one person (individual review) or by a group of people (group review), but this has no effect on the available review options. It can be specified whether both a content review and a formal review should be carried out (see figure 1).

The formal review criteria include, for example, the permissibility of the question type, the presence of hidden solution hints or also the homogeneity of the answer options. For all criteria, it can be indicated in the course of the review whether no (green), minimal (yellow) or serious (red) conflicts occurred. In addition, further comments can be entered in an explanation field (see figure 1). Non-trivial discrepancies, such as spelling mistakes, can be corrected directly by the reviewer. The quality of the item is indicated on a scale (1-5 stars). The more stars obtained, the higher the quality of the respective item. In the UCAN examination network, the State Medical Chamber of Hesse is one of the UCAN partners that make extensive use of the item review option integrated in the IMS, which is why the item creation and the item review process at the State Medical Chamber of Hesse are explained below.

In State Medical Chamber of Hesse, which has been a UCAN partner since 2015 and actively uses the IMS, three teams of experts create examination questions for the final examination (areas of examination: Medical Assistance, Business Organisation and Administration, Business and Social Studies) and the interim examination (examination areas: Medicine and Administration).

The submitted examination questions relate to a practice-oriented problem (case vignette) and reflect learning contents of the training framework plan as well as tendency contents of the framework curriculum (learning fields). Each examination question is considered in the context of the entire case (star-shaped case vignette) within the framework of the review. In addition to grammatical and technical/ content-related accuracy, it is important to choose simple, clear language in the question and the answer options, which does not overburden the examinee's language competence.

The criteria for the formal and content-related review provided in IMS give orientation. The State Medical Chamber of Hesse mainly uses group reviews, but occasionally also individual reviews.

However, it is critical to note that at present it is not possible to evaluate each question separately for the review of "star-shaped case templates". The score is subsequently an average score of the overall item. An exclusive grammatical/orthographical correction of an examination question requires a new review. However, we believe that the review of an examination question should only be repeated if the content is revised. In addition to the evaluation by means of the traffic light system described above, "comments, suggestions for changes, references" can also be sto-

#### C Formal review

Format is correct (K.O.) No clues in answer alternatives / no cueing (K.O.) Question is answerable without the answer alternatives Answer alternatives are homogenous

# •

#### Content review

Correct classification Correct in respect of content (*K*.O.) Difficulty of the question is appropriate for the target group Correct use of patient vignette Question is plausible and understandable (*K*.O.) Answer alternatives are plausible and understandable (*K*.O.)

#### Explanation

I would suggest adjusting answer option B.

B I  $x_2$   $x^2$   $\Omega$   $\equiv$   $\equiv$   $\blacksquare$ 

Figure 1 Exemplary overview of the different criteria of the formal and content review. **61** 



red in the review module; a link to the rubric "comments and references" in the item submission would facilitate the processing of the examination questions.

In conclusion, it can be said that the item review system integrated in the IMS is an effective, standardised method to check item quality prior to its intended use and to correct questionable items if necessary. ◆

#### UTE CLOSMANN & ROSWITHA BARTHEL

State Medical Chamber of Hesse, Frankfurt on the Main, Germany

The original article was written in German by Ute Closmann and Roswitha Barthel. This English translation was carried out by the Institute for Communication and Assessment Research.

# Test statistical analysis and its importance in the evaluation of test items

#### Figure 1

Exemplary representation of an evaluation of two type A questions in the EXaminator, illustrating the frequency analysis of the answers given (A-E), as well as the discrimination index. The discrimination index divides the total sample into the three groups of worst, average and best performers on the basis of terciles. A) The response behaviour for a good question is shown in this figure. The correct answer option (shown in green) was chosen most frequently; all incorrect answers (distractors; shown in red) were also crossed. The discrimination index graph also shows that individuals with better overall exam performance select the correct answer more often than those with poorer overall exam performance. B) The detailed frequency analysis of all answer options, including distractors, conducted in this example identifies answer option (D) as conspicuous, as it was chosen more often than the correct answer, and increasingly even by persons with a good overall examination performance.





n essential objective of test design is the creation and selection of test items that can differentiate between persons with different characteristics. This can only be achieved if not all participants answer the test items identically. In classical test theory, various parameters have become established for

evaluating the quality of test items and their psychometric suitability for measuring particular characteristics. The most familiar indices of item analysis are item difficulty and discriminatory power [1,2].

The item difficulty index pi describes the proportion of correct answers in relation to the size of the total sample [3,4]. The quotient of item difficulty has a value range from 0 to 1; if 65 out of 100 examinees answer an item correctly, this results in a quotient of p = 0.65. The more often a test item is answered correctly, the higher the difficulty index. Thus, as the difficulty index increases, the probability that a person will answer an item correctly increases. This shows that the item difficulty is actually interpreted the other way round, since the difficulty index is low for difficult tasks and high for easy tasks [3,4]. If almost all respondents answer a test item correctly, or if almost no one succeeds in answering the item correctly (i.e. very high or low difficulty index), the differentiation ability of the test item is very low [1,2]. For this reason, medium item difficulties are usually aimed for.

The discriminatory power rit of an item is defined as the correlation between the result of a test item and the corrected overall result of an exam (i.e. the overall test value without the corresponding item) and can assume values between -1 and 1 [1,2,4]. A high positive discriminatory power indicates that a test item differentiates well between individuals with different characteristics and is therefore closely related to the overall test. A low discriminatory power means that the overall result cannot be predicted by answering the test item, or can only be predicted inadequately, and the item does not differentiate between persons with different characteristic values. Generally, items with coefficients of discrimination

MAGDALENA KRIEBER-TOMANTSCHGER, HANS-CHRISTIAN CALUBA, DANIEL ITHALER

Medical University of Graz, Organisational Unit for Studies

and Teaching, Graz, Austria

 Döring, N.; Bortz, J. Forschung 2015; Berlin, Heidelberg: Sprii [2] Moosbrugger, H., Kelava, A. Springer.
 Lienert, G.A., Raatz, U. Testa Union.
 Pospeschill, M. Testtheorie, Te [5] Kelley, T.L. The selection of Psychology. 1939; 30: 17-24.
 Möltner, A., Schellberg, D., Jü schrift für Medizinische Aushäl 63

the can erent eved ems ious l for y for item wers difswer often

scriminatory power [2]. A further parameter for the evaluation of the item quality is the so-called discrimination index D [5,6]. By dividing the groups based on the overall test value (in the EXaminator2 the division is done by means of terzines into the three groups of worst, middle and best performance; see Figure 1) the difference in item difficulty between groups with different characteristics can be determined.

of rit = 0.3-0.5 are classified as medium, and from

rit = 0.5 on as highly selective [1]. The discriminatory

power is therefore related to the difficulty, as test items

with extreme difficulty have lower discriminatory power

and test items with medium difficulty have higher di-

At the Medical University of Graz, the quality assurance of test items for paper-based written exams with at least 25 participants includes the analysis of item difficulties, item discrimination power and discrimination indices. The complete overview and the individual results of the test items are reported back to the responsible examiner, whereby reference is made to test items with extreme difficulties, low discriminatory power or test items for which a specific distractor was selected unexpectedly often. In case of conspicuous item characteristics (see Figure 1B), the examiners are recommended to revise the test items. In the case of errors in content, the test item will be deleted and the judgement adapted accordingly. The creation of high-quality test items is supported within the framework of in-house training programs. In the following article, quality indicators of examinations are discussed, which also play an essential role for the quality of examinations.

 Döring, N.; Bortz, J. Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften. 5. Auflage. 2015; Berlin, Heidelberg: Springer.
 Moosbrugger, H., Kelava, A. Testtheorie und Fragebogenkonstruktion. 2. Auflage. 2012; Berlin, Heidelberg:

Springer. [3] Lienert, G.A., Raatz, U. Testaufbau und Testanalyse. 5. Auflage. 1994; Weinheim: Beltz PsychologieVerlags-

[4] Pospeschill, M. Testtheorie, Testkonstruktion, Testevaluation, 2010; München; Ernst Reinhardt,

[5] Kelley, T.L. The selection of upper and lower groups for the validation of test items. Journal of Educational Psychology. 1939; 30: 17-24.

[6] Möltner, A., Schellberg, D., Jünger, J. Grundlegende quantitative Analysen medizinischer Pr
üfungen. GMS Zeitschrift f
ür Medizinische Ausbildung. 2006; 23(3): Doc53.

## **Quality indicators of exams**

xamination results are a decisive measure of study success. It is therefore important that examinations are based on high quality assurance. Common indicators of quality are reliability, validity and objectivity, which derive from classical test theory. According to the German Society for Medical Education, aspects

such as economy, justiciability, transparency and usefulness for students should also be considered when planning and conducting exams [1]. In addition, there is a requirement to select examination forms and methods that reflect both theoretical knowledge and practical skills. An example of this would be multiple-choice examinations in conjunction with Objective Structured Clinical Examination (OSCE) for passing a teaching unit.

UCAN supports the preparation, execution and evaluation of exams with the corresponding software tools of the ItemManagementSystem (IMS) and the EXaminator for the evaluation of exams. Various quality indicators are integrated here:

Behind the term validity is the general question whether a test measures what it is supposed to measure. When applied to the university context, the aim of determining validity of examinations is to determinewhether it reflects the learning objectives or the content taught in class. At the University Medical Center Hamburg Eppendorf (UKE), a catalog of learning objectives related to the thematic focus of each module provides good orientation for students and educators. A larger framework is provided by "the subject catalogues of the Institute for medical and pharmaceutical Proficiency Assessment (IMPP) [3], which describe the knowledge required for the written parts of the medical state examinations" and the National Competence-based Catalogue of Learning Objectives in Medicine (NKLM) [4], which supplements "Description of Skills and Abilities and Professional Attitudes". In the IMS, this can be illustrated via blueprint or by defining sections in the exam.

The objectivity reflects the independence of the execution and evaluation of the test results. This is given by the possibility of automated evaluation with the EXAMINATOR.

The value of the reliability allows an estimate of the measurement accuracy. The measure "Cronbach's Alpha" (internal consistency) provides information on the extent to which the items of a scale or a test are interrelated. The value can range from 0 (low correlation) to 1 (high correlation) and is output for an entire exam as part of the evaluation with the EXaminator. The evaluation of the quality of individual items on



the basis of difficulty and discriminatory power was described clearly in the previous article (see pages 62-63). Both values can be transferred from the EXaminator into the IMS and thus help in the compilation of later examinations with comparable difficulty.

In addition to determining quality indicators, the the UKE's IMS in particularhas another function: In the winter semester 2019/20 iMED DENT, the only model course of study for dentistry in Germany, was started and thus, in addition to iMED (medicine), the second model course of study in Hamburg [5]. Both courses of study are characterized by a very strong interweaving of different disciplines under one module topic (e.g. accident & musculoskeletal system). Regarding the examinations, there is a requirement for interdisciplinary examinations and OSCEs. The IMS offers the perfect platform for the coordination of exam preparation. Within this framework, the tasks/questions of the exams can be collected centrally and clearly arranged and then reviewed and approved by the responsible persons. The processes of item review using IMS are explained in a separate article (see pages 60-61).

However, in addition to the mathematically oriented quality indicators, there is a need for even more comprehensive training of examiners in the design of good exam questions. Only questions that are clearly phrased and whose difficulty is adapted to the level of education of the students will achieve corresponding quality indicators.

#### IELKA MEYER

University Medical Center Hamburg-Eppendorf, Medical Faculty, Deanery, Hamburg, Germany

[1] Bortz, J. & Weber, R. (2016). Statistik für Human- und Sozialwissenschaftler, Springer, Heidelberg [2] Jünger, J. & Just, J. (2014). Empfehlung der Gesellschaft für Medizinische Ausbildung und des Medizinischer Fakultätentages für fakultätsinterne Leistungsnachweise während des Studiums der Human-, Zahn- und

- Tiermedizin. GMS Zeitschrift für Medizinische Ausbildung, Vol 31(3) Dovc34 [3] Institut für medizinische und pharmazeutische Prüfungsfragen (2020). Gegenstandskataloge. https://www.impp.de/pruefungen/allgemein/gegenstandskataloge.html (abgerufen 10.09.2020)
- [4] MFT Medizinischer Fakultätentag der Bundesrepublik Deutschland e. V. (2015). Nationaler Kompeter ter Lernzielkatalog Medizin.

http://www.nklm.de/files/nklm\_final\_2015-07-03.pdf (abgerufen 10.09.2020) [5] Guse, A.H., Kuhlmey, A. Modellstudiengänge in der Medizin. Bundesgesundheitsbl 61, 132–140 (2018). https://doi.org/10.1007/s00103-017-2678-7









# Legal problems in answer-choice examinations\*

hen designing multiple-choice examinations, it is important to keep in mind that these examinations must

be planned, prepared and conducted in a legally compliant manner. As practical and non-discriminatory as this form of examination may be, there are a whole series of legal pitfalls that (apart from examinations such as the state examinations conducted by the Institute for Medical and pharmaceutical Proficiency Assessment) are repeatedly overlooked and thus make the exam contestable. The UCAN network offers an efficient way of exchanging information through the constant flow of communication between the UCAN partners. Legal aspects are also discussed in order to avoid legal pitfalls and thus increase the quality of the examination content, but also to be able to avoid legal consequences. In 2019, two workshops on the topic of examination law were offered at the UCAN conference in Heidelberg. In the following, two examples are presented, which are of particular practical importance:

#### I. OBSERVANCE OF THE **TWO-INSPECTOR PRINCIPLE**

Most higher education laws of Germany's individual federal states prescribe that an exam that may lead to the final failure of the study program (i.e.: the final exam attempt) must be evaluated by two examiners.

The special feature of examinations in the answer-choice procedure is that an evaluation in the classical sense does not take place after passing the examination: Checking whether the examinee has ticked the correct answers or put the cross in the wrong place can be done by a computer or at least by a person without any specialist knowledge in the respective examination field. All that is required is that the person (or computer) has a control sheet with the correct answers. The German Federal Constitutional Court therefore decided decades ago that the "evaluation" of an exam is upstreamed to the answer-choice procedure: it consists of the creation and selection of questions and answer options.

If, however, an examination is to be set up as a multiple-choice examination as well as an examination for which the two-examiner principle applies, this means that in order to ensure legal compliance, first and second examiners must design the work together. They must therefore agree jointly which questions should be asked and which possible answers should be offered to the examinees. A retrospective "approval" of the task after the second examiner's examination is not recognized by the courts.

#### **II. PROGRESSIVE SCORING OR DEDUCTION OF POINTS** FOR WRONG ANSWERS

The extent to which it may be permissible to design questions in "question blocks" and then to award progressive points or even to sanction incorrect answers with a deduction of points in the case of tests in the answer-choice procedure is a highly controversial - but predominantly negative - debate in the courts. The following scenario is meant: For a block of questions we have a thematic upper sentence and five related statements, which the examinee can mark as "true" or "false". Regularly,



From a legal point of view, such examination concepts tend to be inadvisable. Unless there is a (very) close connection between the individual







questions within a block of questions, there is usually no justification for,

- giving different weight to knowledge deficits (five wrong answers are weighted significantly differently depending on whether they are distributed over one, two or even more question blocks) or
- "devaluing" already positive examination knowledge by giving incorrect answers with regard to the assessment.

Although there are individual cases in jurisprudence which consider such a procedure to be permissible, there is nevertheless a high risk that an examinee who, for example, tries to defend himself against failing such an examination is likely to succeed in court. N

www.bildungsrecht-verenkotte.de

\* This article only considers the legal situation in Germany.

#### **PHILIPP VERENKOTTE**

Specialist lawyer for administrative law, Bildungsrecht Verenkotte, Cologne, Germany

05 Measure, assess and identify competences

4 4 0

5

~

\*

Q

•

phie

/.



 $\diamond$ 

# **Editorial**

ompetency-based education requires competency-based assessments. Anyone who has been involved in the formulation of competence-oriented learning

Jana Jünger

objectives knows the challenge of precise formulation. The curricular implementation of the defined learning objectives as specified by the competence-oriented subject catalogue and the NKLM 2.0 is demanding. An interactive, interdisciplinary and interprofessional curriculum that puts the learners in the foreground and focuses on the sustainable acquisition of competencies is a task that can only be solved in a network of educators. The integration of different competencies in an examination, such as scientific and communication competence, the composition of the appropriate examination formats and contents in a mea-Supervisory Board member of ningful blueprint, as well as the Institute for Communication resource-efficient assessment and Assessment Research implementation and good feedback, additionally increase the degree of complexity for lecturers and those responsible for assessments.

In the following articles, the authors address these topics and show how the UCAN network brings together the different expertise of the partners and develops and makes tools available to all. The diversity of the presented projects, the interprofessionality of the actors, and the number of participating locations are impressive and support the common goal.

With the Master Plan for Medical Studies 2020 and the revision of the Medical Licensing Regulations (ÄAppO), the basis for competence orientation in training and assessment was created. For the first time, competence-oriented examinations in faculties and in the state examination [1] were included as a central, positive performance-controlling element and their

importance for outcome-based training was recognized [2]. How competency-based examinations can be designed is illustrated starting on page 72. The paradigm shift from purely knowledge-based (know-what) teaching and assessment formats to competency-based teaching and assessment formats emphasizes constructive alignment between learning objectives, teaching methods, and assessments. With the adoption of a competency-based subject catalogue and the National Competency-Based Learning Objectives Catalogue, the tools of the network can be used in an even more cross-faculty way in the future because there is a common classification for the content. The comparative research focuses on practical skills of academic and non-academic trainees is also exciting.

The joint project MERlin "Medical Education Research - Lehrforschung im Netz BW" (Medical Education Research - Teaching Research in the BW Network) was planned from the beginning of the funding as a Baden-Württemberg training laboratory for the implementation of the NKLM 1.0. Over the past few years, all the competence centers in Baden-Württemberg have worked together to determine how competence orientation in medical education can be systematically implemented in terms of both content and methodology in order to optimally prepare medical students for professional practice. In this context, it was and is important to involve students from all locations, who actively develop and design assessemnts themselves. The article starting on page 76 impresses how, despite changing students, consistently high quality and increasing distribution in the Progresstest Medicine could be achieved through good handovers and support. It becomes clear that the use of common synergies in the MERlin project contributes to the promotion of competence orientation and has achieved a national and - even with Austria an international - reach and cooperation between students and lecturers via an UCAN tool.

One of the main goals of the Master of Medical Education is to gualify multipliers and leaders for competence-oriented, innovative medical education and training. The two-year postgraduate program Master of Medical Education at Heidelberg University was designed in cooperation with the Medical Faculty Association (Medizinischer Fakultätentag, MFT) as a cross-faculty initiative with the aim of establishing a nationwide network of medical education experts. At the same time, the network provides an ideal basis for lecturers to directly test and evaluate innovations such as the introduction of a digital OSCE during the Corona pandemic. The innovative concepts for teaching and assessing in this master's program are described on the pages 78-81.

For the first time, communication and interprofessional skills of future physicians are given high priority in the ministerial draft. The Master Plan for Medical Studies 2020 explicitly stipulates the longitudinal anchoring of a communication curriculum. Communicative and interprofessional competencies are to be taught integrated with specialist aspects across all years of study. This is an enormous opportunity for all those who want to firmly implement communication and interprofessionality in the faculties' compulsory curricula and have collaborated intensively on this in recent years [3-8]. Working in an interprofessional team as well as communication skills are necessary core competencies in the activities of all health care professions and should be an integral part of the respective education, training and continuing education. The article on the pages 82-83. shows how interprofessional collaboration can be implemented in the examination by means of an OSCE station on interprofes-

sional collaboration. To support students and trainees in their competence development, good feedback is one of the most important teaching methods. Good feedback is time-consuming. The article starting on page 84 shows how annotated videos can be used to provide individualized formative and medium-term summative feedback on students' performance development. This UCAN tool can be applied in various learning and assessment scenarios and will open up new possibilities and ways in the design, planning and implementation of teaching and assessment units in the future. Through international cooperation and the experiences of Swiss colleagues, as presented in the context of the Swiss professional role model. UCAN partners receive interesting ideas in the following article on how professional, communicative and interprofessional competencies can be linked and examined together (see pages 88-91). New in the network is the use of UCAN tools for the

deepening and review of innovative content in the coming generations. Competence orientation among professionals requires an equivalent in the population and among patients. For sustainable patient and health care, however, not only the professional groups in the health care system should be taught competen03 08 2021)

abgerufen: 03.08.2021)

cies; health literacy is a central topic of behavioral and situational prevention in the National Health Literacy Action Plan [9]. In order to achieve universal health literacy in adulthood, health literacy should be an educational goal already in childhood and adolescence, should be promoted and the increase in performance should be made measurable. How health literacy can be taught and assessed among students in grades 7 to 9, and what UCAN tools will contribute to this, is explained in more detail in the last article of this chapter as a look into the future (see pages 92-93). Here, many new opportunities for interprofessional and fruitful collaboration between the network partners arise.  $\blacklozenge$ 

The original article was written in German by Jana Jünger. This English translation was carried out by the Institute cation and Assessment Research

[1] Jünger J. Kompetenzorientiert prüfen im Staatsexamen Medizin. Bundesgesundheitsblatt, 2018, 61: 171–177 [2] Frenk J et al. Health professionals for a new century: transforming education to strengthen health syste interdependent world Lancet 2010 4-376(9756)-1923-1958

[3] Jünger J, Mutschler A, Kröll K, Weiss C, Fellmer-Drueg, Köllner V, Ringel N (2015), Ärztliche Gesprächsführung in der medizinischen Aus- und Weiterbildung- Das Nationale longitudinale Mustercurriculum Kommunikation. Med Welt 2015; 66(4); 189-192.

[4] Institut für medizinische und pharmazeutische Prüfungsfragen. Kommunikative Kompetenzen von Ärztinnen und Ärzten. Leitfaden zur Implementierung des nationalen longitudinalen Mustercurriculums Kommunikation in der Medizin. 2020, online verfügbar unter: https://www.bundesgesundheitsministerium.de/fileadmin/Datei en/5 Publikationen/Gesundheit/Broschueren/Leitfaden Kommunikative Kompetenzen med. Ausbildung.pdf (zuletzt abgerufen: 0.3.08.2021)

[5] Institut für medizinische und pharmazeutische Prüfungsfragen. Patientenorientiert lernen, prüfen, handeln - Entscheidungsfindung und ärztliche Dokumentation. Abschlussbericht zum Projekt "Gemeinsam klug entscheiden und den Patienten und Patientinnen verständlich vermitteln: Überprüfung der klinischen und partizipativen Entscheidungsfindung sowie der Fähigkeit zur ärztlichen Dokumentation im Staatsexamen Medizin". 2021, online verfügbar unter: https://www.bertelsmann-stiftung.de/de/publikationen/publikation/did/patienter orientiert-lernen-pruefen-handeln-entscheidungsfindung-und-aerztliche-dokumentation (zuletzt abgerufen:

[6] Institut für medizinische und pharmazeutische Prüfungsfragen. Berufsübergreifend Denken - Interprofessionell Handeln. Empfehlung zur Gestaltung der interprofessionellen Lehre an den medizinischen Fakultäten 2019, online verfügbar unter: https://www.impp.de/files/PDF/RBS\_Berichte/Berufs%C3%BCbergreifend%20 Denken%20Interprofessionell%20Handeln.pdf (zuletzt abgerufen: 03.08.2021)

[7] Jünger J, Mutschler A (2017). Nationales longitudinales Mustercurriculum Kommunikation in der Medizin. Schlussworte zur Publikationsreihe von Best Practice Beispielen, Med Welt, 2017; 68(6):1-3.

[8] Die Medtalk-Toolbox, Best Practice Beispiele zur ärztlichen Gesprächsführung sowie interprofessionellen Zusammenarbeit und Kommunikation. Online verfügbar unter: https://www.medtalk-education.de/toolbox/ (zuletzt

[9] Schaeffer et al. Nationaler Aktionsplan Gesundheitskompetenz. Die Gesundheit in Deutschland stärken. 2020, online verfügbar unter: https://www.nap-gesundheitskompetenz.de/ (zuletzt abgerufen: 03.08.2021)
## Design of competence-oriented assessments in medicine

nowledge, skills, and abilities as well as professional attitudes can be integrated as competences and observed particularly well in practice-oriented professional requirement situations. The acquisition of competences and the associated orientation towards competences in study programs is a basic prerequisite for adequately preparing graduates for their later professional life. The acquisition of knowledge as well as skills and abilities are usually only socially recognised by the completion of assessments and their certification for professional practice [1].

Assessments therefore play a central role in university teaching - even if not always to the students' pleasure. They fulfil different functions: on the one hand, they serve to test student performance for the purpose of selection and allocation of social status [2], on the other hand, they promote the acquisition of knowledge and competences and can take on a motivational and performance-enhancing control function for learning processes among students (e.g., the experience of competence or feedback on performance) [3].

Students often align their learning behaviour with the assessments requirements and learn what is examined ("assessment drives learning"). With the concept of "constructive alignment" (see Figure 1), which demands for a close interlocking of teaching, learning, and assessment, the learning process of students can be sensibly controlled and the motivation to learn sustainably increased. Once the learning objectives of a course have been defined, the forms of assessment are determined and the structure and content of the learning unit are coordinated with the assessment tasks [4].



In general, assessments are distinguished between summative and formative. Summative assessments are typically graded performances that are carried out after finishing a teaching unit, usually at the end of a semester or module, and are recorded in the study and assessment regulations of the respective faculties. In contrast, formative (mostly ungraded) assessments pursue the goal of documenting and providing feedback to students on their learning progress. Based on this foundation, further learning can be adapted and developed accordingly [6]. Formative assessments are typically not formally included in the study program or in examination regulations and form an important bridge between learners and summative assessments.

Since students primarily orient their learning process towards grade-relevant assessments, assessment tasks and requirements must be closely aligned with the intended learning and competence goals [4]. Only through close coordination between learning objectives, teaching methods used during teaching-learning activities, and assessment requirements and design can the students' learning processes match the assessment requirements in the best possible way and contribute to the desired learning success. In order to support deep learning and sustainable competence acquisition among students, the learning objectives should therefore be clearly defined, operationalised, and transparently communicated in a first step when planning the courses. Here, for example, the learning objective taxonomy according to Bloom (1956) or the learning objective taxonomy matrix by Anderson and Krathwohl (2001) can be used [7,8]. During the design of learning objectives, their verifiability should already be taken into account and the choice of assessment content, an adequate form, as well as suitable task types and situational requirements should be considered [2]. If, for example, the learning objectives of a course are aimed at the acquisition of competences in complex, performance-oriented, subject-matter problems, solution-oriented strategies for mastering such practical, problem-oriented tasks should be included in the assessment scenario.

In addition to the orientation towards the assessment requirements of pre-defined learning objectives, certain aspects should be taken into account for the selection of suitable task types and assessment formats in the sense of a competence-oriented design. According to Schaper et al. (2013), the selection of the question type (e.g., open/closed questions), in contrast to the selection of the assessment format (e.g., oral/written exam), takes on an important role, as the assessment format allows a broad scope for action, but can only be concretised by the question type used [2,9]. When designing the exam questions, care should therefore be taken that:

- (I.) the requirement of the assessment task refers to the requirement formulated in the learning objective
- (II.) in the task the context-free or context-related requirement

is analysed and determined (i.e., with/ without reference to application)

- (III.) the complexity of the requirements is determined (e.g., number of solution steps to master the task)
- (IV.) the degree of "openness" of the assessment task is determined (e.g., by specifying answer options)
- (V.) the number of tasks for a learning objective/content area as well as the time for completion are defined
- (VI.) the quality criteria of objectivity, reliability, and validity are taken into account [9] (see also pages 64-65)

Assessment tasks and formats that have an action and application-oriented character and require complex cognitive performances from the students are primarily suitable for competence-oriented assessments [8]. It is important that students are informed at the beginning of the course about the assessment requirements, the assessment criteria,



and the didactic connection between teaching, learning, and assessment, as this usually guides their learning process [2]. Ideally, asse ment criteria (e.g., in the form of checklists, global rating scales, e form the basis for a standardised evaluation of performance. Chap 4 goes into more detail on the design of standardised, quality-assu assessments (see Chapter 4).

The high importance of competence-orientation in teaching assessment was quickly recognised in university medicine. The option of the Master Plan for Medical Studies 2020 [10], the r sed National Competence-based Catalogue of Learning Objectives Medicine (NKLM) [11], the current restructuring of the medical si examination [12], as well as the revision of the Medical Licensing gulations (ÄApprO) [13] and the subject catalogues of the IMPP [ have set and will continue to set the course for competence-orien teaching and assessment in medical education. This transformation process of teaching and assessment towards competence orientation will challenge the medical faculties in the coming years and lead reorientation of the curricula with a higher degree of interdisciplina and a stronger integration of knowledge and skills.

The Medical Curriculum Munich (MeCuM) at Ludwig-Maxir ans-Universität (LMU) is already well on its way in this regard. As on the three founding members of the UCAN assessment network, the L Medical Faculty already offers a cross-disciplinary curricular struct with competence-oriented longitudinal strands on clinical skills communication and scientific competences in a study programme is module-oriented, particularly in the clinical section. In addition to v ten and oral assessment formats, the activity- and competence-orier OSCE format has also been used for many years in various formative summative contexts with the help of electronic tablet-based check from the UCAN network. Since 2017, the written assessments h been gradually converted to tablet-based e-assessments using the ic ly developed tools of the network. The acceptance of these e-asse ment formats is high among students and teachers alike, especially to the rapid provision of results. The electronic assessment infrastructure has also made it possible to incorporate new question formats with media inclusion and represents a good basis for the further development of our assessment system in the direction of competence-orientation within the framework of MeCuM.

## ANNA MUTSCHLER<sup>1</sup>, MARKUS BERNDT<sup>2</sup>, **CHRISTIAN P. SOMMERHOFF<sup>2</sup>**, MARTIN R. FISCHER<sup>2</sup>

<sup>1</sup> Institute for Communication and Assessment Research, Heidelberg, Germany <sup>2</sup> Institute of Medical Education, University Hospital, LMU Munich, Munich, Germany

-33-	Einführung. In E. Severing, R. Weiß (Hrsg.), Prüfungen und Zertifizierungen in
ess-	der beruflichen Bildung. Anforderungen-Instrumente-Forschungsbedarf (S. 15). Bundesinstitut für Berufschildung
etc.)	https://images.buch.de/images-adb/21/a0/21a00600-7e74-4f7c-9947-
pter	d137360a089b.pdf [zuletzt abgerufen am: 07.06.2021] [2] Gaus, D. (2018). Kompetenzorientiertes Prüfen: Handrei-
ired	chung der Prüfungswerkstatt. Zentrum für Qualitätssicherung und -entwicklung der Johannes-Gutenberg-Universität Mainz. https://www.zq.uni-mainz.de/files/2018/08/2_Kompetenzorientiertes-Pruefen. pdf [zuletzt abgerufen am: 07.06.2021]
and	[3] Walzik, S. (2012). Kompetenzen prüfen: Leistungsbewertung an der Hochschule
ad-	<ol> <li>Herone and Frazis, Kompetent termen (Gala V).</li> <li>Biggs, J. (2003). Aligning Teaching and Assessment to Course Objectives. Teaching and Learning in Higher Education: New Trends and Innovations.</li> </ol>
evi-	University of Aveiro
s in	Aligning%20Teaching%20and%20Learning%20to%20Course%200bjectives.
tate	pdf [zuletzt abgerufen am: 07.06.2021] [5] Hochschule Rhein-Waal (2017) Kurz vorgestellt- Cons-
Re-	tructive Alignment. eLearning und Medientechnik Blog.
12]	https://elearning.hochschule-rhein-waal.de/blog/2017/12/12/kurz-vorge- stellt-constructive-alignment/ [zuletzt abgerufen am: 07.06.2021]
nted	[6] Frölich-Steffen, S., den Ouden, H. (2019). Hochschulprüfungen im Fokus. Vom
tion	Frölich-Steffen, S., den Ouden, H., Gießmann, U. (Hrsg.), Kompetenzorientiert
tion	Rahmenbedingungen und praktische Handlungsempfehlungen (S. 11-27).
to a	[7] Bloom, B. (1956). Taxonomy of educational of objectives: the classification of educatioal goals.
aritv	[8] Anderson L, Krathwohl D. (2001). A taxonomy for learning, teaching and asses-
.,	<ul><li>[9] Schaper, N., Hilkenmeier, F., Bender, E. (2013). Umsetzungshilfen f ür kompeten-</li></ul>
	zorientiertes Prüfen. HRK Zusatzgutachten. Hochschulrektorenkonferenz. Projekt
niii-	de/fileadmin/redaktion/hrk-nexus/07-Downloads/07-03Material/zusatzgutach-
e of	ten.pdf [zuletzt abgerufen am: 07.06.2021] [10] Bundesministerium für Bildung und Forschung (2017). Masterplan Medizin-
MU	studium 2020 (Beschlusstext). https://www.bmbf.de/files/2017-03-31_Master-
ture	[11] Medizinischer Fakultätentag (2021). Nationaler kompetenzbasierter Lernziel-
and	katalog in der Medizin. Version 2.0. https://nklm.de/zend/menu/index [zuletzt abgerufen am: 07.06.2021]
that	[12] Institut für medizinische und pharmazeutische Prüfungsfragen. www.impp.de
writ-	[13] Bundesministerium für Gesundheit. Referentenentwurf- Verordnung zur Neure-
nted	gelung der ärztlichen Ausbildung. https://www.bundesgesundheitsministerium. de/fileadmin/Dateien/3_Downloads/Gesetze_und_Verordnungen/GuV/A/Refe-
and	rentenentwurf_AEApprO.pdf [zuletzt abgerufen am: 07.06.2021]
lists	
ave	
oint-	
ess-	
due	

[1] Severing, E. (2011). Prüfungen und Zertifikate in der beruflichen Bildung: eine

### **CHAPTER 5 – MEASURE, ASSESS AND IDENTIFY COMPETENCES**

## Sharing synergies in the MERlin project competency orientation in medical education

he collaborative project MERLIN "Medical Education Research - Lehrforschung im Netz BW" (www.merlin-bw.de) is the result of a cooperation between the five medical faculties in Baden-Württemberg as part of the two funding cycles of the BMBF's Quality Pact for Teaching from 2012 to 2020 [1].

In order to prepare medical students even better for professional practice, the collaborative project had set itself the goal of systematically implementing competence orientation in medical education both in terms of content and methodology. The basis for this was the National Competence-based Learning Objectives Catalogue for Medicine (NKLM), which defines medical competences and their corresponding level, that students should master after completion of medical studies [2]. These efforts were confirmed by the master plan for Medical Studies 2020 and the draft of the new licensing regulations for physicians (ÄApprO) [3; 4].

Coordinated by the team in Tübingen, the five medical faculties in Baden-Württemberg were working on complementary sub-projects, which were being implemented in corresponding competence centres: evaluation (University of Freiburg), examinations (University of Heidelberg), practical year (University of Mannheim), medical didactics (University of Tübingen) and e-learning (University of Ulm). The Center of Excellence for Assessment in Medicine (KomPMed; www.kompmed. de) at the University of Heidelberg was dedicated to the development of a competence-oriented examination programme. This involved, on the one hand, adapting or newly developing exam content and formats so that the teaching and learning content defined in the NKLM could be tested. On the other hand, electronic aids were made available for the implementation of the overall examination programme based on the NKLM ("exam blueprint"). Here, there was a close cooperation with UCAN right from the start of the project. Within the framework of this cooperation, several modules of the ItemManagementSystem (IMS) were further developed or newly designed. One example is the module "Exam Blueprint", which supports the user in compiling exams on the basis of a pre-defined table of contents ("Blueprint") and thus ensures the representativeness of the exam for the course content. The module allows the use of two classification axes, e.g. organ system, subject, competence or learning objective, and checks whether the choice of tasks corresponds to the blueprint [1; 5; 7]. A contribution on the topic of blueprints in cross-national examinations can be found on the pages 56-57.

As part of the collaborative project MERLIN, KomPMed also developed a new, innovative examination format in cooperation with UCAN: the student competency-oriented progress test (SKPT) in human medicine by students for students (www.komp-pt. de). The aim of the project was and still is to further develop the format of the progress test, which is suitable for longitudinal feedback, in the direction of competence orientation and to use it across faculties in order to provide medical students with feedback on their performance during their studies. The resulting SKPT has been offered once a year since 2013 as a cross-faculty, format-based test and is potentially open to all medical faculties that are UCAN partners. UCAN supports the SKPT, among other things, by helping to develop blueprints, conducting workshops to create exam questions or conducting joint educational research [5: 6: 7].

The SKPT examination questions are prepared by a cross-faculty team of medical students and are subjected to a multi-stage review process. A general detailed contribution on the topic of "item review" is presented on the pages 60-61. The 120 MC questions of the SKPT are developed on the basis of a two-dimensional blueprint, consisting of "subject groups" (according to ÄApprO) and "competence areas" (according to NKLM). Regular innovations ensure that the SKPT is always on the cutting edge of medical education. Thus, not only new question formats are introduced at regular intervals (e.g. Situational Judgement Test and Key Feature Questions), but also innovative additions are implemented (e.g. Confidence Rating). Since 2015 the SKPT has also been offered on a web-based basis. UCAN has provided an IMS platform specially designed for the purpose of the SKPT, in which only examination questions from students are processed. UCAN also developed the online tool for the web-based examination [5;7].

From 2013 to 2019 almost 90 students actively participated in the SKPT team. Over the years, the SKPT has been offered at more and more medical faculties (2013: 8 faculties, 2019: 18 faculties) and reached more and more students (2013: 469 participants, 2019: 1083 participants). For the MC questions, the participating students receive detailed and individual feedback regarding their performance status in their studies compared to the cohort of the academic year, both summarily and differentiated by subject groups and areas of competence. Students who have already taken the SKPT several times also receive a comparison of their performance with previous years. No points are awarded for the Situational Judgement Test questions of the SKPT, but the explanations of the alternative answers can be critically discussed by the students. In addition, the medical faculties also receive feedback on the academic year cohorts at their facility [5].

Overall, acceptance of the SKPT among students is very high. In a follow-up survey in 2018, around 90 % of the participants stated that they would like to participate in the next SKPT again. In addition, about 80 % of the participants reported that they were overall satisfied with the implementation of the SKPT. In 2020 the SKPT was conducted again. We look forward to reporting the results soon. ◆

### JANA STEIMER, NADINE LOBMÜLLER,

SASKIA PANTE, STEFAN WAGENER, ANDREAS MÖLTNER University of Heidelberg, Center of Excellence for Assessment in Medicine, Heidelberg, Germany





- [1] MERLIN Medical Education Research Lehrforschung im Netz BW. Verfügbar unter:
- www.merlin-bw.de (aufgerufen am 07.01.2021) [2] Medizinischer Fakultätentag der Bundesrepublik Deutschland e.V. (Hrsg.)
- (2015). Nationaler Kompetenzbasierter Lernzielkatalog Medizin (NKLM). Verfügbar unter:
- http://www.nklm.de/files/nklm\_final\_2015-07-03.pdf (aufgerufen am 07.01.2021)
- [3] Bekanntmachung des Bundesministeriums für Bildung und Forschung (2017) Masterplan Medizinstudium 2020. Verfügbar unter: https://www.bmbf.de/files/2017-03-31\_Masterplan%20Beschlusstext.pdf (aufgerufen am: 07.01.2021)
- [4] Bundesministerium für Gesundheit (2020). Verordnung zur Neuregelung der ärztlichen Ausbildung. Referentenentwurf vom 17.11.2020. Verfügbar unter: https://www.bundesgesundheitsministerium.de/fileadmin/Dateien/3\_Downloads/ Gesetze\_und\_Verordnungen/GuV/A/Referentenentwurf\_AEAppr0.pdf (aufgerufen am: 07.01.2021)
- [5] Studentischer kompetenzorientierter Progresstest. Verfügbar unter: www.komppt.de (aufgerufen am: 07.01.2021)
- [6] Wagener S, Möltner A, Fleig A, Heid J, Feistner L, Brass K, Burkert M. (2019). "Wo stehen wir?" – Feedback für Fakultäten des studentischen kompetenzorientierten Progresstest. In: Gemeinsame Jahrestagung der Gesellschaft für Medizinische Ausbildung (GMA), des Arbeitskreises zur Weiterentwicklung der Lehre in der Zahnmedizin (AKWLZ) und der Chirurgischen Arbeitsgemeinschaft Lehre (CAL). Frankfurt am Main, 25.-28.09.2019. Düsseldorf: German Medical Science GMS Publishing House; 2019. DocV1-07. https://dx.doi.org/10.3205/19gma007
- [7] Wagener S, Möltner A, Timbil S, Gornostayeva M, Schultz JH, Brüstle P, Mohr D, Vander Beken A, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Kreisel C, Moczko T, Ilig C, Jassowicz A, Müller A, Niesert M, Strübing F, Jünger J. (2015). Entwicklung eines formative kompetenzorientierten Progresstests mit MC-Fragen von Studierenden - Ergebnisse einer multifakultären Pilotstudie. GMS Z Med Ausbild. 2015 Oct 15;32(4):Doc46. doi: 10.3205/zma000988. PMID: 26483859; PMCID: PMC4606478.





## **The Master of Medical Education** (MME) programme -**Innovative concepts** for teaching and testing



he Medical Licensing Regulations from 2002 led to many changes and reform efforts at the medical faculties. In order to qualify multipliers and leaders for these new requirements in the field of medical teaching and examinations, the Medical Faculty Association (Medizinischer Fakultätentag, MFT) conceived the two-year postgraduate course of study, 'Master of Medical Education (MME)" as a cross-faculty initiative and established it administratively at the Medical Faculty of the University of Heidelberg. In accordance with the motto "train the trainer", the aim was and is to promote medical training expertise as well as learning and teaching research and to establish a nationwide network of medical training experts [1, 2].

Currently, seven German medical faculties (Aachen, Berlin, Dresden, Göttingen, Heidelberg, LMU Munich, and Tübingen) are involved in the organisation of one starting module and eight one-week modules. In addition, an elective module is offered annually. This module is dedicated to current topics in medical education, such as digitisation, health literacy, scientific competence, and interprofessional training, which are further developed within the MME community of Practice [3]. UCAN supports the programme in professionalising the participants in the area of examinations by teaching various examination formats in several modules under quality assurance aspects, testing them in practice, and evaluating them with the EXaminator (see figure 1). In the initial module, for example, a mock examination is conducted with multiple-choice (MC) gues-



### Figure 1 Overview of the MME modules. The integration of UCAN into the MME curriculum is marked green.

tions generated by the participants and statistically evaluated. Module 3 builds on this knowledge and deals with the creation, review, and evaluation of MC and key feature questions in the ItemManagementSystem (IMS). Oral-practical examination formats are used in module 5; Participants use UCAN's tOSCE app to record students' performance in the OSCE.

So far, 432 participants have started the MME programme and 215 of them have completed the programme with the award of the Master's degree certificate. An alumni survey, conducted in 2016, revealed that the participants were able to significantly increase their expertise in the various roles of medical education, particularly in the areas of education research and the improvement of teaching quality [2]. In September 2020, already the 17th cohort started with 26 participants. This means that the course was and is fully booked every year - demonstrating that the MME is firmly established in the medical postgraduate education landscape.

Not only in terms of content, but also in terms of methodology, the programme has developed further in recent years and adapted to current requirements. For example, in the wake of the COVID-19 pandemic, several modules of the programme were transformed into completely digital formats for the first time within a short period of time. (The COVID-19 pandemicrelated administration of written homebased-online examinations is listed on pages 104-105) A novelty in module 5 was the transfer of the OCSE course into virtual space: During the module, MME participants designed, revised, and tested this year's virtual OSCE stations using the IMS from UCAN. The OSCE course was then virtually simulated as a web conference under realistic conditions, with the examiners (i.e. MME participants) using UCAN's tOSCE app to evaluate the students (see figure 2, [4]).

As a general conclusion, it can be summarised that the implementation of the digital OSCE was very successful and was perceived by all participants as a valuable experience. However, while not all topics and settings are equally suitable for a valid examination in the virtual space, digitally conducted OSCEs offer great potential for e.g. telemedical communication stations [4].

For the participants, especially the inter-year exchange and the formation of a network plays an enormous role. In this context, experience with examination forms and their implementation is highly relevant,



### Figure 2

Digital OSCE diagram in MME module 5. From the main room of the video conference system, breakout (BO) rooms were established, which students and examiners entered according to the rotation plan. Simulation persons (SPs) and the moderator remained in the same rooms throughout the course. The examiners used UCAN's tOSCE app to document the results [4].

## SASKIA PANTE, STEFAN WAGENER, MICHAEL WEILER, SABINE HERPERTZ, JANA JÜNGER, MARTIN R. FISCHER, ROMAN DUELLI

Universität Heidelberg, Medizinische Fakultät,

MME-Studiengang, Heidelberg, Deutschland

[2] Jünger, J., Pante, S. V., Ackel-Eisnach, K., Wagener, S., & Fischer, M. R. (2020). Do it together! Conception and long-term results of the trans-institutional Master of Medical Education (MME) program in Germany. GMS Journal for Medical Education, 37(3), Doc33. https://doi.org/10.3205/zma001326 [3] http://www.mme-de.net/index.php?community

[4] Pante SV, Weiler M, Steinweg B, Herrmann-Werner A, Brünahl C, Gornostayeva M, Brass K, Mutschler A, Schaal-Ardicoglu A, Wagener S, Möltner A, Jünger J. Digitalization within the MME study program – teaching and assessment of communicative and interprofessional skills in the Heidelberg module via video conference together with a virtual OSCE course. GMS J Med Educ. 2020;37(7):Doc88. DOI: 10.3205/zma001381, URN: urn:nbn:de:0183-zma0013810

Jünger, J., Fischer, M. R., Duelli, R., Putz, R., & Resch, F. (2008). Konzeption, Implementierung und Evaluation eines interfakultären Master of Medical Education Programms. Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen, 102(10), 620-627.

## **Importance of interprofessional** competences in medical education



Figure 1

Handing over a patient via telephone. Source: "Heidelberger Standardgespräche. Handlungsanweisungen zur ärztlichen Gesprächsführung" Medical Faculty of Heidelberg University (2018)

Handing over a patient via telephone. Source: "Heidelberger Standardgespräche. Handlungsanweisungen zur ärztlichen Gesprächsführung" Medical Faculty of Heidelberg University (2018)



ver the past decade, the acquisition of interprofessional competencies has become essential for the curriculum of medical studies at the University of Heidelberg. Interprofessional collaboration not only helps to improve the well-being of patients but it has also a positive effect

on the work atmosphere of the entire medical team. At the same time, mutual respect within the professional groups is promoted [1]. The Master Plan 2020 also requests to focus more on the acquisition of interprofessional competencies and to create corresponding teaching opportunities (see pages 72-75).

Futur physicians must be prepared for situations that demand interprofessional competencies. Ever since 2010, the Medical Faculty of the University of Heidelberg therefore implemented an interprofessional setting with simulation persons (SP) in the compulsory interactive communication trainings (MediKIT) during the 6<sup>th</sup>/7<sup>th</sup> clinical semester of internal medicine. In this course students can, for example, try to hand over a patient to a nurse via telephone in order to both convey nursing-relevant content and develop understanding for the hectic everyday life of another professional group. An important focus is working on attitudes in order to soften the strictly hierarchical structure.

As students will repeatedly be exposed to interprofessional conflict situations, the MediKIT-trainings help students to understand how to professionally deal with such conflicts. The simulation with actual actors playing the role of a nurse creates a situation, in which they can learn to manage conflict discussions in a de-escalating manner and thus contribute to a good working environment. In order to further promote the development of their interprofessional competency, students receive professional feedback on their performance from the trained actors as well as from their fellow students.

Another interprofessional learning module was launched in 2015. In cooperation with students from the Interprofessional Health Care (IPG) training in Heidelberg, a concept aiming to raise students' awareness of team communication in a medical context' was developed. This concept focused on the necessity of good and goal-oriented communication as an important component for cooperative work in the medical team. In the past two years, a cooperation with the Academy for Nursing Professions in Heidelberg has also been established. In regular learning ur students from both medical and health care trainings have the portunity to learn with, about and from each other. Depending on profession, the students elaborate their respective focal points through role play with an actor during anamnesis and consultation interview

Many years ago, the Department of Internal Medicine develop an interprofessional examination station, in which the interprofe onal competency of students can be assessed. Similar in design case scenarios rehearsed in class, students can demonstrate th newly acquired interprofessional competencies in Objective Str tured Clinical Examinations (OSCE'). For this purpose, simula persons are trained in a standardised manner in order to offer students the same starting conditions. In Heidelberg, UCAN's tOS app is used to assess these competencies. Moreover, UCAN's simulated person database (SP-DB) supports the coordination and organisation of the simulated person's assignments and therefore enables a smooth workflow. Together, the UCAN tools like IMS, SP-DB and the tOSCE App form the perfect product for testing interprofessional competencies.

With regard to the upcoming transformation of the state examination, the Faculty of Medicine at Heidelberg University is therefore well prepared.





## Figure 2

nits,
op-
the
ugh
WS.
ped
essi-
n to
heir
ruc-
tion
r all
SCE
NIC

### ANDREA SCHAAL-ARDICOGLU, **BODO WILHELM, JOBST-HENDRIK SCHULTZ**

University of Heidelberg, Medical Faculty, Medi-KIT, Heidelberg, Germany

- [1] Ewers, M., Reichel, K. (2017): Kooperativ Lehren, Lernen und Arbeiten in den Gesundheitsprofessionen: Das Projekt inter TUT. Working Paper No. 17-01 der Unit Gesundheitswissenschaften und ihre Didaktik Berlin: Charite- Universitätsmedizin Berlin
- [2] Peters, Tim, Thrien, Christian (2018); Simulationspatienten, Ein Handbuch für die Aus- und Weiterbildung in medizinischen und Gesundheitsberufen. Hogrefe

## **Strengthening communicative** competences with video annotation

"Language is the dress of thoughts" [1], "Language is a weapon. Keep it honed." [2] or "A word once uttered can never be recalled." [3] - the list of quotes and aphorisms that emphasise the high significance of communication is long. There are many areas in which spoken language is an important and indispensable component. Ho-

wever, the spoken language is not limited to verbal communication, but also takes place through facial expressions and gestures as well as on a paraverbal level. Communication is the most important link between people and the basis for human coexistence. Every day we communicate with each other and in every relationship, communication takes place consciously and unconsciously. The ability to meet people at eye level, to understand and comprehend them through listening, to enter into and

build up a sustainable relationship are essential core aspects of successful conversation and a lasting relationship quality characterised by trust.

In health and medical care, a good conversation between patient and doctor is the basis for a sustainable doctor-patient relationship and represents a central component of professional action. If the quality of the relationship suffers, this can be associated with, among other things, low therapy compliance [4] and incorrect treatment by patients [5], or with legal complaints against doctors [6] and a deterioration in their state of health due to, for example, burnout [7, 8]. If, on the other hand, a patient-oriented, empathetic dialogue is successful, mutual trust can be built up, the willingness to cooperate can be promoted [4] and the success of the treatment, the satisfaction [9] and the health of the patients can be significantly influenced [10-13].

The high importance of communicative competences in health care has been recognised and taken up in political initiatives: Since 2012, medical conversation has been firmly anchored in medical teaching and assessments in Germany, as well as in the National Competence-Oriented Learning Objectives Catalogue in Medicine (NKLM) [14, 15]. The promotion of communicative and interprofessional competences in medical studies is also explicitly addressed in measures 7 and 8 of the Masterplan for Medical Studies 2020 and is also taken into account in the current draft for the revision of the Medical Licensing Regulations (ÄApprO) [16, 17]. Following this, communication skills are to become a component of the first, second and third sections of the medical examination as a higher-level competence [17] In order to prepare students for future interaction with patients, role plays with simulated persons (SP) have



become established in the teaching and assessment of communicative petences. (non-professional) actors take on the role of patients, pa tients' relatives or other actors in the healthcare in a credible manner in order to be to optimally able plan, simulate and reproduce teaching and exam scenarios [18]. Students can use the conversation techniques they have acquired in interaction with the actor and further de-

velop their communication skills. After performing the role play, students usually receive feedback from the actors, the student group and the lecturers.

As a supplementary didactic element, the role play can be recorded on video for reflection on doctor-patient communication. Through the possibility of viewing, fast-forwarding, rewinding and zooming, actions and behaviours can be shown up repeatedly and analysed and reflected in the group.

Video annotation tools go beyond this classic video analysis and enable a more active engagement with the learning content through the direct editing of videos. By recognising and marking individual video sequences (annotations), certain contents can be focussed on, links can be established or individual sections can be declared as unimportant [19]. Video annotations thus open up valuable possibilities and methods to strengthen communicative competences among medical students.

As part of the technical development of UCAN's assessment portfolio (aPortfolio), an electronic prototype teaching and examination format was developed in which videos can be uploaded to an electronic platform, linked to an exam task and enriched with annotations. The assessment criteria (annotations) predefined by the teacher and/or examiner are deposited by the students on the basis of self-selected video time mark. The annotations are displayed both in a timeline and in a list view. During the annotation, students have the possibility to jump between selected time stamps, to create several annotations of the same type and also to comment on individual video sequences (see Figure 1).

The video annotation tool can be used in various areas of teaching and examination in education, further education and training. For each video material, an individually adapted set of categories can be created by the teachers and examiners, with which observation criteria can be mapped. This enables students to carry out a theory- or category-based video analysis, in which case-based learning content can be acquired and trained

com-Trained system To check competences, lecturers and examiners can set threshold values for individual video sequences so that the examinees' annotations can be assessed according to the percentage of agreement. In doing so, the time period of certain video sequences are marked in advance by the lecturers and examiners, which take up one (or more) aspect(s) of the predefined category set to answer the question. If the students' annotations are within this marked time period, credit points are awarded based on the percentage. If annotations are outside the thresholds, students receive no credit points.

By assigning individual rights on the platform, it is possible to determine and control which users should have access to which group(s) of people or objects. This results in a wide range of different application scenarios in the planning and preparation of teaching and examination units, for the implementation of self-, peer and group reflections and feedbacks as well as in the assessment of communicative competences. For example:

- students can prepare for the classroom event in advance within the framework of a blended learning unit using application-related, annotable learning videos on various conversation techniques.
- During a learning setting, role plays between students and actors can be recorded via the tCAPTURE app, which can be annotated directly afterwards by course participants, lecturers and actors.
- In group- and self-reflections, the possibility of playing and rewinding individual annotated video sequences enables action and communication strategies to be specifically perceived, analysed, evaluated and reported back.
- The use of video annotation can also prepare students for written and oral practical exams (e.g. in OSCE format) or the tool itself can find its way into the performance assessment of communicative competences as a new examination format.
- Video annotations can also be used in examiner training in the future, e.g. to support the standardisation of OSCE formats. The same video of an OSCE examination can be presented to all examiners and conspicuous features can be annotated. Afterwards, the annotations can be discussed together in order to harmonise the assessment behaviour of the examiners.

In a next step, the video annotation tool is to be tested and evaluated in cooperation with the Medical Faculty of the TU Dresden with regard to technical handling and methodological-didactic use in a blended learning unit. In this context, it will also be investigated whether the use of video annotations positively influences the acquisition of communicative competences among students.

### MAIKE LINKE <sup>1,2</sup>\*, ANNA MUTSCHLER <sup>3</sup>\*, CHRISTIAN MOSES<sup>3</sup>, LARS FEISTNER<sup>3</sup>

- <sup>1</sup> Dresden University of Technology, Carl Gustav Carus Medical Faculty, Department of Psychosocial Medicine and
- Developmental Neurosciences, Dresden, Germany <sup>2</sup> Dresden University of Technology, Carl Gustav
- Carus Medical Faculty, Didactics and Teaching Research Unit, Dresden, Germany
- <sup>3</sup> Institute for Communication and Assessment Research, Heidelberg, Germany
- \* Equal first authorship



- [1] Samuel Johnsen (1709-1784), englischer Gelehrter, Lexograf, Schriftsteller, Dichter und Kritiker. Zitatnachweis: Universitas (2004): Band 59, Ausgaben 697-702, Seite 759, Verlag Wissenschaftliche Verlagsgesellschaft [Stand: 18.06.2021] http://zitate.net/samuel-johnson-zitate
- [2] Kurt Tucholsky (1890-1935), deutscher Journalist und Schriftsteller Zitatnachweis: Gesammelte Werke (1960): Band 1, Seite 971, Verlag Rowohlt http://zitate.net/ kurt-tucholsky-zitate [Stand: 18.06.2021]
- [3] Horaz, eigentlich Quintus Horatius Flaccus (65 v. Chr.- 08 v. Chr.), römischer Dichter, Denker und Philosoph http://zitate.net/horaz-zitate [Stand: 18.06.2021]
- [4] Kerse N (2004). Physician-Patient Relationship and Medication Compliance: A Primary Care Investigation. The Annals of Family Medicine, 2(5): 455-461.
- [5] Chen RC, Clark JA, Manola J, Talcott JA (2008). Treatment ,mismatch' in early prostate cancer - Do treatment choices take patient quality of life into account? Cancer, 112(1): 61-68.
- [6] Tamblyn R, Abrahamowicz M, Dauphinee D, Wenghofer E, Jacques A, Klass D, et al (2007). Physician Scores on a National Clinical Skills Examination as Predictors of Complaints to Medical Regulatory Authorities. JAMA: The Journal of the American Medical Association, 298(9): 993-1001.
- [7] Graham J, Potts HWW, Ramirez AJ (2002). Stress and burnout in doctors. Lancet, 360(9349): 1975-1976.
- [8] Travado L, Grassi L, Gil F, Ventura C, Martins C (2005). Physician-patient communication among Southern European cancer physicians: the influence of psychosocial orientation and burnout. Psycho-Oncology, 14(8): 661-670.
- [9] Venetis MK, Robinson JD, LaPlant Turkiewicz K, Allen M (2009). An evidence base for patient-centered cancer care: A meta-analysis of studies of observed communication between cancer specialists and their patients. Patient education and counseling, 77(3): 379-383.
- [10] Brown RF, Butow PN, Dunn SM, Tattersall MH (2001). Promoting patient participation and shortening cancer consultations: a randomised trial. British journal of cancer, 85(9): 1273-1279.
- [11] Alamo MM, Moral RR, Perula de Torres LA (2002). Evaluation of a patient-centred approach in generalized musculoskeletal chronic pain/fibromyalgia patients in primary care. Patient education and counseling, 48(1): 23-31.
- [12] Chassany O, Boureau F, Liard F, Bertin P, Serrie A, Ferran P, et al (2006). Effects of training on general practitioners' management of pain in osteoarthritis: a randomized multicenter study. The Journal of rheumatology, 33(9): 1827-1834.
- [13] Del Canale S, Louis DZ, Maio V, Wang X, Rossi G, Hojat M, et al (2012). The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. Academic medicine : journal of the Association of American Medical Colleges, 87(9): 12(43-1249.
- [14] Bundesgesetzblatt (2012). Erste Verordnung zur Änderung der Approbationsordnung für Ärzte. Teil I, Nr. 34 https://www.bgbl.de/xaver/bgbl/start.xav?startbk=-Bundesanzeiger\_BGBl&jumpTo=bgbl112s1539. pdf#\_\_bgbl\_\_%2F%2F\*%5B%40attr\_id%3D%27bgbl112s1539.pdf%27%5D\_\_1623746512977 [zuletzt abgerufen am: 15.06.2021]
- [15] Medizinischer Fakultätentag (2021). Nationaler kompetenzbasierter Lernzielkatalog in der Medizin. Version 2.0. https://nklm.de/zend/menu/index [zuletzt abgerufen am: 07.06.2021]
- [16] Bundesministerium für Bildung und Forschung (2017). Masterplan Medizinstudium 2020 (Beschlusstext). https://www.bmbf.de/files/2017-03-31\_Masterplan%20 Beschlusstext.pdf [zuletzt abgerufen am: 07.06.2021]
- [17] Bundesministerium für Gesundheit. Referentenentwurf-Verordnung zur Neuregelung der ärztlichen Ausbildung. https://www.bundesgesundheitsministerium.de/fileadmin/Dateien/3\_Downloads/Gesetze\_und\_Verordnungen/ GuV/A/Referentenentwurf\_AEAppr0.pdf [zuletzt abgerufen am: 07.06.2021]
- [18] Sommer M, Hiroko Fritz A, Thrien C, Kursch A, Peters T (2019). Simulationspatienten in der Medizinischen Ausbildung – Eine Umfrage zum IST-Stand in Deutschland, Österreich und der Schweiz. GMS J Med Educ, 36(3):Doc 27
- [19] Krüger M, Steffen R, Vohle F (2012). Videos in der Lehre durch Annotationen reflektieren und aktiv diskutieren. In: Csanyi G, Reichl F, Steiner A (Hrsg.). Digitale Medien -Werkzeuge für exzellente Forschung und Lehre. Medien in der Wissenschaft; 61, S. 198-210

## The Swiss professional role model -How are professional, communicative and interprofessional competences assessed?





### Figure 1

Illustration of the Swiss professional role model for health professions based on the CanMEDS roles. (modified from Buss B. (2011) Kompetenzen im Berufsfeld Physiotherapie. IN C. Völker (ed.) Berufliches Selbstverständnis p.105. Berlin. Cornelsen)

> tion counselling. assessments.

**CHAPTER 5 – MEASURE, ASSESS AND IDENTIFY COMPETENCES** 



profession (see Figure 1). The relevance of interprofessional and communicative competences in medical education is described in the two previous articles (see pages 82-83 and 84-87).

The Bern University of Applied Sciences offers Bachelor's and Master's degree programmes in physiotherapy, nursing, midwifery and nutri-

The profession-specific competences in the Physiotherapy degree programme are examined in a 360° perspective. Students complete competency assessments after each module/semester and these are aligned with the learning objectives and content. The overarching learning objectives are outlined using the example of an expert in the following diagram. In order to assess all competences in the roles, the following examinations are used: written and practical exams, such as OSCE, skills, multiple-choice questions, communication assessments, reflection work by means of portfolios, practical examination in direct contact with patients, assessment of clinical decision-making by means of a patient presentation followed by an oral exam, project work in sports/biomechanics and scientific project work. The UCAN tools are used for many of these

Students learn the theoretical basics of communication in several lectures and complete communication training in various patient settings





> with standardised patients/persons and communication trainers in the first and second semesters (see Figure 3). In order to achieve the profession-specific communicative competences, the communication trainings aim to ensure that the students in these settings apply anamnesis, learn how to deal with difficult situations, including conflicts, and learn how to deal with grief and death. In the setting, in addition to the standardised patient, there is also another student in an observer role. After completing the training, the students receive feedback and reflect on their strengths and weaknesses using a video from the situation they experienced.

In addition to the training of profession-specific competences, great emphasis has been placed on the area of interprofessionality in Bern for years. About two years ago, a project was launched at the Bern University of Applied Sciences, which focused on analysing and further developing the existing interprofessional modules. As a result of the project findings, a new joint Curriculum 2020 was developed with all study programmes. This will be used for the first time in the autumn semester. The following modules will be completed across four study programmes: physiotherapy, nutrition counselling, midwifery and nursing: The module "Person-centred health care" is offered in the 1st semester and is assessed by means of e-portfolio and group work. During the semester, students make e-portfolio entries on various questions and at the end they work on a group essay.

The module focuses on the health care system, the care process, interprofessional contexts and the importance of interprofessionality from the perspective of the person concerned and their relatives. The students should acquire the following competences:

- K1: Students observe and analyse the individual starting situation of the person concerned. They explain the central importance of communication for understanding their living environment and relate different views of health and illness to corresponding theories.
- K2: The students derive characteristics and added . value of good interprofessional cooperation from the perspective of the person concerned and analyse the care processes based on this.
- ٠ K3: Students explain the structure, functioning and players as well as the ethical and legal foundations of the health system in Switzerland. They

describe the contribution of their own professional group and relate it to the contribution of other professions.

• K4: Students empower the person concerned in the expertise of their own situation and describe their resources to promote health literacy.

The other modules offered in the 3rd and 6th semesters include the modules "Interprofessional Cooperation" and "e-Health" as well as "Health Promotion in an Interprofessional Context", which are still in the development process.

Switzerland

de:0183-zma0007235

		91
entations p work cises plays with peer	V	
	Image: Control of the second secon	
Danna	<ul> <li>Instruction</li> <li>Role play</li> <li>Video analysis</li> <li>Feedback discussion</li> </ul>	
nodified from V ed Sciences).	Watzek D. (2014)	

## **BEATRICE BUSS**

Bern University of Applied Sciences, Health, Department of Physiotherapy, Bern,

[1] Frank JR, Danoff D. The CanMEDS initiative: implementing an outcomesbased framework of physician competencies. Med Teach. 2007;29:642-7. https://doi.org/10.1080/01421590701746983. [2] Sottas B. Abschlusskompetenzen für alle Gesundheitsberufe: das schweizerische Rahmenwerk und seine Konzeption. GMS Z Med Ausbild. 2011;28(1):Doc11. DOI: 10.3205/zma000723, URN: urn:nbn:-



## Promoting health literacy in childhood and adolescence



he ability to find, understand, evaluate and apply health-relevant information is referred to as "health literacy" [1-3]. It supports people in everyday life in making decisions in the areas of health promotion, prevention and care of diseases that contribute to maintaining or optimising quality of life and health over the entire life span [4].

Although health literacy has become a topic of increasing relevance in Germany in recent years, 58.8 percent of the German population only have a limited health literacy. According to the second "Health Literacy Survey Germany (HLS-GER 2)" from 2021, only 14.7 percent have a very good and 26.5 percent a sufficient health literacy [5]. International studies show that health, health-related and disease-related behaviour as well as the use of health services are negatively influenced by low health literacy [6]. Possible consequences are, for example, unhealthy behaviour (such as increased tobacco or alcohol consumption) [7,8], lack of participation in preventive measures [9], lower compliance to treatment, later diagnosis or poorer self-management skills [4,6]. Health literacy is closely linked to the level of education, individual motivation and the demands as well as the complexity of the respective living environment (e.g., social status, migration background and age) [6].

## .₋**₋≁**∕⊢GWS



Health literacy covers several areas of life, and its promot should be a common societal task. Strengthening it requires lo term strategies and various support measures that enable individu to make health-related decisions in a self-determined manner. He not only institutions of the health care system, but also of the edu tion and training system play an essential role, as they accompapeople throughout their life course and support the development cognitive, social and emotional knowledge, skills and abilities t have an influence on health literacy [6].

Against this background, health literacy should already be tau and promoted in childhood and adolescence: Almost every seco 15- to 29-year-old in Germany has difficulties understanding alth-related information or effectively implementing these into the own, individual actions [6]. Since a lack of basic knowledge in has ling personal health can only be made up for with a great deal of fort later in life, schools, through their central role, have the poten to exert a positive influence on health literacy. The National Act Plan on Health Literacy thus also formulates anchoring health literamore firmly in education curricula as a central goal [6].

The school context offers numerous starting points to promote alth and health literacy of pupils through appropriate measures to lay a foundation for health-conscious behaviour in later phase life [10,11]. In order to make use of these and to support school promoting health literacy of their pupils, the non-profit foundation Stiftung Gesundheitswissen has launched the school project "Pa senlos gesund": Together with acknowledged experts, the foundation has developed a media package that builds up and promotes pupils' competences regarding health literacy. It was designed use in lower secondary school lessons and is divided into a tota seven modules. These consist of worksheets, experiments and p ject work. They enable interactive, interdisciplinary and cross-me use. In July 2019, the school project received an award from Gesellschaft für Pädagogik, Information und Medien e.V. (Society Education, Information and Media) as an outstanding digital edu tional medium in terms of pedagogy, content and design. It can ordered by schools free of charge via the project website www.p senlos-gesund.de.

To be able to enhance the media package "Pausenlos gesur based on the needs of teachers and pupils, the Stiftung Gesundhe wissen, the GWS - Gesundheit, Wissenschaft, Strategie GmbH (H alth, Science, Strategy GmbH) and the Institute for Communicat and Assessment Research are jointly conducting an evaluation p ject. The aim is to analyse for selected modules of the media pac ge, among other things, which contents are particularly helpful, h well the teaching concept and the materials can be used in every teaching and to what extent they contribute to the acquisition of co petences by pupils. For the corresponding investigation, various i truments (including subjective and objective measurement of hea literacy) will be used in a study and control group.

SASKIA EGARTER <sup>1,*</sup> , ANNA MUTSCHLER <sup>1,*</sup> ,
MARTINA ALBRECHT <sup>2</sup> , KONSTANTIN
BRASS <sup>1</sup> , CHANTAL V. BAUSCH <sup>3</sup> , MICHAEL
GRIMM², UNA GROSSMANN², JÖRN HEID¹,
KATJA KIRCHNER³, LARS KÖNIG², MICHAEL
LAUERER <sup>3</sup> , MARKUS SEELIG <sup>2</sup> , ECKHARD
NAGEL <sup>3</sup>
<sup>1</sup> Institute for Communication and Assessment Research
Heidelberg Germany
2 Stiffung Cooundhaiteuisean, Barlin, Dautachland
Consume destination of the second sec
Gesundheit, Wissenschaft, Strategie GmbH, Bayreuth,
Deutschland
*equal first authorship
[1] Sørensen K, van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, Brand H. Health literacy and public health: A systematic review and integration of definitions
and models. BMC Public Health. 2012;12:80. doi: 10.1186/1471-2458-12-80. [2] Schmidt-Kaehler S, Vogt D, Berens E-M, Horn A, Schaeffer D. Gesundheits-
kompetenz - verständlich informieren und beraten: Material- und Metho- densammlung zur Verbraucher- und Patientenberatung für Zielgruppen mit
geringer Gesundheitskompetenz: Universität Bielefeld, Fakultät für Gesundheits-
wissenschatten; 2017. Unline verfügbar unter: https://pub.uni-bielefeld.de/down- load/2908199/2909623/mms_gesundheitskompetenz_lq_170321.pdf [zuletzt
geprüft am 25.05.2021] [3] Quenzel G. Schaeffer D. Health Literacy - Gesundheitskompetenz vulnerabler
Bevölkerungsgruppen; 2016. Online verfügbar unter: https://uni-bielefeld.com/
takultaeten/gesundheitswissenschaften/ag/ag6/publikationen/QuenzelSchaeffer_ GesundheitskompetenzVulnerablerGruppen_Ergebnisbericht_2016.pdf [zuletzt
geprüft am 25.05.2021] [4] Österreichische Plattform Gesundheitskompetenz Gesundheitskompetenz
- was ist das? Online verfügbar unter: https://oepgk.at/gesundheitskompe-
tenz-was-ist-das/ [zuletzt geprüft am 05.05.2021] [5] Schaeffer D, Berens E-M, Gille S, Griese L, Klinger J, Sombre S de, Vogt D, Hur-
relmann K. Gesundheitskompetenz der Bevölkerung in Deutschland vor und während der Corona Pandemie- Ergebnisse des HLS-GER 2-2021. Online vor-
fügbar unter: https://pub.uni-bielefeld.de/download/2950305/2950403/HLS-
GER%202_Ergebnisbericht.pdf [zuletzt geprüft am 01.07.2021] [6] Schaeffer D, Hurrelmann K, Bauer U, Kolpatzik K. Nationaler Aktionsplan Ge-
sundheitskompetenz. Die Gesundheitskompetenz in Deutschland stärken. 2018, Barlin, KomPart
[7] Conwell LS, O'Callaghan MJ, Andersen MJ, Bor W, Najman JM, Williams GM. Early
adolescent smoking and a web of personal and social disadvantage. J Paediatr Child Health. 2003;39(8):580–5. doi: 10.1046/i.1440-1754.2003.00240.x.
[8] von Wagner C, Knight K, Steptoe A, Wardle J. Functional health literacy and he-
aun-promoting benaviour in a national sample of british adults. J Epidemiol Com- munity Health. 2007;61(12):1086–90. doi: 10.1136/jech.2006.053967.
[9] Alsoliman S. Oral Awareness, Social Status, Caries and Malocclusion in Schoolchildren, (Dissertation, Zahnmedizin) Frost-Moritz-Arodt-Universität
Greifswald; 2010.
ы broder J, Ukan U, Bauer U, Schlupp S, Pinheiro P. Advancing perspectives on health literacy in childhood and youth. Health Promot Int. 2020;35(3):575–85.
doi: 10.1093/heapro/daz041. [11] Borzekowski DLG. Considering children and health literacy: A theoretical appro-
ash Dadistrias 2000 124 Suppl 2 S282 8 doi: 10.1542/pada 2000 1162D

06 Always one step ahead: digitalisation in the assessment sector

ADC

 $\diamondsuit$ 

.@-

P

## Editorial

he preparation of high-quality examinations involves considerable effort on the part of educators. For students, on the other hand, an exam is a par-

ticularly stressful situation that demands their full concentration and attention. The use of digital assessment tools and systems can significantly support the creation and execution of examinations. Assessment workflows are facilitated, previously analogue, time-consuming examination preparations are optimised and structured quality assurance is made possible. In addition, they enable the assessment of diverse curricular content and media, especially in medicine. At the same time, digital assessment systems have to be as easy to use as possible to prevent students from being distracted from focusing on the examination. In order to be able to conduct legally valid examinations, digital assessment systems and tools must be technically reliable, meet data protection requirements, and ensure equal opportunities for students. The necessary technologies are being developed by the Institute for Communication and Assessment Research as part of the UCAN network.

The COVID-19 pandemic gave digitalisation an enormous boost last year and challenges were quickly revealed in the process. Necessary digital tools had to be selected and integrated into the technical infrastructure. New processes had to be defined, communicated and implemented across the board at various levels of the educational institutions. The new digital offers had to comply with data protection requirements, could not violate ethical principles, had to preserve equal opportunities and respect privacy. At the same time, the demands on the personal and technical skills of students, educators, and administrators have increased.

With COVID-19 incidence numbers dropping, face-to-face teaching will also return to universities. This will reveal which of the digital achievements will remain in the long term. In order to decide what best



Stefan Titz Supervisory Board member of the Institute for Communication and Assessment Research

promotes teaching and learning or supports the administrative process, a reflective, unbiased handling of digital methods and tools is necessary. The article starting with pages 98 describes a medical degree program that is largely digital and shows that a combination of digital and face-to-face teaching can be a permanently profitable concept for learners and educators. The implementation of electronic examinations with UCAN tools is a crucial component of this.

examinations.

The pages 100-103 provides a detailed explanation of the added value that digital examinations can have compared to conventional, e.g. paper-based, examinations. The use of tablets in combination with the tEXAM app allows innovative question types to be used in order to effectively test specific areas of competence. This aspect is clearly explained using the image marking tasks "Hot-Spot" and "Region of Interest" integrated in the ItemManagementSystem.

E-learning enables students to learn independent of time and place. Therefore, it is obvious to use these advantages also for distance online examinations. However, high hurdles need to be overcome due to technical, legal and data protection reguirements. How the technical implementation can be carried out using the Progress Test is described in the pages 104-105, yet country-specific legal requirements make the implementation of summative distance online examinations less attractive in the long term. For formative examinations, however, this offers attractive new possibilities.

The electronic examination format is not only suitable for distance examinations, but is also increasingly used in the context of face-to-face assessments due to its resource-saving nature. How a part of the third state examination in veterinary medicine at the LMU has been converted to a digital format since 2009 is described on the pages 106-107. Two of the subjects of the veterinary exam were tested on tablets. The use of standardised digital OSCE exams to assess internationally trained nurses seeking employment in Ontario (Canada) is described on the pages 108-109. The numerous positive aspects of conducting assessments electronically, such as higher examiner satisfaction when

using the tOSCE app to assess student performance, are listed on the pages 110-112. The article describes the successful complete conversion to digital examination formats for practical as well as written examinations in the ENT department. It is a good example of the substantial added value that results from the use and deployment of UCAN tools, namely more efficient preparation, execution and follow-up of

## **Digital teaching** and examination of medicine



"Study medicine online? That is not possible!" A similar reaction comes from many people who criticise the innovative medical degree programme at EDU. However, we are not innovative at this point in time, but simply consistent. For the teaching of theoretical knowledge, we use virtual classroom technology, which had already advanced well before the Corona pandemic outbreak. In virtual classrooms, students can follow presentations, solve problem-based questions in small groups in so-called "break-out rooms", and later present them in plenary sessions, accompanied by experts or tutors. In our view, the great advantage of this type of knowledge transfer is the active, direct opportunity to address each other by name. Besides, lecturers can use the students' non-verbal reactions to assess whether the participants are keeping up and whether the amount of material and the speed of the knowledge transfer need to be adjusted.

Students work together "collaboratively" on a specially programmed learning platform, just as possible at most medical universities through traditional learning platforms. We have stored all written learning objectives in a database and assigned them to the individual modules and study weeks. The learning objectives are linked to content from the learning platforms Amboss, Draw-it-to-know-it and electronic textbooks, among others so that the students receive a "red thread" through the medical studies that they can use for orientation. Regular feedback loops with students and the teaching staff result in the database with the stored learning objectives, constantly updated and refined. The EDU study programme is generally structured into a three-year Bachelor's programme



easily memorised.

and a two-year Master's programme and is in line with EU Directive 2005/36. An academic year consists of three trimesters, so-called modules. These, in turn, are divided into a theoretical learning phase of eight weeks and a subsequent clinical rotation of four weeks. The clinical rotations ensure that students receive a 12-week clinical experience per year and under supervision right from the beginning of their studies. In our view, this is indispensable for knowledge retention, as, in this way, the theoretical learning content can be emotionally linked and more

Of course, the examinations also play an essential role in this study concept. We examine modules longitudinally. High-stakes and lowstakes examinations alternate, and results are in the students' "Gradebook". Individual and group work is provided with oral or written feedback to promote the learning process. Proctoring software guarantees the objective examination conditions for written online examinations. It continuously monitors students via the laptop's camera while taking the exam and locks the laptop during this time for non-permitted online research. With the Umbrella Consortium for Assessment Networks (UCAN), we have found a partner that fits perfectly into our overall concept of digitalisation. Together, we complement each other on both technical and content-related issues and have made a lasting contribution to the development of a new tool, the ProgressTest Wrapper, for written distance online examinations. Find an overview of a preliminary version of this tool to use online distance examinations in this anniversary report (see pages 104-105).

The study programme also contains a Research Track, which starts in the seventh module and introduces students to the basic scientific work principles. They learn the basic rules of evidence-based medicine, how to distinguish a good paper from a bad paper, how to design and evaluate a clinical study, the preparation of a study synopsis as well as a review article, and then finally deliver a Bachelor's and Master's thesis as proof of good scientific practice.  $\blacklozenge$ 

## **Innovative question types** enable image marking items in assessments



ablet-based Objective Structured Clinical Examinations (OSCEs) were implemented at the Medical Faculty of the University of Ulm in the winter semester 2013/14, tablet-based written exams in the summer semester 2016. The number of mobile devices has now been increased to 300 in order to be able to examine complete cohorts tablet-based (see Figure 1). For this purpose, UCAN's examination software tEXAM was used in combination with the ItemManagementSystem (IMS).

The advantages of tEXAM are obvious: by integrating photos and videos, innovative, practice-oriented question formats can be used, examinees can provide readable answers to free text questions, the data can be checked for plausibility during the examination and can be evaluated even faster. The handling of the devices and apps has proven to be completely uncomplicated for both the examinees and the examiners; the preparation of paper sheets by the examiners is no longer necessary.

As part of two tablet-based exams in preclinical and clinical subjects, Region of Interest and Hot-Spot tasks were tested for the first time in 2019 (see figure 2). Both question types are so-called image-marking tasks and are particularly suitable for testing procedural knowledge. In Region of Interest tasks, the examinee must recognise an object or a specific structure within an image and mark the area accordingly. The UCAN evaluation tool, EXaminator, can subsequently be used to determine the percentage match value. Both over-marked and under-marked areas are subtracted negatively from the overall match score. Depending on the threshold value specified when the question was created, the examinee's answer is evaluated accordingly. The default threshold for this question type is 0.6, meaning that 60 percent agreement must be achieved to obtain full marks for the task. However, there is a strong correlation between threshold and image size, so the former should be adjusted with specificity for each individual region of interest question created. Analogous to Region of >



Figure 1 Examination room in the UIm Exhibition Hall, which was used for tablet-based examinations by the Medical Faculty of the University of Ulm due to corona.

## A Example Region of Interest task



### Figure 2

Example illustrations of Region of Interest and Hot-Spot tasks. A) The area marked by the author is shown in blue, while the marking of a student is shown in yellow. The third panel shows the overlay of both markings in green. B) Here the principle of a hot-spot task is illustrated



🖂 🗛 +

Progress: 4/5 questions

Please move the icon to the asked p

✓ Question #1

✓ Question #2

✓ Question #3 Question #4

Finish exam



Example Marking the Region of Interest task "anteroseptal akinesia". Within this task the region of the ventricular wall with movement disorder is to be marked (shown in yellow). (Department of Cardioanaesthesiology of the Clinic for Anaesthesiology and Intensive Care Medicine, University Hospital Ulm).



### Figure 3

Doe222, John

Watch the video below of a heart ultrasound and mark the mitral valve on the still

Example of the Hot-Spot task "Ultrasound 2". In this task, the mitral valve is to be marked with crosshairs. Illustration shows how the task is displayed in tEXAM. (Department of Cardioanaesthesiology of the Clinic for Anaesthesiology and Intensive Care Medicine, University Hospital Ulm).

> Interest tasks, examinees need to mark a structure in Hot-Spot tasks as well. However, instead of marking an area, a crosshair is used for marking. When creating the task, the authors determine an area that contains the required structure. If the examinee's cross is within this marking, the task is assessed as correct; if the cross is outside this area, no points are awarded.

At the Medical Faculty of Ulm, among other things, video sequences were supplemented with still images on which the searched-for findings had to be marked: on the one hand, areas were searched for that had figure 3), on the other hand, the searched-for findings had to be identified with a crosshair stored in the app (Hot-Spot; see figure 4).

**0}**♥ **0**}**■ 0**}**■** 

The creation of the items was easy for IMS-experienced user: after the videos and associated image files had been imported into the media pool of the IMS, they could be integrated in the Hot-Spot or Region of Interest items. Whereby a coverage of 0.4 (40% agreement) was deposited for the latter, which was included in the evaluation without any changes. This evaluation mode, which was deliberately designed to be generous during the test phase, resulted in the Region of Interest items being answered correctly by 100% of the examinees and should be increased in the future (standard value stored in the IMS: to be marked with the finger (Region of Interest; see 0.8) in order to increase the test statistical significance of the exami-

nation questions and to enable better differentiation in the range of examination results.

The feedback from the examinees and the examiners was clear: the use of image-based question formats was evaluated positively throughout, but Hot-Spot items were preferred because they can be highlighted and evaluated more precisely. Possibly, a remedy could be found by using tablet pens (feedback from one examinee: "my finger was too thick to mark the area I was looking for"), but after these pilot projects it was decided to exclusively use hot spot items in exams for large cohorts at the university of UIm in the future.



### **ANNA VANDER BEKEN & LAURA KAUFMANN**

University of Ulm, Medical Faculty, Ulm, Germany

## Home-based online exams during the Corona Pandemic

ith the "Corona Epidemic University Regulations" issued by the Minister of Culture and Science of the State of North Rhine-Westphalia, the legal regulation for dealing with the pandemic-related restrictions in university operations was intro-

duced on 15th April 2020, and with it the decision to allow all examinations to take place without failures. At the University of Witten/Herdecke, the first "home-based online exams" were promptly implemented on the internal e-learning platform Moodle at the beginning of April 2020. In the further course of the project, the examination system of the Dean's Office of Human Medicine decided to adapt the examination server for the formative ProgressTest provided by the UCAN network (hereinafter referred to as KiM (Klausuren im Modellstudiengang; means: exams in the model course), so that summative examinations with additional control mechanisms against attempts at cheating can be taken. It had to be clarified whether this technical solution would be suitable for the requirements of summative examinations.

The home-based online exams were designed in such a way that students could take them from home on the KiM exam server. The students needed two devices to conduct the exams: one for processing the exam on KiM and one for dialling into the digital supervisor room of the video conference platform Zoom. Students logged in simultaneously in groups of max. 16 students. In the video conference room, the examinees meet a responsible supervisor.

After an identity verification, the examinees' smart phone/tablet was positioned so that the supervisor could see both the examinee and the processing screen. The examination area on KiM was activated for a total of 60 minutes. As soon as the examination started within this time window, the examinee had 40 minutes to answer the usually 20 MC questions on the respective subject. In the eventuality of technical problems, this also provided a sufficient time buffer.

During the summer term 2020, a total of 21 home-based online exams with 1,028 students in the model course of study in human medicine were conducted at the University of Witten/Herdecke, initially 14 exams on Moodle with 691 students and, following the implementation of the UCAN server, 7 exams with 337 students. Except for one incident in which an exam question was not displayed correctly, no major technical incidents occurred on the exam server during the exams, so that each exam could be evaluated. In no summative home-based on-

Figure 1 Example photo of students taking a home-based online exam.

line exam did students have to be warned and/or no attempts at deception were detected.

The results of the medical students in the subjects examined were on average comparable to those of the previous terms in face-to-face examinations, and even slightly less favourable, so that disproportionately frequent attempts at deception cannot be assumed. Nevertheless, the University of Witten/Herdecke has decided to return to face-toface examinations as soon as possible, also in view of the discussions on data protection at Zoom.

However, the positive experience with the examination server has led to the fact that the possibility of online face-to-face examinations is currently being developed. The advantages of the fast evaluation of the examination results and thus the reduction of the administrative effort for the examination system should also be used in the future. In addition, this will allow a flexible changeover from face-to-face online examinations to home-based online exams, should this be necessary in the further course of the corona pandemic.

Germany



The authors would like to thank the staff of the examination centre for human medicine at the University of Witten/Herdecke, especially Ingrid Koscholleck-Szappanos and Reiner Frankowiack, and the staff of the Institute for Communication and Assessment Research, especially Jörn Heid, for setting up and programming the examination server.  $\blacklozenge$ 

105

## SONJA SCHULZE-TRAUTMANN<sup>1</sup>, RUTH KANIA<sup>1</sup>, MARZELLUS HOFMANN<sup>2</sup>, MICHAELA ZUPANIC<sup>3</sup>

<sup>1</sup> University of Witten/Herdecke, Faculty for Health, Department of Human Medicine, Administration of examinations, Dean of Studies, Witten, Germany <sup>2</sup> University of Witten/Herdecke, Faculty for Health, Dean of Education, Witten,

<sup>3</sup> University of Witten/Herdecke, Faculty for Health, Interprofessional and collaborative Didactics in Medicine and Health Professions, Witten, Germany

### CHAPTER 6 - ALWAYS ONE STEP AHEAD: DIGITALISATION IN THE ASSESSMENT SECTOR

## Making state exams in veterinary medicine digital

n Germany the study of veterinary medicine is provided at five universities - Munich, Giessen, Leipzig, Berlin and Hannover. At the Faculty of Veterinary Medicine, LMU Munich approximately 240 graduates complete their studies in veterinary medicine every year. The teaching contents of the study subjects, as well as the competency

to be examined of each individual subject in the study of veterinary medicine are prescribed in the Regulation on the Licensing of Veterinarians (TAppV). After the preliminary veterinary examinations, the TAppV specifies 20 examination subjects in the Veterinary State Examination. However, the faculties themselves may determine the time of each examination or its partial examinations, the type of examination and the admission requirements, e.g. in the form of a certificate.

Since 2019, a part of the third state exams at LMU Munich has been performed on iPads with the app tEXAM in cooperation with the working group "Medical Faculty Examination". A contribution about the optimization of the examination workflow by using UCAN tools of the Veterinary Medicine Leipzig is printed in chapter 6.1. Thanks to the successful interfaculty collaboration between human and veterinary medicine at the LMU, it was possible to draw on the existing experience in dealing with tEXAM in human medicine, thus enabling a smooth examination. In the winter semester 2018/2019, the examination "Internal Medicine" and in the winter semester 2019/2020 the examination "Laws and Regulations of the Veterinary Profession" were conducted for the first time in this type of examination. While the last-mentioned examination contained 30 type A questions, the examination "Internal Medicine" comprised 12 patient cases (Key Feature), which were compiled by 18 authors from four chairs (see table 1). In addition to the number of questions in the table, an open question was placed at the end of each case in order to obtain feedback on the difficulty of the exam questions and comments on the case. However, this question was not evaluated.

Technical training on the ItemManagementSystem (IMS) for the authors took place at the first exam preparation meeting 14 months before the exam date. The exam coordinator and representatives from the veterinary clinics participated in this meeting. Case preparations took place during and after several internal training sessions and meetings. The Office of Student Affairs conducted the formal review by using the review scheme in the IMS. A detailed cont-

## Table 1

Structure of the veterinary examination "Internal Medicine" in the winter semester 2018/2019

Case- Nr.	Animal species	Chair	Number of questions; question type*	Points
1.	Cattle	tle Clinic for ruminants with outpatient clinic and stock management	6; a, b, c	100
2.			8; a, c, d	100
3.			7; a, d, e	100
4.			8; a, c	100
5.	Horse	Clinic for horses	10; a, b, c	100
6.			9; a, c	100
7.			10; a, b, c, d	100
8.	Dog	Medical clinic for small animals	10; a, b, c	100
9.			7; b, c	100
10.			7; a, b, c, d	100
11.	Pig	Clinic for pigs	9; a, b, c	100
12.			8; a, b, c	100

\* a: TypeA, b: Pick-N, c: Type KPrime, d: Region of Interest, e: Open Question

review, the fine-tuning, as well as the allocation of points of the questions were carried out by colleagues of the veterinary clinics in several meetings. A mock exam, in which one case per animal species was structured in the same way as the final exam, was available to students four weeks before the exam date in order to familiarize themselves with the iPads and the tEXAM app. 218 examinees took part in the veterinary examinati-

ribution regarding the item review integrated in the IMS

is explained on page 60 following. The subject-related

on "Internal Medicine" on March 20th 2019, which was the last examination in the entire course of study for most of the examinees. The examination was conducted in two cohorts, each examination group had three hours to work on 12 cases. All in all, the examination went smoothly, even though our students were not familiar with the lecture hall. The students found the tEXAM app very user-friendly and the examination procedure very plea-

sant and fair. The evaluation was completed at the beginning of the following week and reported to the examination office. It was a great leap forward, but a very positive change for everyone involved.

## HAO STOLL



107

I would like to use this opportunity to give my thanks to the working group "Medical Faculty Examination", headed by Prof. Christian Sommerhoff, for their technical support. I would also like to thank the colleagues of the subject "Internal Medicine" at the Faculty for their trust and commitment.

## **Digital Assessment** of Nurses in Canada

ouchstone Institute is a non-profit corporation that offers expertise in evaluation and curriculum development to promote public confidence in professional competence in the Canadian workforce. Specializing in creating valid, authentic, competency-based experiences for health professio-

nals, the organization supports successful transitions to training and practice that meet professional and societal needs. Expertise in simulation, innovation in exam technology, and robust research-based quality assurance meet the diverse needs of Touchstone Institute's clients, stakeholders, and partners.

The Organization's digitization journey began in 2014 after meeting the team of Umbrella Consortium for Assessment Networks (UCAN) Following training on their ItemManagementSystem (IMS), Touchstone Institute adapted UCAN's multiple tools for delivering



tablet-based exams to fit their needs. Initially UCAN's technology was integrated into the Internationally Educated Nurses Competency Assessment Program (IENCAP) to score the OSCE component of this exam that tests the knowledge, skill and judgement of internationally educated nurses (IENs) seeking nursing registration in Ontario. The IENCAP was developed by Touchstone Institute in collaboration with the College of Nurses of Ontario (CNO).

Touchstone Institute developed research protocols to monitor the impact of the move to tablet

scoring. The technology was first introduced in a controlled setting using viewing examiners to score stations to identified logistical issues with the change is scoring modality. The viewing examiner trial was followed by a psychometric study to compare the difference between scoring on paper vs scoring on tablet, demonstrating no systematic differences in

the scoring [1]. Subsequently, the tablet technology was integrated into the live stations of the IENCAP OSCE administrations. The technology was readily adopted by examiners given the ease of use and efficiency. Touchstone Institute worked with UCAN to further modify both the tOSCE app, and tOSCE server to fit organizational needs, which then lead to the development and implementation of new processes to support the administration of tablet-based exams. Since the introduction of the tablet technology, Touchstone Institute has assessed over 3,000 examinees and conducted 70 administrations scoring with tablets.

With the technology proven to work effectively, Touchstone Institute rolled out tablet-based scoring options to the College and Association of Registered Nurses of Alberta (CARNA) for the Alberta Registered Nurses Assessment Program (ARNAP). Touchstone Institute has now assessed over 300 examinees and conducted 18 administrations of the ARNAP in the province of Alberta using UCAN's technology. This remote administration was made possible by modifying the technology to operate over a dedica-

ted wireless network, allowing for off-site collaboration and delivery. Touchstone Institute has continued to invest in

tablet technology, and is now able to conduct simultaneous MCQ and OSCE administrations for most assessments (see figure 1). Touchstone Institute's membership in UCAN has been integral to growth

(IGOEE)

and development in providing competency assessment for several health professions in Ontario and other Canadian jurisdictions. In addition to nurse examinations, Touchstone Institute also successfully uses the UCAN tOSCE app to rate further OSCE examinations. Besides using the electronic rating of OSCEs, the Touchstone Institute also employs the UCAN software, tEXAM, for tablet-based written exams. Following, all assessments are listed were UCAN tools are used to capture examinee performances:

109

• Alberta Registered Nurses Assessment Program (ARNAP)

- Canadian English Language Benchmark Assessment for Nurses (CELBAN)
- Internationally Educated Nurses Competency Assessment Program (IENCAP)
- Internationally Graduated Optometrist Evaluating Examination
- Knowledge and Competency Assessment Tool (KCAT) on behalf of the College of Dietitians of Ontario (CDO) for internationally educated dietitians
- National Assessment Collaboration (NAC) Examination for international medical graduate (IMG)
- Canadian English Language Assessment for Optometrists (CELAO)
- · Canadian Fertility and Andrology Society Assessment for Assistive Reproductive Technology (CFAS ART) Lab Professionals
- Medical Council of Canada Qualifying Examination Part II (MCCQE Part II)
- National Assessment Collaboration Objective Structured Clinical Exam (NAC OSCE)
- Nurse Practitioner Practice Assessment (NPPA)
- Therapeutics Decision Making (TDM) Examination

## **SIMON NGUYEN & ALEX TRAN**

Touchstone Institute, Toronto, Kanada

## **Record examinations** completely electronically



### Figure 1

Examiner's perspective on subjective effort in operating the iPad and tEXAM software for selected sub-steps during the exam. Display of the mean values with standard deviation.

n closer inspection, the paper-based re-

cording of examinations in the Department of Otolaryngology at Heidelberg University Hospital not only proved to be resource-intensive in terms of material, preparation/ post-processing and archiving, but also frequently involved problems such as illegible handwriting, missing identifiers, unclear markings or lost examination sheets. In addition, the manual calculation of the results of the individual performances and the entry into a database proved to be time-consuming and subject to human error. The implementation of a digital recording of student performances was carried out in several steps in the summer and winter semesters of 2019. First of all, the oral practical examination was digitised with tOSCE. While the previous article explains the technical introduction of the tOSCE app, this article focuses on the digitalisation of the Objective structured clinical examination (OSCE) examination and the change to electronic scoring sheets. Before the implementation, a single DIN A4 sheet per examinee existed for recording the performance of all three OSCE stations. With the transition the rating checklists of the respective stations were improved and a global rating was introduced. The global rating is a general assessment of subsections of an OSCE station, in which >



F) The rating options were appropriate. G) With the help of the system I was able to assess the examinee better.

the skills to be assessed.

### Figure 2

User acceptance and satisfaction with the functionality of the system (green), the changed evaluation criteria (red) and subjective effort in using the system (black) Answers on a 6-step Likert scale with 1 "Do not agree at all" to 6 "Agree completely". Representation of the mean values with standard deviation.

ting for each examinee in addition to the

111

from my task than the documentation on paper.

K) Overall, how satisfied are you with the functionality of electronic OSCE exams? Das Bildschirmlayout und die Anweisungen waren klar.

➤ points are assigned on the basis of a horizon of expectations and the clinical assessment. The checklist, on the other hand, assigns points for partial solutions, some of which are very small [1]. The global rating has a higher internal consistency and inter-station reliability, so fewer OSCE stations are needed to achieve the same reliability [2]. User acceptance and satisfaction with the changed assessment criteria, the functionality of the new system (tOSCE) and the subjective effort required to operate the system were assessed from the examiners' point of view using standardised questionnaires (6-level Likert scale, 1 = "do not agree at all" to 6 = "agree completely" and visual analogue scale "VAS") after the OSCE had been carried out.

All examiners assigned to the OSCE examination in the summer semester 2019 were interviewed. The mean values of the questions queried using VAS are shown in figure 1, the results of the questions queried using Likert scales are shown in figure 2. In summary, all examiners were very satisfied with the adapted checklists and the functionality of the app tOSCE. Compared to paper-based recording of examinee performance, electronic rating using tOSCE was found to be easier, and the use of (software and) iPads did not represent a distraction.

After the successful transition of tOSCE, tablet-based written exam using the tEXAM app (see also reports on the experiences with tEXAM of other UCAN partners on the pages 42-47) were finally implemented in the winter semester 2019. Before using the tEXAM app, the change from a paper-based written exam to a computer-based recording of the exam was associated with some challenges. For example, computer pools had to be available in a suitable size and at the desired time. If the number of workstations was too small, it was necessary to split up the examination group. In addition, the presence of several employees was necessary for technical support on the computers.

Digital written exams are desirable in terms of resource utilisation and use of innovative question types beyond the multiple-choice (MC) format and offer the possibility of embedding high-resolution images in questions and zooming in or out using familiar touch gestures. The much better display quality of the images compared to printed images is helpful for accurate assessment by students. In addition to pictures, the use of videos is possible as well. This means a significant added value for the practical construction of case vignettes.

In contrast to the paper-based exams that were previously created manually, the use of iPads allows for any order of questions as well as permutation of answer choices for MC questions, ensuring that students' individual performance is assessed. The iPad-based examination allows the use of question types beyond the MC format, so that with the switch to electronic examinations, Long Menu questions were used for the first time. With this type of question, a list of possible answers is stored, which can be very long, so that this question type can be equated with the difficulty of free-text questions, but allows for quick automated correction [3]. The use of iPads offers more cognitive and visual possibilities, so that certain competency areas can be assessed more appropriately (see chapter 5).

During the exam situation, the students did not have any technical questions or encountered any operating problems. The handling of the iPads and the tEXAM app is therefore not a challenging task for the students.

By using tEXAM on iPads, all the above-mentioned hurdles could be overcome and thus all the advantages of conducting examinations digitally could be used. The examinations could take place in the previously designated rooms and in unchanged student group sizes. With a group size of about 50 students, the technical support was sufficiently well covered with one person, so that no further personnel resources were needed. In summary, the switch to iPadbased written exams has been a success. We see great potential in the use of the UCAN tools, as the preparation, execution and follow-up of exams can now be handled and designed more efficiently.

### **TOBIAS ALBRECHT**

Universitätsklinikum Heidelberg, Hals-Nasen-Ohrenklinik, Heidelberg, Deutschland

Adler, Mark D. et al. "Comparison of checklist and anchored global rating instruments for performance rating of simulated pediatric emergencies." Simulation in healthcare : journal of the Society for Simulation in Healthcare 6 1 (2011): 18-24
 Brannick MT, Erol-Korkmaz HT, Prewett M: A systematic review of the reliability of

objective structured clinical examination scores. Med Teach 2011, 45: 1181–1189 [3] Cerutti, B., Blondon, K. & Galetto, A. Long-menu questions in computer-based assessments: a retrospective observational study. BMC Med Educ 16, 55 (2016). https://doi.org/10.1186/s12909-016-0578-4







///.

## Editorial

years of in a network - that means 15 years of conceptual science-based cooperation with the use of continuous technical

developments. During this period, the digitalization of examinations has also been introduced in a wide range of training courses.

For the study program of Human Medicine, which was the crystallization point of UCAN, the various numbers show a successful story. The steadily growing pool of questions in the network is now one of the largest question libraries in the world, with approximately 700,000 questions. For the medical faculties, the use of validated exam questions from other faculties means the saving of immeasurable working hours. The joint development of a broad portfolio of flexibly usable assessment tools and the standardization of assessment workflows are based on an intensive scientific exchange between all members of the UCAN network. This is a successful project that must be continuously developed and adapted to the constantly changing requirements, including the planned new German Medical Licensing Regulations (ÄApprO). Thus, the UCAN testing network is constantly faced with new requirements with potential for optimization, but also opportunities that should be addressed jointly. These challenges are discussed in the chapter "Mastering the future together". Furthermore, it will be shown how this platform can be transferred to other training fields.

The first article provides a well-founded summary of the origins of the ÄApprO, which on the one hand regulates the training of physicians in their variety of subjects and on the other hand forms the basis of the examination regulations. This ultimately led to the establishment of the IMPP. The further development of medical education in consideration of the Master Plan for Medical Studies 2020 will be discussed. In addition, the importance of these reforms will be highlighted, taking into account the realignment of the health care system in general. New challenges,

**Gabriele Döller** Supervisory Board member of the

including infectious risks, environmental pollution, climate change, demographic change, migration require expanded conceptions up to an interprofessional medical education. In medicine, practice-oriented assessments have been established, which must be continuously developed further. To this end, persons responsible for examinations are to receive sound support via scientific exchange and digital tools (see pages 118-123).

In another chapter relating to patient care, the implementation of the recommendations of the German Scientific Council (Wissenschaftsrat, WR) published on July 13, 2012, on higher education qualifications for health care (Drs. 2411-12) is addressed. The Scientific Council recommendations focused on those activities that have a direct relationship to patients. These include the nursing professions (including geriatric care), logopaedics, physio- and ergotherapy, and midwifery. As a result of demographic change, a profound change in the need for health care was expected. In addition to the increasing complexity of the mandate to provide care, the Scientific Council considered intersectoral and interdisciplinary care at the interfaces of the various health care professions to be of decisive importance. New requirements arose in total for the interprofessional interaction of the health care professions. For this reason, the Scientific Council recommended that 10 to 20% of a training cohort be academically qualified.

described.

So far, in addition to the study program in medicine, nursing, midwifery, and physiotherapy, the study program in physician assistance is also represented in the assessment network, which is offered, among others, at the Ostbayerische Technische Hochschule Amberg-Weiden (OTH-AW) and reported in the second article (see pages 124-125). The aim is to use the close cooperation in the UCAN network to set the course for standards in the education of the relatively new study programme in Germany.

However, the UCAN network has attracted the attention not only of healthcare professions, but also, for example, skilled crafts. How teaching, learning and testing will be carried out in a digitized world in the future is the subject of the following article (see

Institute for Communication and Assessment Research

pages 126-127). As part of the InnoVET project "ProNetHandwerk" funded by the Federal Ministry of Education and Research (BMBF) and the Federal Institute for Vocational Education and Training (BIBB), modular, cross-craft "blended learning" training courses are being developed. Examinations in the skilled craft sector are characterized by a high degree of complexity, which is reflected both in terms of content and in the examination procedure regulations and the associated processes. As part of the "ProNetHandwerk" project, the UCAN tools are being further developed and adapted to meet the requirements of the skilled crafts.

The chapter "Mastering the future together" concludes with an article starting on page 128 in which the UCAN team takes a closer look at the direction of the UCAN assessment network for the coming years. Five major outstanding challenges, namely the revision of all existing UCAN tools, the new ÄApprO, the academization of the health professions, the expansion to the skilled crafts, and professional training are

I wish the tirelessly working UCAN team furthermore reliable, innovative and committed cooperation partners, so that the extremely successful assessment network will be continuously expanded together.

## **Quo vadis Master Plan Medical Studies 2020?**

A personal look back and forward what do we learn from the "never-ending" story?



he history of reforms in the training of future physicians is as old as medical education itself. Reforms are necessary to address the changing demands of society on physicians in medical education.

A century ago, Abraham Flexner was commissioned by the Carnegie Foundation to systematically examine the curricula of medical faculties in the USA and Europe to determine how well the trained physicians were qualified for their start in the profession and summarized the results of the evaluation in the Flexner Report, which received worldwide attention [1]. Especially the education in Germany and Austria was presented as a model, because here scientific and practical competences were taught to patients at the same time "...The student no longer merely watches, listens, memorizes; he does" [2] and because the contact with the patients was in the foreground "that method of clinial teaching will be excellent which brings the student into close and active relation with the patient" [2]. The interaction with patients and the assumption of responsibility for medical activities were a central point according to the current competence orientation. However, many of these positive approaches were also lost due to the exodus and persecution of significant physicians during the

Nazi period in Germany. In particular, the loss of the practical orientation of medical education in the post-war period led to dissatisfaction among those entering the profession and the medical profession. As a consequence, the call for a practice-oriented education based on common standards became

louder and was widely discussed already since the

Medical Congress in Königstein in 1953.

**CHAPTER 7 – MASTERING THE FUTURE TOGETHER** 

However, it took another twenty years before significant reforms were incorporated into the then new licensing regulations in 1972. This included for the first time the admission of psychosocial subjects in the training and the implementation of fair and standardized final examinations, which were to be carried out in a standardized manner by the newly founded Institute for Medical Examination Questions (later IMPP) in 1971.

It is no coincidence that about 50 years ago both objectives, the inclusion of psychosocial subjects in education and the fair design of examinations happened at the same time. Both issues were concerns of Thure von Uexküll, who as "mastermind of the first hour" [3] and as central force in the "small commission" promoted the redesign of training and assessments since the mid-1960s and was intensively involved in the foundation of the IMPP. The internist Thure von Uexküll, founding professor of the new Ulm University in 1967 and founding dean of the Medical Faculty in Ulm, had recognized together with numerous reformers that the perspective of the patient, patient orientation and teamwork had to be strengthened in a modern education and that this new education had to be reflected in the examinations. For this reason, the "small commis-sion" was already working on concepts for a redesign of the oral examinations, which, however, to the regret of the commission members, did not find their way into the licensing regulations at that time. The demands for a European coordination of the examination contents of future physicians were also not pursued, although they were also demanded by the World Health Organization (WHO) when the IMPP was founded. The reformers were far ahead of their time, because they recognized that in an increasingly globalized world, reforms in education could not be limited to one country. Therefore, close cooperation existed at that time in the German-speaking countries with the Institute for Education and Examination Research in Bern



(today: Institute for Medical Education -IML), which was founded by Prof. Hannes Pauli - also an internist - at the same time as the IMPP in 1971. The new Bernese model of integrated training was subsequently transferred to the faculties throughout Switzerland. Practical course exams were also introduced in Switzerland as a national final exam in 2011. In Germany, however, it soon became apparent that the reform ideas were only implemented to a limited extent and met with considerable resistance at numerous levels. While the "small commission", in particular Thure von Uexküll, had demanded that the oral-practical examinations be reformed and, above all, that they be coordinated with their European partners, this was only implemented to a limited extent in medical training and in the further activities of the IMPP.

In the 1980s and 1990s, the Murrhardt Circle, which was supported by the Robert Bosch Foundation, boosted efforts to reform medical training. The central theme was the formulation of a modern image of the physician - what roles should future physicians fulfill and what should the appropriate training look like? Once again, the focus was on strengthening the practical relevance of training, linking preclinical and clinical training and, above all, patient orientation. There was optimism that the reform could succeed this time. W. Schuster, a member of the German parliament ("Bundestag") who was active in health policy, summarized the developments and controversies at that time between the states and the federal government, the scientific and the health side, under the heading "The never-ending story: the reform of medical training" in the journal for Medical Education [4].

Once again, the reform failed due to the resistance of the insisting forces, which tried to preserve their vested interests by all means.

Almost a quarter of a century ago, Rosemarie Stein wrote the headline "Reform dead, lobby successful" in the Tagesspiegel and showed the strategy of the insisting forces [5]. The adoption of the new Medical Licensing Regulations, which was prevented at the last meters, was a bitter setback for the committed student representatives and for the reformers in the faculties.

As a young resident in internal medicine at Heidelberg University Hospital, I had joined the student representatives of AG STIMULUS, with whom I had been actively campaigning for the modernization of medical studies since 1995. Although the hoped-for new Medical Licensing Regulations did not come and disappointment was felt everywhere, neither students nor lecturers were discouraged and developed the reform curriculum HeiCuMed under an innovative dean (Prof. Günther Sonntag).

Five years later, with the publication of the new Medical Licensing Regulations in 2002, we were ready to go and well prepared. Even if the change in the licensing regulations was not as comprehensive as had been hoped, it did provide the basis for new cooperation between the disciplines and was a decisive step in the direction of competence orientation.

As was the case in Heidelberg at the time, reform projects had begun in many faculties to implement the new Medical Licensing Regulations appropriately. In order to avoid "reinventing the wheel"

➤ at all locations, we established the postgraduate course Master of Medical Education (see pages 78-79) at the University of Heidelberg in close cooperation with the Medical Faculty Association, in which we have been qualifying multipliers and managers in the field of medical education and training since 2005. Like the reformers decades before, it became clear to us that the reforms in medical education and the qualification of the lecturers need a strengthening network and good tools that make the implementation of the reforms feasible. Thus, it is no coincidence that key players involved in the founding of the MME such as Waltraud Georg from the Charite in Berlin and Martin Fischer from the LMU in Munich - together with me and Konstantin Brass founded the Medical Assessment Alliance (today UCAN) in the cooperation of the three faculties of Heidelberg, Berlin and Munich, whose circle has been continuously expanded (see pages 16-17).

In 2010, the Lancet Commission published its report "Health professions for a new century" [6]. In this report, an international group of scientists and leaders in medical education set out how the transformation of medical education can strengthen health systems in a constantly changing world. For the first time, medical education and assessments were internationally recognized as having a strong leverage effect for the reorientation of the health care system. A completely new access to the good health is not the same for all people, social inequalities and socio-economic factors provide several years of differences in life expectancy even in Germany. They noted that the challenges posed by environmental pollution, climate change and their impact on health can no longer be solved by one profession alone. The focus on university-based medicine that has prevailed in recent decades must



be broadened in favour of medical education that is inclusive of all sectors of care and interprofessional. The increasing ambulantization of medicine requires a reorientation of curricula in form and content. New infectious risks, globalization and migration do not allow a limitation to a national horizon. This places enormous demands on future graduates. The current high rates of frustration and burnout at the end of the practical year (PJ) and after the first year of postgraduate training, which range partly between 40-50%, have been demonstrated in numerous studies [7-10]. A reorientation of the curricula therefore requires an integration of the new topics, a review of the necessity of previous contents, the coordination with other health professions and a consistent constructive alignment, in order to prepare future physicians well for their professional start and to ensure patient safety.

This international reorientation, the results of the growing German education research and the encouraging reports from various reform and model curricula in Germany led to the fact that the federal government already included in the coalition agreement in 2013 "...to promote practical relevance and to strengthen general medicine in the study program, we want to develop a master plan medical studies 2020 in a conference of the health and science ministers of the federal and state governments" [11]. After intensive discussions, the Master Plan for Medical Studies 2020 was finally adopted by the Ministry of Health and Science on March 31. 2017. The Master Plan for Medical Studies 2020 was intended to set the course for training the next generation of physicians who can meet the challenges of a society of longer life. The Master Plan places particular emphasis on doctor-patient communication, as well as collaboration between the health professions. Competencies in prevention and health promotion as well as in outpatient care "... must also be trained in practice... General medicine must be given the status in medical school that it also has in health care." [12]. These disruptive demands in the content orientation of teaching, the change of training locations and the integration of other professions as well as the consistent strengthening of patient orientation were simultaneously combined with a focusing of learning and assessment content. What is new in the Master Plan is that a major point is devoted to practice-oriented exami-



nations. Politicians had recognized that the paradigm shift in medical education towards competency-based learning must also be reflected in assessments and that examinations play a crucial role as a central control element. "Exams are motivational, provide clear direction, and promote learning. The process, content, and form of exams must be standardized and coordinated." [12]. Anyone who reads the Master Plan for Medical Studies 2020 carefully will recognize that, for the first time in the history of the Federal Republic of Germany, numerous international and national scientific evidences served as a basis for a planned reform of the licensing regulations.

Consequently, the coalition agreement for the 19th legislative period of 2018 reaffirmed this objective. "We want to implement the Master Plan for Medical Studies 2020 as quickly as possible" [13].

We are writing the year 2021, actually, the Master Plan Medical Studies 2020 should be almost yesterday's news, right?

In December 2019, the Federal Ministry of Health presented a working draft of the new licensing regulations. The COVID-19 pandemic required all forces to be focused on combating and containing the pandemic. The draft bill for the new Medical Licensing Regulations followed in November 2020. Once again, discussions arose about the measures of the Master Plan for Medical Studies 2020, which had already been established for four years and had already been successfully tested or even implemented at many locations.

the |. lical

The new Medical Licensing Regulations were postponed until the next legislative period. Memories of the failure of the Medical Licensing Regulations in 1997 are awakening; as Rosemarie Stein headlined in the Tagesspiegel at the time "Reform dead. lobby successful." similar risk rises now. Rainer Woratschka writes today 24 years later, also in the Tagesspiegel, "Experts: Reform of medical studies in danger" [14]. Also the debate in the FAZ this spring between Josef Pfeilschifter, who calls the "reform plan for medical licensing" "the work of bureaucrats alien to practice" [15] and my replica "Which patient is afraid of competent doctors?" makes it clear that just as 25 years ago, the reform of medical education is about much more than a future-oriented education of future generations of doctors. Concerns about redistribution of budgets and capacities, paradigm shifts at all levels, as they require consistent patient- and practice-oriented training, are often not openly expressed, but often represent drivers in resistance to reform.

In regard to the increasing dramatic challenges, ranging from the strengthening of health care in  $\label{eq:rescale}$ 

### WHAT DOES THIS MEAN FOR UCAN AND FOR THE PARTNERS OF THE NETWORK?

The Master Plan for Medical Studies 2020 reinforces the work done so far in the network, and UCAN is already well prepared for the upcoming changes.

The assessment network is becoming increasingly important here. Many of the demands that have been taken up in the Master Plan for Medical Studies 2020, the drafts for the new Medical Licensing Regulations, and also the international position papers are supported by the Assessment Network for Medicine, as has already been explained in many articles in this 15th annual report.

The competence-oriented reorientation of assessments, the globalization and standardization of assessment content, as well as the use of digital tools and efficient workflows is an indispensable necessity that is dictated by changing social and worldwide conditions. All of these aspects have been successfully implemented in UCAN for years, but should now be strengthened in a targeted manner.

International and interprofessional coordination has been a matter of UCAN for years already, but it would make sense to intensify this not only with regard to the tools but also to the content of the assessments. The use of digital tools to conduct standardized parcour exams has been tried and tested in many cases and has been implemented efficiently in routine practice. This means that the basis has already been laid for successful implementation of the new Medical Licensing Regulations in the area of assessments. The next steps are to provide more targeted support for those responsible for the assessments and the lecturers by means of predefined but site-specific adaptable assessment procedures.

With IMS 3.0, the platform becomes more modern and functional. This is an essential joint step. Subsequently, the networking of the examiners must be expanded with regard to the new content. The inclusion of the public health service in the licensing regulations, aspects such as climate, environment and health, but also the strengthening of general medicine are essential challenges that are not yet sufficiently reflected in the exam content, but must be met in all faculties. The scientific exchange and the connection of the professional colleagues on these topics would make it easier for everyone to create good exam tasks in these new areas. At the same time, this would open up exciting research fields for cooperation projects between the partners.

In addition to strengthening the exchange of content and expertise, a new focus could be on exam efficiency and exam economics. One of the main reasons for founding the network was the desire of clinical colleagues to minimize inefficient administrative work processes. Strengthening the exchange of information and determining the costs of certain factors would be very helpful for resource planning in the faculties when **CHAPTER 7 – MASTERING THE FUTURE TOGETHER** 

new practical assessment formats are introduced, as JANA JÜNGER is currently the case at many locations.

The student progress test is a good example of how the positive aspects of formative examinations can be worked on in a network, although it is also evident that the number of participants has remained constant over the years. Here it is necessary to develop models together with committed students how more efficient learning can be spread by means of "test-enhanced-learning". Especially the new topics of public and planetary health benefit from the work of a committed interprofessional student body, which, for example, is strongly committed to measures to combat climate change.

In summary, it can be stated that UCAN is well prepared for the implementation of the Master Plan for Medical Studies in wide areas and can provide the partners with important support through the digital tools. On this basis, it is important in the future to expand the content work on new topics and their mapping in good exams, to strengthen interprofessional collaboration and to involve the students in the development tasks.

It is to be hoped that in the next legislative period the courage will be found to adopt long-standing and well-matured measures that are necessary for the reorientation of medical training with a new licensing regulation and thus also to bring the long path of the reformers of the last decades to a good end and thus a new beginning.

124

[8] Kocalevent RD et al. Burnout und Gratifikationskrisen im Längsschnitt bei Ärztinnen und Ärzten während der fachärztlichen Weiterbildung in Deutschland. Psychother Psychosom Med Psychol, 2020; 70(08): 319-329 [9] Shanafelt TD et al. Burnout and self-reported patient care in an internal medicine residency program. Ann Intern Med, 2002; 136:358-367

[10] Thomas MR et al. How do distress and well-being relate to medical student empathy? A multicenter study, J Gen Intern Med, 2007; 22:177-183

[11] Bundesregierung. Deutschlands Zukunft gestalten. Koalitionsvertrag zwischen CDU, CSU und SPD. 18. Legislaturperiode, 2013, S. 58, online verfügbar unter: https://archiv.cdu.de/sites/default/files/media/dokumente/ koalitionsvertrag.pdf (zuletzt abgerufen: 03.08.2021) [12] Bundesministerium für Bildung und Forschung. Masterplan Medizinstudium 2020 (Beschlusstext).

2017

03.08.2021)



### German National Institute for state examinations in Medicine, Pharmacy and Psychotherapy (IMPP), Mainz, Germany

The original article was written in German by Jana Jünger. This English translation was carried out by the Institute for Communication and Assessment Research

[1] Flexner A. The Flexner Report on Medical Education. Ind Med Gaz. 1913;48(5):189-190

[2] Lohölter R. Zum Titelbild: Pädagoge, Wissenschaftsmanager und Visionär. Zum 125. Geburtstag von Abraham Flexner (1866-1959). Med. Ausbildung. 1991; 8(1):59-64

[3] Universität Ulm. Ausstellung 50 Jahre Uni Ulm. Online verfügbar unter: https://www.uni-ulm.de/universitaet/profil/geschichte-der-universitaet/ausstellung-50-jahre-universitaet-ulm (zuletzt abgerufen: 03.08.2021)

[4] Schuster W. Die unendliche Geschichte: die Reform der ärztlichen Ausbildung, Gesundheitswesen (Suppl Med Ausbild). 1998; 15(Suppl1):51-53

[5] Stein R. Lobby erfolgreich, Reform tot. Der Tagesspiegel, 1997, online verfügbar unter: https://www.tagesspiegel de/themen/gesundheit/lobby-erfolgreich-reform-tot/19602.html (zuletzt abgerufen: 03.08.2021)

[6] Frenk J et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet. 2010, 4;376(9756):1923-1958

[7] Koehl-Hackert N et al. Belastet in den Beruf - Empathie und Burnout bei Medizinstudierenden am Ende des Praktischen Jahres. Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen. 2012; 106(2):116-

[13] Bundesregierung. Ein neuer Aufbruch für Europa. Eine neue Dynamik für Deutschland. Ein neuer Zusan menhalt für unser Land. Koalitionsvertrag zwischen CDU, CSU und SPD. 19. Legislaturperiode. 2018, S. 100, online verfügbar unter: https://www.bundesregierung.de/resource/blob/974430/847984/5b8bc23590d-4cb2892b31c987ad672b7/2018-03-14-koalitionsvertrag-data.pdf?download=1 (zuletzt abgerufen:

[14] Woratschka R. Experen: Reform des Medizinstudiums in Gefahr. Tagesspiegel Background, 2021, online verfügbar unter: https://background.tagesspiegel.de/gesundheit/experten-reform-des-medizinstudiums-in-gefahr (zuletzt abgerufen: 03.08.2021)

[15] Pfeilschifter J. Therapie ohne Diagnose. Frankfurter Allgemeine Zeitung, 2021, online verfügbar unter: https://www.faz.net/aktuell/karriere-hochschule/der-reformplan-zur-aerztlichen-approbation-ist-praxisfern-17165034.html (zuletzt abgerufen: 03.08.20 21)

## **Standardised examinations in the Physician Assistant course of study**



igital examinations have been in line with the spirit of the times not only since the Corona pandemic. Nevertheless, a new legal ordinance was issued in Bavaria. With retroactive effect as of April 20, 2020, legally compliant digital remote assessments were thus made possible [1]. Against this back-

ground, well-founded e-assessment systems such as those provided by UCAN are becoming more important.

The ItemManagementSystem (IMS) forms the backbone of the UCAN modular system. There, questions (items) can be written, managed and shared. A review function as well as test statistical values for the individual items from their use in previous exams allow a quality-assured exam creation. Accordingly, the system has already proven itself many 1000 times in the field of human medicine for which the system was initially developed.

The existing public pool of examination questions in human medicine can, however, also be of benefit to other health care professions by introducing and using examination questions here and by successively promoting the standardisation of examinations. Since the increasingly complex reality of health care implies high demands on patient safety [2], close cooperation between the various health care professions is essential. The UCAN network provides the platform for

exchange between the various health care professions and can thus contribute to sustainable patient safety. Cooperation and exchange between the health care professions in the context of examinations carried out by UCAN is saving increasing amounts of time with regard to the preparation and evaluation of the examinations, particularly because of the standardised validation algorithms.

Within the scope of a cooperative e-examination in the courses of studies "Physician Assistance - Arztassistenz" at the Ostbayerische Technische Hochschule (OTH) Amberg-Weiden and "Medizinische Assistenz Chirurgie" at the Fliedner Fachhochschule Düsseldorf, the system was used for the first time in the summer semester 2020 for the still young profession of Physician Assistant in Germany. The professional profile - already established for decades in Anglo-American countries - could be part of the solution to the increasing shortage of physicians in Germany. In the Netherlands too, physicians have successfully delegated tasks to physician assistants for almost 20 years. Through the PA course of studies, graduates should be able to take over medical activities in the course of delegation by a doctor and should also be able to plan, decide and act independently.

In the meantime, courses of study for the training of Physician Assistants are offered at more than 10 other, mainly private universities in Germany, apart from the OTH Amberg-Weiden and the Fliedner Fachhochschule Düsseldorf. The OTH Amberg-Weiden is currently the only state university in Germany that offers the course of studies with primary qualification - i.e. with admission directly for school graduates with university entrance qualification - in eight semesters. The non-primary qualification programmes are generally six-semester programmes for students who have completed education in a health profession.

A detailed validation of this pilot project, which involves the integration of medical examination questions in an interprofessional context, is still pending. First results are promising. "The routine use of the UCAN examination system for the training of physician assistants would be a further important step in interprofessional training within the health

Amberg-Weiden, Germany

care system," says Stefan Sesselmann - Professor of Interprofessional Health Care and head of the Physician Assistance program at OTH Amberg Weiden. Together with his colleagues on the board of the German Association of University Physician Assistants (DHPA), Sesselmann, who himself holds a habilitation in orthopedics and trauma surgery, would like to set the course for standards in the training of physician assistants in Germany.

### **ISABELLA IOBST & STEFAN SESSELMANN**

Ostbayerische Technische Hochschule (OTH) Amberg-Weiden,

Department of Industrial Engineering and Healthcare, Physician Assistance,

[1] Verordnung zur Erprobung elektronischer Fernprüfungen an den Hochschulen in Bayern (Bayerische Fernprüfungserprobungsverordnung – BayFEV) vom 16. September 2020 [2] Eckpunkte der Bund-Länder-Arbeitsgruppe "Gesamtkonzept Gesundheitsfachberufe", S. 2

# Teaching, learning and assessments in a digitised world

hen computer-based examinations were introduced in the skilled-crafts sector in 2007, they were offering many advantages even then. Now, in view of the corona pandemic and the increasing awareness of safety and hygiene measures to be applied, the benefits of using computer-based examinations become even more explicit:

While traditional paper-based examinations involve a process of hand-to-hand passing – from printing to handing out to the examinee to correcting the written examinations –, computer-based examinations pass on data digitally, thereby reducing personal contacts.

To fully utilise the advantages of computer-based examinations, a corresponding examination software and infrastructure is required. The Central Agency for Continuing Vocational Education and Training in the Skilled Crafts (ZWH) meets these needs within the framework of the project "Professionalisation and Networking in the Skilled Crafts – ProNet Handwerk". As one of 17 projects, the joint project of the ZWH was selected for excellent professional education and training in the InnoVET innovation competition of the Federal Ministry of Education and Research (BMBF), and the project work commenced on 1 October 2020. Together with its partners from the skilled-crafts organisation and with the academia, the ZWH will develop and test new structure-building qualification offers, especially in the construction and finishing trades, during the four-year project period. Special emphasis will be put on the following instruments:



Modern further training in the skilled-crafts sector are established using modular, cross-craft further-training concepts in the subject area of "Smart Living and Working" with targeted professional qualifications at DQR levels 6 (Bachelor Professional) and 7 (Master Professional).



Didactic-methodological competencies as well as media and IT competencies in the digital transformation are promoted by continuing education for training staff in the skilled-crafts sector based on their specific needs.

An e-campus is provided as a basis for cross-location, cooperative working and learning processes as well as networking, incorporating new digital learning and working technologies.



An examination software for online examinations will be integrated for assessing competences after completion of the individual modules and for the final examinations.

The assessment tools of the Umbrella Consortium for Assessment Networks (UCAN) provide the basis for the adaptation and further development of the examination software. Examinations can thus be conducted as written, computer-based examinations, paper-based examinations, or tablet-based oral/practical examinations. Examination results can be evaluated with a comprehensive analysis tool and thus provide task developers with valuable information on the quality of a task or an examination.

The UCAN tools have been used for examinations in medical education and training for 15 years. With 77 partners in eight countries, UCAN, as an umbrella organisation for various examination networks, has examined more than 12 million candidates.

The examination requirements in the skilled-crafts sector are in no way inferior to the examination requirements in the health sector. On the contrary, the examinations in the skilled-crafts sector are characterised by a high degree of complexity, both in terms of content and regarding examination procedure regulations and associated processes.

Within the framework of the ProNet Handwerk project, the UCAN tools are therefore being further developed and adapted to meet the requirements of the skilled crafts. The testing of the first adaptations of the examination software and the e-campus as well as testing a mobile laptop infrastructure are scheduled for autumn 2021.

Comprehensive needs analyses are currently being carried out for the adaptations of the examination software, the development of the e-campus and the definition of the mobile laptop infrastructure. The requirements derived from these analyses form the basis for the development of software and hardware solutions, which can then be used via the ZWH once they have been completed. ◆

### **QUNG SCHROETER-TAN**

INNOVET.

Central Agency for Continuing Vocational Education and Training in the Skilled Crafts (registered association), Online Assessments, Düsseldorf, Germany



Bundesministerium fur Bildung fur Grachung



Gefördert als InnoVET-Projekt aus Mitteln des Bundesministeriums für Bildung und Forschung.



## **Our vision for the common future**

oday we can look back on 15 successful years in the UCAN network, during which we have jointly mastered countless challenges in the field of assessment. The best way to illustrate this success is with various numbers from our databases. Since the beginning of our work, we have successfully completed more than 40,000 exams with around 15 million participants. With around 700,000 questions, the steadily growing item pool in the network is now one of the largest question libraries in the world. The number of questions shared with all partners in the network has risen to 125,000, and the use of exam content from other faculties by itself has saved far more than 140,000 working hours or the equivalent of 70 working years over the last 15 years.

However, we also have new challenges ahead that we can successfully overcome together, in line with our motto "TEAM: Together Everyone Achieves More". Over the next five years, we will focus on the following five challenges in particular:

### **1. REVISION OF ALL EXISTING UCAN TOOLS**

Currently, all UCAN tools (see pages 22-27) are being fundamentally revised. Our authoring system, the second version of the ItemManagementSystem (IMS2) has already been in use for more than 11 years and will be replaced by IMS3 in the next few years. The most important aspect of the implementation is a much-simplified entry of exam content. IMS3 is currently under development.





The administration of users, groups and institutions has been outsourced to a separate tool, the CUStodian (CUS). This is intended to streamline IMS3 to the maximum and make it more clearly structured. Further, CUS will be used as the interface for permissions and settings for all other UCAN tools, replacing the distributed user management in each tool. CUS is currently in beta testing with several partners.

The actors database has also been moved from the IMS to its own tool, the ActorsExpert (ACE). Here, simulation persons and their trainers will find it easier to plan, book and invoice appointments. ACE is currently also being tested by several partners.

Our tool for calculating results and test statistics, EXaminator2 is currently being replaced by EXaminator3 (EX3). EX3 can evaluate more question and exam types automatically, but at the same time the tool is clearer, easier to use and faster than the successful previous version. EX3 is about to enter the roll-out process today.

All UCAN tools for electronic assessment (respectively the server and client versions of: CAMPUS for desktop-based assessment, tEXAM for tablet-based assessment, tOSCE for tablet-based practical assessment, and ProgressTest for web-based assessment) will be increasingly merged over the next few years. The goal is a smaller number of tools to reduce complexity in operation, maintenance and support.

All tools will be more closely interconnected to facilitate the work of all those involved in the assessment workflow. The development but also the



introduction of the new tools at the individual partner sites is a complex and time-consuming undertaking. Here, the UCAN team is dependent on patience and constructive feedback from the partners.

### 2. NEW MEDICAL LICENSING REGULATIONS

The Master Plan Medical Studies 2020 is included in the working draft of the new Medical Licensing Regulations (ÄApprO), the adoption of which has currently been postponed until the new legislative period. Within the framework of the planned changes, 14 measures of the Master Plan Medical Studies 2020 are to be implemented, following the ministerial draft. The current draft calls for an earlier practical orientation in the course of study by closely linking theoretical and practical content from the first semester onwards. Furthermore, it provides for the first state examination to be divided into a written first state examination and an oral second state examination, the latter to be taken in the form of a objective structured clinical examination (OSCE). It is our concern in the assessment network to support responsibles for examinations as well as lecturers in the best possible way in the future with the introduction as well as the conversion to tablet-based OSCE exams and to implement predefined, but individually adaptable assessment procedures at the location (see pages 42-47). Together, we have the chance to use our many years of expertise in the field of assessments to make the day-to-day work of all members easier and to save resources. As a pioneer in the field of electronic OSCE examinations, we want to further expand this exam format in order to make the OSCE tool usable for multiple-mini interviews (MMI) as well as motivational interviews, for example.

In order to be jointly prepared for new challenges with regard to innovative and competence-oriented performance assessments, the assessment portfolio (aPortfolio) is currently being further expanded. As a first module, the assessment of video annotations has already been developed, whereby interprofessional, communicative and task-oriented competencies can be taught and tested complementary to the OSCE format (see pages 84-87). In the coming years, further modules are to follow, which will enable as well as facilitate the recording of workplace-based and competence-oriented assessment performance. The aim

of the overall "aPortfolio" project is to develop a platform on which non-traditional student performances (e.g. patient reports, MiniCEX, Encoutercards, 360° feedback, multisource feedback, presentations) can be stored, assessed by examiners and also viewed by students. This tool could be further developed in the context of its conceptual and technical development process also for the maintenance of a logbook in which, as a rule, training objectives as well as standards of the training sections are recorded, by students and teachers. They serve as orientation and structuring of the training section and document the learning progress as well as the training goals of the students. For an optimal technical implementation of the aPortfolio we would like to use the expertise in our national and international network to develop a basic concept together with you, which can meet the needs of all members of the network.

### **3. ACADEMIZATION OF HEALTH PROFESSIONS**

Especially in recent years, an increasing academization of the health professions and an increase in new courses of study could be observed. In this sense, it is of great importance to us to promote interprofessional cooperation, to collaboratively develop new examination topics and to use the network as a platform for projects and cooperations by integrating additional occupational groups of the health sector. To date, in addition to the Medicine degree program, other professions e.g., Nursing, Midwifery, Physical Therapy, Emergency Medical Services Vocational Education, Medical Assistant Surgery, and the Physician Assistance degree program (see pages 124-125) are included. In order to be able to integrate these and also other health care professions into the UCAN network, we will increasingly participate in subject-specific congresses in the future. Our visit to the German Nursing Day in 2020 should be mentioned here as representative.

### **4. EXPANSION IN THE SKILLED-CRAFTS SECTOR**

In recent years, we have also been able to inspire UCAN partners outside the healthcare sector with our network and our portfolio of assessment tools. In the project "Professionalisation and Networking in the lot from each other.

problems that arise.

## UCAN-TEAM

130

Skilled Crafts – ProNet Handwerk" (see pages 126-127), we are working with 6 partners to adapt and extend our UCAN tools and workflows to support the requirements of examinations of the Chambers of Crafts. We are convinced that the assessment system in the fields of skilled crafts and medicine have a lot in common, but at the same time we can learn a

### 5. CONTENT TRAINING COURSES

In addition to resource optimization, quality assurance of exam content is an important aspect of our work. In the next few years, we would like to set up a training program to support partners in creating good questions, optimally compiling exams, and interpreting test statistics in a comprehensible way. There was a successful pilot involving medical expertise in 2021 (see pages 58-59).

Of course, in addition to these five major challenges, there will also be a lot of smaller, individual wishes and requirements. As in the past, the UCAN team will continue to incorporate all of the partners' ideas into the development and support of the UCAN tools and to jointly overcome any

Finally, we would like to thank you once again for the successful and lively cooperation as well as the constant exchange. We are confident that we will be able to learn a lot from each other and with each other in the future years as well, and that we will master the upcoming path with all the upcoming opportunities and challenges together.

Institute for Communication and Assessment Research, Heidelberg, Germany





**CHAPTER 8 – TEAM PROFILES** 



**CHAPTER 8 – TEAM PROFILES** 





Institute for Communication and Assessment Research.



is responsible for the (further) development of our electronic assessment tools.



LARS FEISTNER takes over the technical management of UCAN.



### **KERSTIN LUBIK**

takes over the supervision of our UCAN partners and accompanies projects such as the implementation of exam formats at the faculties.



WINFRIED KURTZ

is a software developer mainly responsible for the front-end development of the IMS as well as the development of the Examinator<sup>3</sup>.



ANNA MUTSCHLER

supports the conceptual and scientific work of the institute and is active in the field of public relations.



KLAUS YAN takes over technical-administrative tasks and optimises the development and work processes in the UCAN team.



SASCHA STELLING is working on the relaunch of the actors database and brings his expertise in the design of visually attractive software.



CHRISTIAN MOSES supports the UCAN team in software development and is chairman of the institute's works council.



ALEJANDRA PÉREZ GARCIA is a software developer and contributes her expertise to the further development of Examinator<sup>3</sup>.



EDUARD LAAS is the first contact person on our support hotline and helps UCAN partners with their concerns.



works mainly on LaTeX exports (PDF exports) of various tools.





RESEARCH

SASKIA EGARTER

brings in her expertise in the areas of research, project management and quality assurance.



is responsible for financial and personnel administration as well as partner contracts.



DANIEL FRISING

is a student of applied computer science and responsible for the visualisation of internal server data, among other things.



is responsible for the further development of individual modules in the aPortfolio.

SUPPORT



## Membership

## **Since 2006**

## HEIDELBERG



The Medical Faculty of Heidelberg University, together with Charité Berlin and LMU Munich, is a founding member of UCAN. Among other things, the faculty is committed to practical relevance, interdisciplinarity and competence orientation in medical studies as part of the Heidelberg Curriculum Medicinale (HEICUMED). The main motivation for initiating a medical examination network was the desire for scientific exchange of experience and knowledge in the field of medical examinations as well as the bundling of joint resources for the creation, implementation and quality assurance of innovative examination formats.

In almost all departments of the preclinical and clinical sections in human medicine and dentistry, the ItemManagementSystem (IMS) is used to create tasks and examinations. Written examinations (scanning of answer sheets) are initially evaluated with Klaus, and the UCAN tool Campus is used for computer-based examinations. For quality assurance purposes, the exams are evaluated with EXaminator2 in order to report back any conspicuous tasks to those responsible for the exams.

The first OSCE with tablet-based checklists took place in 2012 in internal medicine in Heidelberg. Since then, tablets have been successfully used in OSCEs in five other subjects. Since 2020, tablet-based written exams have also been conducted in three subjects. A comprehensive expansion to further subjects is planned.

Founding member of UCAN in 2006

## MUNICH



MEDICINE DENTISTRY VETERINARY MEDICINE

The Medical Faculty and the Ludwig Maximilian University Hospital in Munich are founding members of the Assessment Network next to Berlin and Heidelberg. Initial goals of the cooperation from the LMU's point of view included intensifying interfaculty exchange to improve examination quality and interfaculty and intrafaculty cooperation through the use of a joint assessment platform.

The medical assessment landscape at the LMU Munich is characterised by a high number of examinations, students and lecturers. In addition to the ItemManagementSystem (IMS), other UCAN tools are also used. Tablet-based assessments have been conducted on a large scale since 2017 in collaboration with the Faculty of Veterinary Medicine. In particular, new written examination formats are being tested. The introduction of tablet-based examinations has led to a significant acceleration of the evaluation and feedback processes.

In addition to the joint development of the software platform, various aspects of medical examinations were researched and published together with other UCAN partners.

Founding member of UCAN in 2006



## **Since 2007**

## DRESDEN



### MEDICINE

At the Medical Faculty of the TU Dresden, a total of about 2,700 students are studying in the courses "Standard Study Course of Medicine" and "Model Study Course of Medicine, Dentistry, Public Health/Health Science and Medical Radiation Sciences". When the first IMS user training took place on 07.09.2007 after various preparatory works, hardly no one had any idea that once a year approx. 100 exams of approx. 180 lecturers are held with the IMS at the faculty. Star-shaped case templates are a distinguishing feature of the exams. The clinical examination course uses the IMS-OSCE exams as well as the joint OSCE exam of general medicine, surgery and internal medicine with 12 stations. The latter has even been tablet-based since 2015. The application of the review procedure, the use of examination questions from the consortium, the evaluation of question statistics and documented process sequences are important components for ensuring quality in teaching, which has led to a "DIN-EN-ISO-9001:2008 certified quality management for teaching".

## DUSSELDORF



MEDICINE

The Medical Faculty of Heinrich Heine University Dusseldorf has been a member of the UCAN Assessment Network since 2007. In Dusseldorf, paper-based MC/MS examinations with up to 550 participants are conducted as part of the model course of study in medicine. The ItemManagementSystem (IMS) has proven its worth in the compilation of these interdisciplinary examinations, especially for item administration. Klaus and EXaminator are used to evaluate and create the test statistics. The clinical-practical part of the intermediate medical examination of the Dusseldorf model course of study in medicine has been carried out tablet-based with tO-SCE since summer 2016.

With the completion of the innovative and interdisciplinary teaching and learning center for medicine (i2L2med) in 2023, the usage of further tools such as Campus for e-exams or aPortfolio is planned.

## HAMBURG-EPPENDORF



In 2007, the Medical Faculty of the University of Hamburg joined the Assessment Network as the fourth member after Berlin, Munich and Heidelberg. There was a desire to evaluate the many MC exams centrally and electronically in an assessment centre and to create uniform quality standards for the exam questions. The ItemManagement-System (IMS) was optimal as a central element.

At the University Hospital Hamburg-Eppendorf (UKE), 500 first-year students per year begin their studies in medicine, dentistry and midwifery. With a total number of more than 3,600 students, the number of examinations is very high. The module final examinations in the model study programmes medicine iMED and dentistry iMED DENT are interdisciplinary and include different exam formats. In the field of medicine, the main parts are MC examinations and practical parts, which are conducted as structured oral or OSCE examinations. The most comprehensive examinations are the scientific selection test HAM-Nat and the so-called "Prüfung Normalfunktion", an intermediate examination after the 3rd semester (oral and OSCE examination), which is required as an equivalence to the oral part of the first section of the medical examination.

Hamburg uses the IMS for about 140 exams per year, which are evaluated with the EXaminator. Since 2014, tOSCE has been used for the structured oral exams, and since 2018, tEXAM has been used increasingly for the implementation of selected exams on tablets.

## TÜBINGEN



The Medical Faculty of the Eberhard-Karls-University of Tübingen has been a member of UCAN since 2007 as part of the Baden-Württemberg Competence Network for Teaching in Medicine. Central to the decision to become a member was the need for a system for the administration, exchange and quality assurance of examination contents as well as the possibility to create, print and analyse examinations.

Characteristic of the medical examinations in Tübingen are centrally organised examination blocks (two blocks per semester with one examination day per semester) and, since 2013, the use of electronic OSCEs with the help of the UCAN system tOSCE in the 6th semester.

In addition, the Faculty of Medicine Tübingen has been participating in the competence-oriented student progress test of UCAN since 2013 and is in close cooperation with other member faculties of UCAN.

Since 2018, individual electronic examinations in the dental medicine course have also been carried out using the UCAN system tEXAM.

## **Since 2008**



The University Hospital of Freiburg joined the IMS/UCAN Network in 2008 as part of the "Kompetenznetz Lehre in der Medizin Baden-Württemberg". The main reasons for this were more efficient examination procedures and the further development of examination quality. Currently, examinations in human medicine, dentistry and molecular medicine are carried out with the help of the IMS. In human medicine, exams in most subjects are carried out using IMS and thus examine a large number of students. Since 2012, the University Hospital of Freiburg has also been working closely with various other UCAN faculties within the framework of the MERLIN project with regard to competence-based examinations and feedback on examinations.

In 2013 and 2014, the University Hospital of Freiburg piloted a computer-based key feature examination in neurology with the UCAN tool Campus. Since 2015, various OSCEs (for example in surgery or ENT) have been carried out in the institution with the help of tOSCE. In addition, Freiburg has been taking part in the UCAN ProgressTest since its inception. The ProgressTest was designed by UCAN and is based on student competence.

## GÖTTINGEN

UNIVERSITÄTSMEDIZIN GÖTTINGEN

MEDICINE DENTISTRY

The University Medicine Göttingen (UMG) joined UCAN in 2008. The study regulations of human and dental medicine allow new forms of questioning techniques, especially for e-exams, and list Key Feature, Long Menu, KPrim and PickN questions as examples. In an examination handbook, sub-score rules are recommended for the last two question types and are automatically stored in the IMS. In the case of question exclusions, the faculty orientates itself on the IMPP.

Centrally supervised exams in the pre-clinical as well as in the clinical study phase are exclusively conducted as e-examinations. This also includes a small number of free text exams, which are no longer handwritten due to better readability and thus faster correction. New study programmes such as Molecular Medicine or Cardiovascular Science also use e-examinations. There are currently about 13.000 exam cases per year in about 150 exams. All exam questions are subject to a formal review by the Dean of Studies in addition to the subject-specific review in the inner circle of colleagues.

The main motivation for UCAN membership was the desire to replace paper exams with Word, a common pool of questions and integrated tools such as Campus, tEXAM and EXaminator. Currently, e-assessments are conducted with Campus, in individual cases with tEXAM, evaluations with EXaminator and OSCEs with tOSCE. The UMG was responsible for the new development of video-based items.

## **Since 2009**

## MANNHEIM



### MEDICINE

The Medical Faculty Mannheim of the University Heidelberg joined UCAN in spring 2009. A decisive factor for the membership was the idea of cooperation: All faculties work with very similar goals and examination contents, especially for MC exams. The exchange of questions and know-how regarding the creation of exam questions with other faculties is therefore very important. Particularly important is the objective of constantly increasing the exam guality and reliability through standardised exam processing and feedback of question quality to the examiners. The examinations in Mannheim are characterised by a high examination frequency in the pre-clinical study section with intermediate examina-

tions during the modules, which are intended to give feedback on the individual learning success. Just like the integrated modules in the pre-clinic, the examinations are interdisciplinary. In addition to MC exams, OSCEs, poster examinations and open text questions are also offered in the model study programme. In addition to the ItemManagementSystem (IMS), the EXaminator is currently being used in Mannheim.

## WITTEN/HERDECKE



On the recommendation of other UCAN partners, Witten/Herdecke University (WHU) decided to join the examination network in 2009. In the clinical part of the medical curriculum written exams are mostly developed as MCQ-format and executed with Item Management System (IMS). In the field of OSCE's an adjustment currently takes place by introducing tablet-based OSCE's (using tOSCE).

## **Since 2010**

## **ERLANGEN-NUREMBERG**



MEDICINE

DENTISTRY

The Friedrich-Alexander-University Erlangen-Nuremberg has been a UCAN partner since 2010. One of the main reasons for joining the "Medical Assessment Network" was the desire to improve the examination situation. In Erlangen, the IMS has been used since joining. In addition, the Klaus tool has been used for conducting paper-based examinations, the EXaminator and, since 2016, for conducting written examinations on tablet computers using the UCAN app tEXAM. Klaus and the EXaminator are used in dentistry.

GENEVA



MEDICINE

DENTISTRY

The Medical Faculty of the University of Geneva has been an UCAN member since 2010. The institution's vision is to offer students a high standard integrated curriculum through compelling teaching and learning approaches. The initial motivation to become an UCAN partner was the capacity to connect the online assessment software Campus, which the institution had been using for a couple of years, to an item pool. The faculty currently uses UCAN to develop online assessments, including regular multiple choice questions, key-features, and OSCE evaluation grid. All the OSCE exams and almost all written exams are now taken on tablets with tOSCE or tEXAM.

## **GIESSEN**

## JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

MEDICINE

The Justus Liebig University of Giessen joined UCAN and the Assessment Network in 2010 after initial contacts had already been made in previous years. After reviewing and testing several exam and test systems, a membership of UCAN proved to be the best solution for the purposes in Giessen. In Giessen, almost all written exams are now created with the help of the ItemManagementSystem (IMS) and carried out paper-based together with the corresponding scanner system Klaus. This results in an immensely large examination volume. Electronic exams are currently only held in selected scenarios, among others as tool in OSCE situations or as digital pre-tests using ILIAS. The EXaminator is also used intensively for quality assurance. In OSCE exams, case simulations on tablets are also used and also serve as uniform exam documentation.

## MARBURG

Philipps Universität Marburg

### MEDICINE

Phillips University Marburg has been a UCAN partner since 2010, initially together with Gießen. Many e-examinations are written at the Marburg Department of Medicine, some of them since 2008. Today, with a few exceptions, all written examinations are e-examinations. For those examiners who use the IMS database for the compilation of the exams, a corresponding interface was developed in close cooperation between Marburg HRZ employees and UCAN.

The two medical departments of the Universities of Gießen and Marburg have been working closely together for many years in the field of e-learning, learning platforms and e-assessments. At UCAN, the two departments were accepted as members together.

The number of subjects using the IMS is constantly increasing. Marburg examiners use the IMS most intensively for the compilation of written examinations, which are then transferred to the ILIAS-based e-examination system. Soon the tOSCE software will also be used.

## **Since 2011**

MAINZ



Mainz University Medical Center has been a member of the UCAN network since October 2011. In the implementation of e-examinations, the Department of University Medicine plays a central role within the Johannes Gutenberg University of Mainz. Approximately 40 percent of all e-examinations at the university are conducted by the Department of University Medicine. Against this background, it made sense to join UCAN and thus obtain a tool for organizing and exchanging exam questions. In addition, the cooperation with the UCAN network offered itself to establish iPad exams together. Since the semester of 2015/2016 tEXAM has been used in about 150 exams with an average of 180 examinees. This totals more than 25.000 individual exams. By using iPads, exams are conducted more flexibly and independently of central PC rooms.

## HOMBURG/SAAR



The Faculty of Medicine in Homburg/Saar has been a member of the UCAN medical examination network since 2011. The faculty offers a clearly structured study of medicine in a relatively individual framework. Every year about 275 new medical students start their studies

in Homburg. The studies are organized by many clinics and institutes of the medical faculty. The IMS is used to compile examinations in the fields of general medicine, anatomy, gynaecology, ENT, paediatrics, and clinical chemistry.

In dentistry, about 27 new students start their studies each year. For exam composition, the IMS is used in the departments of anatomy, ENT and clinical chemistry, among others.

## ULM



### MEDICINE DENTISTRY

The Medical Faculty of the University of Ulm has been a member of the UCAN examination network since summer 2011. The decisive factors for the membership were the possibility of inter-university cooperation, the stimulation of cooperation within the University of Ulm (group pools) and the optimisation of the workflow.

In Ulm, tablet-based practical examinations have been carried out since 2013 and since 2016, the app tEXAM has been used, with which combined examinations (MC and practical exam part) as well as regular examinations with different question types (e.g. Long\_Menu, Region of Interest, Hot-Spot, etc.) can be carried out tablet-based. In addition, the Medical Faculty of the University of Ulm has been using the SP-database system for web-based administration of the simulation patient program since 2015. All in all, tOSCE, tEXAM, EXaminator, the SP-database as well as the public pool of the IMS are used in Ulm. In other subjects, the IMS is only used as a system for creating exams. Over the years, close cooperation has developed with the system developers and the scientific advisory board.





**BERN** 

## **Since 2012**



Berner Fachhochschule

The Bern University of Applied Sciences, Department of Health Professions, has been a partner of UCAN since 2012. As one of eight departments of the BFH, it offers teaching, research, continuing education and services in the fields of nutrition and dietetics, midwifery, nursing and physiotherapy.

The department is divided into the four divisions Nutrition and Dietetics, Midwifery, Nursing, Physiotherapy, the Institute for Person-centred Health Care, the Institute for Health Economics and Health Policy and the Health Services Division. The divisions of the four health care professions offer Bachelor's and Master's degree programmes, applied research and development as well as continuing education and services.

With the UCAN tools, the Berne University of Applied Sciences has web-based applications that meet the requirements of the review process when creating exam questions and cover the aspects of quality assurance for question development and revision using statistical parameters. All candidates undergo a two-part aptitude test to be admitted to the study programme. This decides on admission to the programme. The first part of the approximately 1000 candidates per year are tested in writing using the ItemManagementSystem (IMS) and scanner-based paper sheets.

The IMS is also used in all study programmes for written examinations with scanner sheets. The IMS makes it possible to relieve the workload of numerous recurring administrative tasks.
### GRAZ



The Medical University of Graz has been a UCAN partner since 2012. The Graz University of Medicine is motivated for membership by its participation in the assessment network and the gradual possibility of being able to process all examinations by one system, as well as of being able to use different examination formats and question types.

The majority of the module exams for the study of human medicine are handled using the IMS (3 to 4 exams per semester for 20 modules each). Some of the module examinations for the dental studies are handled using the IMS.

The IMS is also used for the admission procedure for the allocation of study places in human and dental medicine. For the OSCE and the KPJ degree, tOSCE is used. In the future, the e-assessment will also be processed via the UCAN system.

The preclinical and clinical learning objectives catalogue is created in the IMS and the exam questions are linked to the learning objectives. Klaus and the EXaminator are also used for processing the paper-based module examinations.



The Medical Faculty (FME) of Otto-von-Guericke University Magdeburg has been a UCAN partner since 2012. At present, e-examinations are used in over 25 subjects at the FME. Important reasons for joining UCAN were the desired improvement of examination quality and the justiciability of e-examinations.

At present, the UCAN tools are mainly used for e-assessments performed with Campus and, since 2015, also for oral examinations with tOSCE.

# **Since 2013**

**AACHEN** 



The Medical Faculty of the RWTH Aachen University has been a member of UCAN since 2013. There, central electronically supported evaluations of paperbased (MC) exams with up to 90 examinations per year are carried out with a class size of about 280 students. There are about 300 computer workplaces available at the university, which are used for examinations of other faculties (Dynexite) and in individual cases for formative examinations of the Medical Faculty. The main reasons for Aachen's membership of UCAN were the use of the item database, the increase in the quality of its own exam questions, the centralised cooperation and easier versioning of exams. Currently, the ItemManagementSystem (IMS), the EXaminator for test statistics and exam evaluation, and the Klaus tool for paper-based exams are used in addition to the IMS. For OSPE exams, tOSCE is used in some cases. tEXAM is currently only used for voluntary practice exams. The use of tEXAM for summative examinations is planned.



# **GERMAN MEDICAL CHAMBERS**



#### MEDICAL ASSISTANT

In 2008, several German Chambers of Physicians and Regional Chambers of Physicians joined forces with the aim of jointly creating and using a central pool of questions for the written questions of the interim and final examinations for medical assistants. Between 2008 and 2010, the questionnaire pool was set up in three stages:

- Level 1: Structure of the question pool, collection, cataloguing and development of a keyword index
- Level 2: Management of the task pool and collection of new tasks
- Level 3: Quality assurance of the task pool

In 2013, the State Medical Chamber of Hesse signed the partnership agreement with UCAN. Since then, the task sets for the final and intermediate examinations have been created with the ItemManagementSystem (IMS); for the first time with the task sets for 2015. At present, only the tool for creating items and exams is used.

# EUROPEAN BOARD EXAMINATION IN OTORHINOLARYNGOLOGY -HEAD AND NECK SURGERY (EBE-ORL-HNS)



MEDICAL SPECIALIST SOCIETY

European Board Examination in Otorhinolaryngology - Head and Neck Surgery (EBE-ORL-HNS) was founded in 2008. Since 2009, it has been organizing regular written and oral examinations in various European cities. In 2013 it became the first European professional association to join UCAN. Within the framework of the European Board Examination, it conducts annual examinations consisting of a written (with MCQ) and an oral examination. The aim of the examination is to establish a uniform Europe-wide quality standard for the specialist area in order to guarantee quality and thus patient safety even with the increasing mobility of medical specialists. Currently, more than 150 candidates from Europe and many other non-European countries take part in these examinations, which are conducted using various UCAN tools.

# EUROPEAN SOCIETY FOR INTENSIVE CARE MEDICINE (ESICM)



#### MEDICAL SPECIALIST SOCIETY

The European Society for Intensive Care Medicine (ESICM) is the European Society for Intensive Care Physicians. The Examination for the European Diploma in Intensive Care Medicine (EDIC) consists of a biannual written examination in Europe (with over 400 participants) and in two non-European exam centres (with over 400 participants), and of a biannual oral examination in 6-7 locations in Europe (with over 200 participants). The ESICM was the first specialist society to use tOSCE for its oral and practical examinations.

# **Since 2014**

# FOEDERATIO MEDICORUM CHIRURGICORUM HELVETICA (FMCH)

fmch

#### MEDICAL SPECIALIST SOCIETY

The Foederatio Medicorum Chirurgicorum Helvetica (FMCH) is an association of the surgical societies in Switzerland, which deals with important health policy issues. The FMCH's goal and purpose is to unite professional societies and professional groups in order to guarantee high-quality and technically advanced medical care for the population. To this end, it coordinates and bundles the common interests of its members.

The basic examination in surgery, conducted by the FMCH's examination board, is a compulsory part of the specialist examinations of nine Swiss surgical societies. This basic examination is a written examination that aims to evaluate the basic knowledge of surgery. Since UCAN's accession in 2014, more than 2000 candidates have been tested with the UCAN tools so far. In cooperation with the UCAN team, the exam, previously held in German and French, can be offered in English since 2020.

### um for Assessment Networks. In a first step the workflow switched to scanner readable answer sheets. in a second step we decided to use the tOSCE for the Objective Structured Clinical Examination. Until now over 500 exams have been delivered with the UCAN Tools since the accession.

# SWISS SOCIETY OF INTENSIVE CARE MEDICINE (SGI, SGI-SSMI)



#### MEDICAL SPECIALIST SOCIETY

The Swiss Society of Intensive Care Medicine (SGI) has been a UCAN partner since 2014 and uses the software tools primarily to prepare its written examination for approximately 100 candidates per year.

### **KREMS**



MEDICINE

The private Karl Landsteiner University (KL) has been a UCAN-Partner since 2014. At KL, medical studies and psychology studies are currently offered in the Bachelor/Master system. The Bachelor Medical Sciences is in English. The degree programs are module-based (system-based, integrated) and include longitudinal competency-based elements. UCAN-based examinations usually take place at the end of each module as part of module examinations and in the medical program at the end of each academic year as part of integrative cross-sectional examinations. From the 3rd year of study in medicine, questions based exclusively on clinical cases are used. All written exams are currently administered on tablets. Short answer question exams are also currently being converted to e-format.

The following tools are used at KL: item and exam management, comapplications allow Touchstone Institute to adminisputer-based exams (tablet and proctored web exams), test statistical analyter assessments far more efficiently with a reduced sis, and the student competency-based ProgressTest. environmental impact.

KL is very interested in scientific cooperation with other UCAN Partners.

# SWISS SOCIETY FOR OTO-RHINO-LARYNGOLOGY, NECK AND FACE SURGERY (SGORL)



#### MEDICAL SPECIALIST SOCIETY

The Swiss Society for Oto-Rhino-Laryngology, ENT and Facial Surgery (SGORL), which brings together the Swiss ear, nose and throat specialists, uses the ItemManagementSystem (IMS) to conduct its written specialist examinations bilingually (German/French) with approximately 30 participants per year.

### TORONTO



MEDICINE NURSING NUTRITIONAL SCIENCE OPHTHALMIC OPTICS REPRODUCTIVE TECHNOLOGY

Touchstone Institute was established as a not-for-profit organization in 2006 to provide competency assessment services and learning programs for internationally educated health professionals as a component of the Ontario Government's health human resource strategy. Assessments are designed to determine if examinees meet Canadian competency standards, and learning programs help professionals transition into Canadian training and practice settings.

Touchstone Institute joined the Umbrella Consortium of Assess-Each year, around 80 paper-based exams are crement Networks (UCAN) in 2014. UCAN has enabled Touchstone Insated using the ItemManagementSystem (IMS). The titute's transition to an online ItemManagementSystem (IMS) and conanswer sheets are scanned and corrected using Klaus version from paper-based to tablet and online assessments. The UCAN and the results are evaluated in EXaminator. The sta-

### **KRAKOW**



#### MEDICINE

The Jagiellonian University is one of the oldest universities in Europe and has an excellent reputation in Poland and worldwide.

The Jagiellonian University offers two different ways to study medicine in Krakow: complete a 6-year programme in Polish, and a 6-year programme in English. Jagiellonian University offers hybrid curriculum which offers both traditional and innovative learning modalities. The individual fields or subjects are taught at the Jagiellonian University as blocks which are usually concluded with an examination or as longitudinal full semester or full year tracks.

Since 2014 the Jagiellonian University joined the Umbrella Consorti-

146

In 2015 Touchstone Institute implemented UCAN's Item Management System to house all exam content and to support exam cycle development and administration. The tOSCE tablet application was first used to score our Objective Structured Clinical Exam (OSCEs) for Internationally Educated Nurses. This technology was subsequently applied to several other health professional programs. In 2016 the tEXAM application was implemented to deliver Multiple Choice Question (MCQ) exams on tablets. With UCAN's support in 2017, Touchstone Institute launched its first off-site tablet-based OSCE in the province of Alberta. Now, with upgraded technology and a fleet of tablets, Touchstone Institute is able to conduct simultaneous MCQ and OSCE administrations for most assessments. Touchstone Institute's membership in UCAN has been integral to growth and development in providing competency assessment for several health professions in Ontario and other Canadian jurisdictions.

# **Since 2015**

# FRIBOURG



MEDICINE

NEUROSCIENCE

The University of Fribourg has been a UCAN partner since 2015. Within the Section of Medicine of the Faculty of Science and Medicine, UCAN based testing is carried out for the written exams of the study programmes in Medicine (Bachelor and Master), as well as the programme in Biomedical Sciences (BMS).

tistical data is then reinjected into IMS. The collection of questions in a database, the Item Review tool and the analysis of the psychometrics produced by EXaminator allow a continuous improvement of the quality of questions and the exams overall, with the help also of the partners in the UCAN network.

The Section of Medicine of the Faculty of Science and Medicine offers bilingual studies, and all exam questions are provided both in German and in French simultaneously. The challenge of developing and implementing this bilingualism in IMS was successfully achieved through a close cooperation between the Institute for Communication and Assessment Research and the University of Fribourg.

The Section of Medicine plans to progressively introduce further tools during the academic year 2020-2021: tEXAM for testing on iPads and online, as well as tOSCE.

# **Since 2016**

### HANOVER



MEDICINE

The Hanover Medical School (MHH) has been a UCAN partner since 2016. The aim of the cooperation was and is the technically stable and safe implementation of an adjustable, electronic Objective Structured Clinical Examination (OSCE).

In the model study course HannibaL, the final examinations in the module "Diagnostic Methods" in the form of an OSCE are held annually at the end of the 2nd year of study. The exams focus on medical conversation and practical medical skills and abilities. Within one week, about 290 students pass an OSCE course consisting of nine examination stations with standardised patients. The examiners evaluate the students' performance with the help of examination tablets and by using tOSCE. The individual examination matrices for each station are managed in the ItemManagementSystem (IMS) and are continuously developed further.

In the future, the detailed evaluation of the individual examination stations using EXaminator is planned in order to improve the quality of the MEDICINE DENTISTRY PHARMACY PSYCHOTHERAPY examinations in a targeted manner.



The Medical Faculty of the University of Leipzig has been a UCAN partner since 2016. Since 2017, the Faculty of Veterinary Medicine has also been using UCAN tools as part of a partnership.

At the Faculty of Medicine (as of Oct. 2019) 36 success controls of the clinical study section of human medicine are organized via IMS. In particular, scanner/paper-based MC exams and tablet-based OSCEs will be held.

At the Faculty of Veterinary Medicine, 22 paper-based clinical section trials will be conducted via UCAN in January 2018. In the preclinical section, the subject Anatomy examines the semester-accompanying partial examinations using tEXAM. Since winter semester 2019/20, the examination has taken place electronically on ipads in two pre-clinical and three clinical subjects.

# **Since 2017**

THE GERMAN NATIONAL **INSTITUTE FOR STATE** EXAMINATIONS IN MEDICINE. PHARMACY AND **PSYCHOTHERAPY** (IMPP)



The German National Institute for State Examinations in Medicine, Pharmacy and Psychotherapy (IMPP) is specifically responsible for the content and assessment of Germany's writstudy section. This item pool results from the work of ten state examinations in Medicine, Pharmacy, Child and Adolescent Psynumerous teams, which are accompanied by a review chotherapy, and Psychological Psychotherapy. The academic consultants process from a central location. The faculty benefits at IMPP work closely with numerous external experts to ensure the high from the online-based IMS, which facilitates decentrastandard of the examinations, which are harmonized throughout Germany lized exam development across clinical locations. and are jointly coordinated by IMPP and the examination boards of the federal states. planned to conduct decentralized exams in the UK-

In order to simplify the processes of generating exam items for the state examinations, the IMPP introduced the electronic ItemManagementSystem (IMS) of the UCAN network in 2017 as an internal examination administration system across all departments. The IMS offers a variety of options for recording the characterizing data of exam items, assessing the quality of items in an integrated review process, and creating computer-based balanced examinations. It also allows a simplified implementation of systematic surveys. Year after year there are around 9,000 students in the field of medicine who take the written state examinations created by the IMPP. In so doing, the institute helps to maintain high standards among graduates and to secure the provision of high-quality healthcare for every patient and for the population as a whole.

The cooperation between the partners in the faculties and the IMPP is an important factor to enable the "Constructive Alignment" in the field of examinations. The interlocking and close coordination of faculty and state examinations makes it easier for students to learn in a targeted manner for their future profession.

# BOCHUM



The Faculty of Medicine at the Ruhr University Bochum (RUB) has been a member of the assessment consortium since 2017. It offers an integrated reform study program in medicine with 344 study places in pre-clinical and 246 study places in clinical training. Clinical training takes place at the UK-RUB, the privately sponsored Ruhr University's hospital, known as the "Bochum Model". It has more than 3,500 beds at 12 locations. Meanwhile, all MC exams are keyed in the IMS. The faculty has set up a computer room with 176 workstations in which the entire cohort can be examined in two rounds using the CAMPUS system. A second, compatible computer room with over 200 seats is currently being set up by the university. The UCAN system has also proven its efficiency in scannerbased paper examinations.

In the area of exam development, the medical school's IMS question pool includes over 7,000 questions, of which 5,000 are for the clinical

Complementary to the CAMPUS use, it is RUB with iPads via tEXAM and to expand them with new exam formats.

# KIEL

CAU Christian-Albrechts-Universität zu Kiel

DENTISTRY

MEDICINE

The Medical Faculty of the Christian-Albrechts-Universität zu Kiel has been a member of the Assessment Network since the end of 2017. The decisive factor for joining was the desire to conduct tablet-based examinations and to include other question types, which are also used by the IMPP, in the university examinations. In July 2018, a first pilot project with a few exams was conducted. Since summer semester 2019, all exams in the second phase of medical studies (about 40 per semester) have been held with tEXAM in a central exam week. Examinations in the first study phase are carried out with the IMS/Klaus on paper, read in and electronically evaluated. Question authors are trained in the use of the IMS and enter their exam questions into the system independently. As part of quality assurance, the question authors receive the static test evaluations of their exams generated with the EXaminator; these evaluations are also included in the performance-based allocation of teaching funds. In a next step, the use of tOSCE for clinical practical examinations will be tested.



# **Since 2018**

### BONN



#### MEDICINE

The Medical Faculty of the University of Bonn has been a partner in the Assessment Network since 2018.

The decision for the cooperation with UCAN was on the one hand to increase the quality of the faculty's internal examinations (MC examinations, clinical-practical OSCE examinations, oral examinations etc.) and on the other hand to further develop the assessment system in the future.

First of all, the decentrally organised examinations and question pools were and are being transferred to the ItemManagementSystem (IMS). Right from the beginning, e-exams were written in connection with the interface to ILIAS. Paper-based exams will be implemented successively with Klaus and the simplified creation and versioning of exams in IMS will be used for paper-based exams. The EXaminator will gradually be used for evaluations and the statistical data will be fed back into the IMS.

In the winter semester 2019/20 the first clinical-practical examination was completed with tOSCE. The pilot phase for tEXAM is scheduled to start in the summer semester 2020.

# TÂRGU MUREŞ



MEDICINE DENTISTRY PHARMACY

George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureş (UMPhST) is a prestigious Romanian higher education institution, with a dynamic development, functional, efficient, optimal and flexible management mechanisms, as well as strong administrative stability.

Located in the middle of Transylvania with a tradition of 75 years of medical and pharmaceutical education, the University became academically stronger as a result of the merger, in 2018, with the "Petru Maior"

University, another prestigious higher education institution in Târgu Mureş.

After completion of the merging procedure, the university has acquired a new configuration, currently carrying out, within its seven faculties, programmes at bachelor and master level, as well as doctoral and postgraduate programs of study in three different languages Romanian, Hungarian and English.

To ensure the quality of studies and examinations in the long term, the university joined the UCAN network in 2018. This quality assurance takes place among other things through extensive group review processes in the ItemManagementSystem. More than 800 exams have been held since accession.

# **Since 2019**

### AUGSBURG



MEDICINE

Since October 2019, doctors have been trained in a model study program at the Medical Faculty of the University of Augsburg. The model character of the program is particularly evident in the fact that the program is not divided into a preclinical phase (natural and social science, theoretical foundations of medicine) and a subsequent clinical phase (clinical-theoretical and clinical disciplines), but rather preclinical basic science and clinical content is taught in an integrated manner. In this way, students gain insights into medical practice at an early stage. In this way, they experience contact and interaction with patients at an early stage. In addition, special emphasis is placed on scientific and evidence-based thinking and acting. Through targeted promotion of social and communicative skills, the personal development of the students is promoted and strengthened in a special way.

The goal and claim of the model study program is a professionally the best possible way.

in Kalkara. Malta. As the first educational institution education, oriented towards medical skills and roles. A special concern of its kind in Europe, EDU offers an interactive, digital is to support the students in their professional development as doctors in study of human medicine. The National Commission for Further and Higher Education (superseded by the In order to reflect this development in the field of examinations, Malta Further and Higher Education Authority as of the Medical Faculty Augsburg is also a member of the Umbrella Con-January 2021) of the Republic of Malta has granted sortium for Assessment Networks. Students will be able to take both accreditation for the Degree in Medicine. From the paper-based exams and desktop-based exams on their own purchased first trimester, students at EDU learn the scientific and laptops. In the long term, it is planned to conduct OSCE examinations practical foundations of human medicine in a digital using the App tOSCE. campus and in practice at teaching hospitals.

### DUISBURG-ESSEN



#### MEDICINE

The Medical Faculty Duisburg-Essen has been a member of the Assessment Network since autumn 2019.

In the context of digitisation, it is our greatest endeavour to get our central tasks set out in this respect. The quality and variety of the tools offered by UCAN was the decisive point for us to decide for the cooperation. The exchange of items is another important aspect. Not only because of the high number of items, but also because of the quality assured by the standardized review procedure.

It is also important for us to implement other item types in the fore-The European College of Veterinary Dermatology seeable future, which should succeed in any case with the question types offered in the IMS. We will first carry out individual tests with tEXAM. At joined UCAN in 2019 and we will have our first tablet the beginning of the new year we will take the first practical exams with based exam with UCAN in 2020. tOSCE. For the summer semester 2020 we hope to be able to perform our We choose UCAN as the system provides the central final examinations with tEXAM. necessary tools to develop a computer/tablet-based

### **KALKARA**



MEDICINE

EDU (https://medical.edu.mt) is a European Institution of Higher Education. EDU is operated by Digital Education Holdings Limited (DEH) based

EDU supports the Digital Education Action Plan of the European Commission and the United Nations in realizing the third and fourth goal for sustainable development ("Good Health and Well-Being", "Education for All").

# **EUROPEAN COLLEGE OF VETERINARY DERMATOLOGY** (ECVD)



VET.-MEDICAL SPECIALIST SOCIETY

examination which includes images and case based questions. One convincing item type for us is the long menue question type.

This allows us to create deeper knowledge questions.



# **Since 2020**

**CENTRAL AGENCY FOR CONTINUING VOCATIONAL EDUCATION AND TRAINING** IN THE SKILLED CRAFTS (ZWH)



As part of the InnoVET project ProNet Handwerk, the Institute for Communication and Assessment Research (CARES) and the Central Agency for Continuing Vocational Education and Training in the Skilled Crafts (ZWH) are working on the further development of the UCAN tools together, ensuring that these tools meet the special requirements of the skilled trades. The change from paper-based to digitally supported examinations is only gradually taking place in the Chambers of Crafts and Skilled Trades. During this process, the ZWH is providing support for its member chambers throughout Germany.

In this context, Campus enables a secure computer-based execution of the advanced training examinations that have been newly developed in the project. It provides a selection of question and item types to choose from when customising examinations.

tOSCE ensures fast, simple, and legally compliant documentation of the practical examination components, e.g., in a journeyman's or master's examination, and for this reason, it is of long-term interest to the skilled crafts organisations.

The ZWH is supported by the Chambers of Crafts and Skilled Trades as well as regional councils representing their respective Chambers and the German Confederation of Skilled Crafts (ZDH). Like the association with UCAN, this affiliation offers great synergy effects for all members. For this very reason, the UCAN membership will continue to be a primary goal to the ZWH. Moreover, the ProNet Handwerk project is based on the idea of a network. To make vocational training in the skilled trades future-proof, modern and digitised learning and examination processes need to be developed in close collaboration.

# HAMBURG

NCU HafenCity Universität Hamburg

ARCHITECTURE

The still young HafenCity University Hamburg was founded in 2006 as the University of Architecture and Metropolitan Development by merging four departments of three Hamburg universities. With almost 2,400 students, it combines all important aspects of construction, urban development in design, engineering and natural sciences as well as humanities and social sciences in the studies Architecture, Civil Engineering, Geodesy, Urban Planning, Metropolitan Culture, Resource Efficiency in Architecture and Planning and Urban Design.

The HCU is part of a Hamburg-wide e-Assessment project, which aims to bring digital examinations to a new level in all local universities. In addition to the classic central pool solution, a mobile assessment centre consisting of iPads and laptops has been set up, which can also be used for larger exams in the respective institutions on request, where cohorts of 300 students can be tested simultaneously.

With almost three to four hundred first-year students every year, an iPad solution is favoured for the digital testing of interdisciplinary courses such as "Theoretical-Conceptual Foundations" at the HCU. but it is also to be used for smaller formats.

For this reason, a cooperation with the UCAN network, of which the university became a member in March 2020, was a logical step.

# AGA KHAN



MIDWIFFRY NURSING MEDICINE

The Medical College was established in 1983, as a part of the Aga Khan University's Faculty of Health Sciences in Pakistan, and attaches great emphasis to the professional, personal and intellectual development of students, so that its graduates become contributory members and leaders of society. Our programmes are tailored to international standards in curriculum, student engagement and assessment, and aim to develop clinical competence in community settings and hospitals, as well as the assessment of health and prevention of disease in communities through primary health care programmes.

School of Nursing and Midwifery, SONAM, is the first academic unit of the Aga Khan University in Pakistan. Founded in 1980, the School has led the way in introducing new academic programmes in nursing and midwifery that prepare students using a blended learning curriculum and simulation-based training at the University's Centre for Innovation in Medical Education.

SONAM's collaborations with several public and private sector institutions, regulatory bodies and federations and NGOs within Pakistan and across the globe have enabled us to bring a diverse pool of expertise and to improve nursing and midwifery education and practice within the country. Our graduates go on to join diverse teams of clinical experts, researchers, academicians and policymakers and are able to make an impact on the healthcare landscape.



# **Since 2021**

# BRANDENBURG



MEDICINE The state-recognized Brandenburg Medical Model Program (BMM) stands for practice-oriented and science-based teaching concepts as well as for the unity of research, teaching and patient care. The medical studies

at the Brandenburg Medical School (MHB) pursue the goal of optimally preparing students for the challenges of their profession in terms of professional and communicative skills. Both in the individual selection process and in the practice-oriented studies, personality and personal development play a central role. Together with the university hospitals in Bernau, Brandenburg an der Havel, Neuruppin and Rüdersdorf, as well as numerous cooperating hospitals and academic teaching practices in the state of Brandenburg, the MHB offers a practice-oriented and science-based study program in human medicine that takes into account not only various forms of care, but also the special features of the state. Medical practice is inextricably linked with communicative skills in conversation, teamwork and self-reflection. In order to adequately test both communicative and professional competencies, MHB has been a UCAN partner since 2021. With the help of the digitalization of OSCE examinations, a further

step towards quality-assured examinations is to be taken.

# BAYREUTH



MEDICINE

The Institute of Medical Management and Health Sciences at the University of Bayreuth joined the UCAN assessment network in March 2021. As part of the Public Health Service and Rural Physician Quota, the Institute conducted online selection interviews for prospective medical students for the first time. This involved an assessment of relevant core competencies, subject-specific personal aptitude, and applicant motivation. A selection interview consists of short interviews and a one-on-one interview. The next selection interviews are planned for 2022.

During the final preparation and production of the anniversary report further institutions have joined UCAN:

- Medical Faculty of Goethe University Frankfurt
- Medical Faculty of the Friedrich Schiller University Jena
- East Bavarian Technical University Amberg-Weiden (study program: Physician Assistance)
- Fliedner University of Applied Sciences Dusseldorf (study programs: Social Work, Pedagogy/Professional Pedagogy for Emergency Medical Services, Midwifery, professional pedagogy, medical assistance-surgery, Physician Assistance, Health Services Research and Management in Health Care)

We warmly welcome everyone in the network and look forward to the upcoming cooperation!







W/A

# **Publications and** congress contributions within the UCAN network



he UCAN network is not only characterised by the extremely successful development of the common examination platform IMS and all UCAN tools, but also by its scientific character. The joint academic exchange, supported by a large number of UCAN partners, forms the basic element of the UCAN network.

From the beginning, the annual partner meetings in particular offered important opportunities for UCAN partners and external guests to discuss current developments in the field of medical education and the subject area of examinations. These meetings were often the starting point for joint scientific research and publications in national and international journals.

Our ambition is to network with others in the field of competence measurement and (higher) education and training outside the UCAN network in order to share our research activities and experiences. In the years 2006-2021, 26 publications were produced in which we contributed or in which the UCAN tools were used as a methodological basis. In the same period, we participated in or organised a total of 48 national and international scientific conferences, congresses, symposia or meetings (see Figure 1). In total, we contributed to scientific exchange with 74 congress contributions in the form of lectures, posters and workshops. In addition, we organised 18 workshops on various topics of Communication and Assessment Research (see Figure 2). A list of our participations and contributions at scientific events and in scientific journals can be found on the following pages.  $\blacklozenge$ 







### Figure 2

Congress contributions within the UCAN network broken down by presentation type. "Talks" and "posters" refer to congresses and conferences, while "workshops" also include working meetings and project meetings of the UCAN network.

# PUBLICATIONS WITHIN THE UCAN-NETWORK

Egarter S, Mutschler A, Tekian A, Norcini J, Brass 41–50. K. Medical assessment in the age of digitalisation. BMC Med Educ. 2020;20(1):101. doi: 10.1186/ s12909-020-02014-7.

Pante SV, Weiler M, Steinweg B, Herrmann-Wer- 3. ner A, Brünahl C, Gornostayeva M, Brass K, Mutschler A, Schaal-Ardicoglu A, Wagener S, Möltner A, Jünger J. Digitalization within the MME study program - teaching and assessment of communicative and interprofessional skills in the Heidelberg module via video conference together with a virtual OSCE course. GMS J Med Educ. 2020:37(7):Doc88. doi: 10.3205/zma001381.

Trost S, Dieterle J, Herrmann M, Signerski-Krieger J. Videodarstellungen in psychiatrischen Prüfungsfragen: Eine Pilotstudie. Nervenarzt. 2019. doi: 10.1007/s00115-019-00794-y.

Fleig A, Lubik K, Lindner M. Basisexamen Chirurgie: Grundkenntnisse der Chirurgischen Disziplinen. Schweiz Ärzteztg. 2019. doi: 10.4414/ saez.2019.17961.

Deis N, Mutschler A, Jünger J, Akbar M. Werde ich als Ärztin überhaupt verstanden? Anpassung an individuelle Sprachniveaus und Anwendung von verständnissichernden Maßnahmen. In: Jünger J. Hrsg. Ärztliche Kommunikation. Stuttgart: Schattauer; 2018. S. 461-72.

Jünger J, Hrsg. Ärztliche Kommunikation. Stuttgart: Schattauer; 2018.

Monteiro S, Sibbald D, Coetzee K. i-Assess: Evaluating the impact of electronic data capture for OSCE. Perspect Med Educ. 2018;7(2):110-9. doi: 10.1007/s40037-018-0410-4.

keine gute Nachricht für Sie... Überbringen schlechter Nachrichten. In: Jünger J, Hrsg. Ärztliche Kommunikation. Stuttgart: Schattauer: 2018. S. 293-302.

Núñez A, Hinding B, Jünger J. Gut kommunizieren? Es lohnt sich! Auswirkungen der Arzt-Patienten-Kommunikation. In: Jünger J, Hrsg. Ärztliche Kommunikation. Stuttgart: Schattauer; 2018. S.

Jünger J, Mutschler A. Nationales longitudinales Mustercurriculum Kommunikation in der Medizin. Schlussworte zur Publikationsreihe von Best Practice Beispielen. Die medizinische Welt. 2017;68(6):1-

Jünger J, Mutschler A. Wie kann ärztliche Gesprächsführung gelingen? FRAUENARZT. 2016;57(11):1104-7.

Hochlehnert A, Schultz J-H, Möltner A, Timbil S, Brass K, Jünger J. Electronic acquisition of OSCE performance using tablets. GMS Zeitschrift für medizinische Ausbildung. 2015;32(4):Doc41. doi: 10.3205/zma000983.

Jünger J, Mutschler A, Kröll K, Weiss C, Fellmer-Drueg, Köllner V, Ringel N. Ärztliche Gesprächsführung in der medizinischen Ausund Weiterbildung- Das Nationale longitudinale Mustercurriculum Kommunikation. Die medizinische Welt. 2015;66(4):189-92. Möltner A, Timbil S, Jünger J. The reliability of the pass/fail decision for assessments comprised of multiple components. GMS Westkämper R, Lange J, Adamina M, Rosset P, Zeitschrift für medizinische Ausbildung. 2015;32(4):Doc42. doi: 10.3205/zma000984.

> Ringel N, Weiß C, Fellmer-Drüg E, Schultz J-H, Herzog W, Schäfert R, Jünger J. Kommunikative Herausforderungen bei Patienten mit somatoformen Störungen meistern. Die medizinische Welt. 2015;66:5 S.

> Thamburaj AJ, Brass K, Herrmann M, Jünger J. 8th meeting of the medical assessment consortium UCAN: "Collaborative Perspectives for Competency-based and Quality-assured Medical Assessment". GMS Z Med Ausbild. 2015;32(4):Doc37. doi: 10.3205/zma000979.

> Wagener S, Möltner A, Timbil S, Gornostayeva M, Schultz J-H, Brüstle P, Mohr D, Vander Beken A, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Kreisel C, Moczko T, Illg C, Jassowicz A, Müller A, Niesert M, Strübing F, Jünger J. Development of a competency-based formative progress test with student-generated MCQs: Results from a multi-centre pilot study. GMS Zeitschrift für medizinische Ausbildung. 2015;32(4):Doc46. doi: 10.3205/zma000988.

Mutschler A, Winkler E, Jünger J. Leider habe ich Jünger J, Just I. Recommendations of the German Society for Me-

dical Education and the German Association of Medical Faculties regarding university-specific assessments during the study of human, dental and veterinary medicine. GMS Zeitschrift für medizinische Ausbildung. 2014;31(3):Doc34. doi: 10.3205/zma000926.

Boeder N, Holzer M, Schelling J. Realisation of the guidelines for faculty-internal exams at the Department of General Medicine at the University of Munich: Pushing medical exams one step ahead with IMSm. GMS Zeitschrift für medizinische Ausbildung. 2012;29(3):Doc42. doi: 10.3205/zma000812.

Böhme K, Schelling J, Streitlein-Böhme I, Glassen K, Schübel J, Jünger J. Comparison of collegial individual and group reviews of general practice multiple choice questions. GMS Zeitschrift für medizinische Ausbildung. 2012;29(4):Doc57. doi: 10.3205/zma000827.

Hochlehnert A, Brass K, Möltner A, Schultz J-H, Norcini J, Tekian A, Jünger J. Good exams made easy: the item management system for multiple examination formats. BMC Med Educ. 2012;12:63. doi: 10.1186/1472-6920-12-63.

Hochlehnert A, Brass K, Moeltner A, Juenger J. Does medical students' preference of test format (computer-based vs. paper-based) have an influence on performance? BMC Med Educ. 2011;11:89. doi: 10.1186/1472-6920-11-89.

Fischer MR, Holzer M, Jünger J. Exams at medical faculties - quality, responsibility and perspectives. GMS Zeitschrift für medizinische Ausbildung. 2010:27(5):Doc66. doi: 10.3205/zma000703.

Möltner A, Duelli R, Resch F, Schultz J-H, Jünger J. Fakultätsinterne Prüfungen an den deutschen medizinischen Fakultäten. GMS Zeitschrift für medizinische Ausbildung. 2010;27(3):Doc44. doi: 10.3205/ZMA000681.

Möltner A, Nikendei C, Schultz J-H, Jünger J. Einfluss der Prüfer auf die Bewertungen in einem OSCE. GMS Zeitschrift für medizinische Ausbildung. 2008;25(1):Doc10.

Brass K, Schenkat H. 15 years experience in collaborative assessment: The umbrella consortium for assessment networks (UCAN). Kuala Lumpur: Ottawa: 2020 (Presentation).

sentation)

Lenck B, Herinek D, Höppner H, Behrend R, Winkelmann C, Herrmann B, Blümke C, Klemme B. Bestandsaufnahme von IPE-Aktivitäten im deutschsprachigen Raum. Osnabrück: IPA; 2020 (Workshop).

Mutschler A. Medtalk-Toolbox - Austausch von Best Practice Beispielen zu den Themen der "Ärztlichen Gesprächsführung" und "Interprofessionellen Zusammenarbeit und Kommunikation". Osnabrück: IPA 2020 (Workshop).

Schenkat H, Brass K, Egarter S, Klasen Martin, Sopka Saša. How to provide technical support to curriculum planners using the Item-Management-System? Kuala Lumpur: Ottawa; 2020 (Presentation).

Brass K. Herausforderungen im Bereich medizinischer Prüfungen gemeinsam meistern. Frankfurt: GMA; 2019 (Presentation).

Gornostayeva M, Schlasius-Ratter U, Deis N, Brass K, Jünger J. Überprüfung interprofessioneller Kompetenzen: Entwicklung und Testung von OSCE-Stationen, Frankfurt; GMA: 2019 (Presentation).

Heid J, Egarter S, Brass K. Verwendung verschiedener Prüfungssoftwareprodukte für unterschiedliche Einsatzszenarien im Prüfungsverbund. Siegen: EPS; 2019 (Presentation).

matische Medizin (DKPM)

Schultz J-H, Nikendei C, Weyrich P, Möltner A, Fischer MR, Jünger J. Qualitätssicherung von Prüfungen am Beispiel des OSCE-Prüfungsformats: Erfahrungen der Medizinischen Fakultät der Universität Heidelberg. Z Evid Fortbild Qual Gesundhwes. 2008;102(10):668-72. doi: 10.1016/j.zefg.2008.11.024.

# 2. **CONGRESS/CONFERENCE CONTRIBUTIONS<sup>1</sup>**

Heid J, Egarter S, Lang C, Affeldt H, Brass K. Experiences on Five Years of Summative Assessment on iPads. Kuala Lumpur: Ottawa; 2020 (Pre-

<sup>[1]</sup> Congresses/conferences are abbreviated as followst: The Association for Medical Education in Europe (AMEE); Jahrestagung der Gesellschaft für Medizinische Ausbildung (GMA); Assessment of Competence in Medicine and the Healthcare Professions (Ottawa); E-Prüfungs-Symposium (EPS); Interprofessioneller Ausbildungskongress (IPA): International Association for Communication in Healthcare (EACH): Deutsches Kollegium für Psychoso-

Karsten G. Gerull S. Heid J. Cascorbi I. Ebermann I. Einführung Tablet-basierter Klausuren an der Medizinischen Fakultät der Christian-Albrechts-Universität zu Kiel, Frankfurt: GMA: 2019 (Presentation).

Kurtz W, Brass K. Over 10 years of experience in collaborative assessment: The umbrella consortium for assessment networks (UCAN). Wien: AMEE; 2019 (Presentation).

Linke M, Berth H, Richter EP, Pich H, Kugel T, Hinz M, Ehrlich S, Mutschler A, Brass K. "Halten die Akkus durch?" - Pilotprojekt zum tabletbasierten schriftlichen Prüfen an der Medizinischen Fakultät Carl Gustav Carus der TU Dresden. Frankfurt: GMA: 2019 (Presentation).

Mutschler A, Gornostayeva M, Deis N, Hinding B, Brass K, Jünger J. Medtalk-Toolbox – Austausch von Best Practice Beispielen zu den Themen der "Ärztlichen Gesprächsführung" und "Interprofessionellen Zusammenarbeit und Kommunikation". Frankfurt: GMA; 2019 (Presentation).

Wagener S, Möltner A, Fleig A, Heid J, Feistner L. Brass K. Burkert M. Wo stehen wir? - Feedback für Fakultäten des studentischen kompetenzorientierten Progresstest. Frankfurt: GMA; 2019 (Presentation).

Wagener S, Möltner A, Heid J, Burkert M. Key Feature-Fragen im studentischen kompetenzorientierten Progresstest. Frankfurt: GMA; 2019 (Presentation).

Brass K. UCAN: 13 years of experience in cooperative medical assessment. Basel: AMEE; 2018 (Presentation).

Kania R. Hofmann M. Ehlers J. Zupanic M. BIUX<sup>2</sup>X2 [Bericht über Forschungsergebnisse]. Wien: GMA; 2018 (Poster).

Kurtz W, Brass K. UCAN: 12 years of experience in cooperave medical assessment. Abu Dhabi; 2018 (Presentation).

Mihaljevic A, Probst P, Wagener S, Nunez A, Lindner M, Brass K. Möltner A. OSCE-Station Wissenschaftskompetenz [Bericht über Forschungsergebnisse]. Wien: GMA; 2018.

Mihaljevic AL, Probst P, Wagener S, Núñez A, Lindner M, Brass K, Möltner A. OSCE-Station Wissenschaftskompetenz, Wien: GMA: 2018 (Presentation).

Núñez A. Lindner M. Brass K. In between the Lines: Language Use in Medical Education, Basel: AMEE: 2018 (Presentation).

Schenkat H, Arias J. MC-Klausur auf Papier oder auf dem Tablet – was bevorzugen unsere Studierenden? [Bericht über Entwicklungsprozess]. Wien: GMA; 2018.

Vander Beken A, Kammer T, Bunk M, Grab-Kroll C. Tabletbasierte Long Menu-Prüfungen – ein Erfahrungsbericht [Bericht über Entwicklungsprozess]. Wien: GMA; 2018 (Poster).

Vander Beken A, Muth C, Schneider A, Grab-Kroll C. eSchulung für OSCE-Prüfer [Bericht über Entwicklungsprozess]. Wien: GMA; 2018 (Poster)

Wagener S, Möltner A, Fleig A, Feistner L, Heid J, Brass K, Holz T, Weber M, Pflaum P, Rogg D, Kellermann F, Berg L, Breithaupt MH, Dehmel L, Grad A, Xiang Jin J, Hai-Ning Lu K, Müller A, Rinawi T, Shang V, Zimmermann K, Alhalabi O, Park J, Grupp M, Klauth A, Lepper A, Lichnock Z, Mayer J, Hollmann A, Meuth C, Siegel F, Peitz N, Brüstle P, Mohr D, Schüttpelz-Brauns K, Würth G, Jünger J, Burkert M. "Was will ich prüfen?" - Erweiterung des Blueprints im studentischen kompetenzorientierten Progresstest [Bericht über Entwicklungsprozess]. Wien: GMA; 2018 (Poster).

Wagener S, Möltner A, Timbil S, Fleig A, Feistner L, Heid J, Brass K, Burkert M. "Da bin ich mir sicher" – Confidence rating im studentischen kompetenzorientierten Progresstest [Bericht über Forschungsergebnisse]. Wien: GMA; 2018 (Poster).

Lindner M, Möltner A, Feistner L, Brass K. Automatische Zusammenstellung von Prüfungen mittels eines genetischen Algorithmus. Münster: GMA; 2017 (Presentation).

Lindner M. Möltner A. Feistner L. Brass K. Herausforderungen beim automatischen Klassieren von Fragen. Münster: GMA; 2017 (Presentation).

Wagener S, Gaitzsch E, Brass K, Heid J, Herrmann L, Günther J, Ney S, Müller A, Dikmen HO, Zimmermann K, Yilmaz OK, Wittstock F, Alhalabi O, Park J, Harapan BN, Kollmeier B, Ronellenfitsch L, Mayer J, Baumann T. Daunert L. Brüstle P. Mohr D. Schüttpelz-Brauns K. Vander Beken A. Jünger J, Möltner A. Videofragen im studentischen kompetenzorientierten Progresstest. Münster: GMA; 2017 (Presentation).

Ardicoglu Andrea, Lubik K, Hudasch Ulrike, Schultz J-H, Feistner

Lars. The standardized Patients Database (SPDB). Heidelberg; 2016 (Presentation).

Brass K. Heid J. Affeldt H. Ithaler D. Tabletbasierte Prüfungen in der Medizin: Erfahrungen und Ausblick. Bern: GMA; 2016 (Workshop).

Brass K, Jünger J. 10 years of experience in collaborative assessment: the Umbrella Consortium for Assessment Networks (UCAN). Perth: Ottawa; 2016 (Presentation).

Brass K, Jünger J. UCAN: 11 years of experience in cooperative medical assessment. Barcelona: AMEE; 2016 (Presentation).

Brass K, Jünger J, Feistner Lars. Collaborative Assessment of Communication Skills: The Umbrella Consortium for Assessment Networks. Heidelberg; 2016 (Presentation).

Mutschler A, Kröll K, Weiss C, Gornostayeva M, Fellmer-Drüg E, Jünger J. Longkomm-Toolbox – Exchange of Best Practice Examples on the Subject of Communication Skills. Heidelberg; 2016 (Presentation).

Mutschler A, Kröll K, Weiss C, Ringel N, Fellmer-Drüg E, Brass K, Kurtz W, Jünger J. Erfahrungen mit der Longkomm Toolbox - Import von Best Practice Beispielen zur Ärztlichen Gesprächsführung in eine Online-Plattform. Bern: GMA; 2016 (Poster).

Schenkat H, Grützmann T, Simon M, Bruch M. Mitgliedschaft der Medizinischen Fakultät der RWTH Aachen im umbrella consortium for assessment networks (UCAN). Was ist seit dem Eintritt in den Verbund und der Einführung des Item Management System (IMS) passiert? Bern: GMA: 2016 (Poster).

Wagener S, Gaitzsch E, Bäßler F, Möltner A, Gornostayeva M, Brass K, Müller A, Mayer J, Zimmermann K, Heismann J, Schultes D, Benkowitz C, Frey J, Günther J, Herrmann L, Schoenwandt E, Ney S, Monthe LC, Grözinger M, Alhalabi O, Park J, Kurzeck A, Kuster E, Wittmann A, Fries M, Kollmeier B, Kreisel C, Nguyen T, Baumann T, Daunert L, Brüstle P, Mohr D, Schüttpelz-Brauns K, Vander Beken A, Jünger J. Studentischer kompetenzorientierter Progresstest - Vom Paper-Pencil-Test ins Web. Bern: GMA; 2016 (Presentation).

2015 (Poster).

Kröll K, Ringel N, Weiss C, Mutschler A, Brass K, Kurtz W, Fellmer-Drüg E, Gornostayeva M, Jünger J. Nationales, longitudinales Mustercurriculum Kommunikation für die Medizin – Die Entwicklung der Longkomm-Toolbox. Leipzig: GMA; 2015 (Poster).

Mutschler A, Weiss C, Fellmer-Drüg E, Kröll K, Brünahl C, Dinkel A, Fehr F, Harnacke D, Hladschik-Kermer B, Huebner J, Lausberg H, Merse S, Petermann-Meyer A, Reschke K, Schnegelsberg A, Schönbauer A, Silbernagel W, Sonntag B, Stöcker G, Thomas M, van der Mei SH, Villalobos M, Vitinius F, Wecht D, Weinert M, Jünger J. Entwicklung eines Einsteigerund Aufbau-Workshops für Dozierende kommunikativer Kompetenzen in der Medizin. Leipzig: GMA; 2015 (Poster).

Wagener S, Möltner A, Gornostayeva M, Brass K, Eckrich F, Baumann T, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Hubach A, Illg

Westkämper R, Brass K, Norcini J, Hays Richard. Inter-institutional cooperation in competency-based and quality-assures medical assessment in an international context. Perth: Ottawa: 2016 (Workshop).

Brass K, Jünger J. UCAN: 10 years of experience in cooperative medical assessment. Glasgow: AMEE; 2015 (Presentation).

Eckrich F, Wagener S, Möltner A, Gornostayeva M, Brass K, Baumann T, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Hubach A, Illg C, Jassowicz A, Kreisel C, Lüke J, Moczko T, Müller A, Niesert M, Strübing F, Brüstle P, Mohr D, Todtenhaupt H, Vander Beken A, Jünger J. Integration professionellen Handelns in Prüfungen: "Situational Judgement Test"-Fragen im Rahmen des studentischen kompetenzorientierten Progresstests. Leipzig: GMA; 2015 (Presentation).

Heid J, Lindner M, Brass K, Affeldt H, Möltner A, Jünger J. Tabletbasierte Prüfungen in der Medizin: Erfahrungen und Ausblick. Leipzig: GMA;

Hochlehnert A, Möltner A, Feistner L, Brass K, Jünger J. Unterschiedliche Aufgabenkomplexität von MC-Fragen: erste fachspezifische Analyse auf syntaktischer Ebene. Leipzig: GMA; 2015 (Presentation).

Hochlehnert A, Möltner A, Feistner L, Brass K, Jünger J. Unterschiedliche Aufgabenkomplexität von MC-Fragen: erste fachspezifische Analyse auf syntaktischer Ebene. Leipzig: GMA; 2015 (Workshop).

Wagener S, Möltner A, Gornostayeva M, Brass K, Eckrich F, Baumann T, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Hubach A, Illg C, Jassowicz A, Kreisel C, Lüke J, Moczko T, Müller A, Niesert M, Strübing F, Brüstle P, Mohr D, Todtenhaupt H, Vander Beken A, Jünger J. Progresstest von Studierenden für Studierende - Was haben wir erreicht, wo geht es hin? Leipzig: GMA; 2015 (Poster).

C, Jassowicz A, Kreisel C, Lüke J, Moczko T, Müller A, Niesert M, Strübing F, Brüstle P, Mohr D, Todtenhaupt H, Vander Beken A, Jünger J. Qualität studentischer MC-Fragen. Leipzig: GMA; 2015 (Poster).

Wagener S, Möltner A, Gornostayeva M, Jünger J. Competency-oriented concepts in a formative progress test with questions constructed by students. Glasgow: AMEE; 2015 (Presentation).

Brass K, Möltner A, Feistner L, Kurtz W, Jünger J. Facing the challenges of assessment through cooperation: The Umbrella Consortium for Assessment Networks (UCAN). Milan: AMEE; 2014 (Presentation).

Brass K, Möltner A, Feistner Lars, Kurtz Winfried, Jünger J. Facing the challenges of assessment through cooperation: The Umbrella Consortium for Assessment Networks (UCAN). Milan: AMEE; 2014 (Presentation).

Heid J, Brass K, Hochlehnert A, Möltner A, Schultz J-H, Jünger J. Using Tablets for Written and OSCE Exams: Principles and Experiences. Ottawa: Ottawa; 2014 (Presentation).

Jünger J, Brass K, Möltner A, Hochlehnert A, Heid J. Kurtz W. International Consortium for Assessment Networks (ICAN): facing the challenges of competency-based assessment. Ottawa: Ottawa; 2014 (Presentation).

Wagener S, Gornostayeva M, Möltner A, Schultz J-H, Brüstle P, Jünger J. Development of a formative competency-based progress test with MC-items constructed by students - pilot test and further development. Milan: AMEE; 2014 (Workshop).

Wagener S, Gornostayeva M, Möltner A, Schultz J-H, Brüstle P, Mohr D, Vander Beken A, Better J, Fries M, Gottschalk M, Günther J, Herrmann L, Kreisel C, Moczko T, Illg C, Jassowicz A, Müller A, Niesert M, Strübing F, Jünger J. Entwicklung eines formativen kompetenzbasierten Progresstests mit MC-Fragen von Studierenden - Piloteinsatz und Weiterentwicklung. Hamburg: GMA; 2014 (Poster).

Brass K, Jünger J. Kompetenzbasierte Prüfungen leichter im Verbund, Graz: GMA: 2013 (Presentation). Heid J, Brass K, Hochlehnert A, Möltner A, Schultz J-H, Jünger J. Using Tablets for OSCE Exams to Reduce Errors and Optimize Documentation. Prag; 2013 (Presentation).

164

Hochlehnert A, Brass K, Möltner A, Schultz J-H, Jünger J. An International Consortium for Assessment Networks (ICAN): facing the challenges of competency-based assessment. Prag: AMEE; 2013 (Presentation)

Hochlehnert A, Möltner A, Brass K, Schultz J-H, Jünger J. Identification of formal mistakes and cueing by automatic review algorithms. Prague: AMEE; 2013 (Presentation).

Lindner M, Möltner A, Schultz J-H, Jünger J. Automatisierte Generierung von Klausuren auf Grundlage eines Blueprints. Graz: GMA; 2013 (Presentation).

Brass K, Wojtanowski T, Kurtz W, Feister L, Lindner M, Möltner A, Hochlehnert A, Schultz J-H, Jünger J. Sechs Jahre "Prüfungsverbund Medizin": Reflexion und Ausblick. Aachen: GMA; 2012 (Presentation).

Heid J, Brass K, Haag M, Wojtanowski T, Kurtz W, Feister L, Lindner M, Möltner A, Hochlehnert A, Schultz J-H, Jünger J. Kostengünstige, elektronische Prüfungen im Verbund: Der Einsatz von Tablets bei studienbegleitenden Examen. Aachen: GMA; 2012 (Presentation).

Hochlehnert A, Möltner A, Brass K, Schultz J-H, Jünger J. Identification of formal mistakes and cueing by automatic review algorithms. Lyon: AMEE; 2012 (Presentation).

Hochlehnert A, Möltner A, Brass K, Wojtanowski T, Kurtz W, Feistner L, Lindner M, Schultz J-H, Jünger J. Identifizierung von formalen Fehlern durch automatische Reviewalgorithmen. Aachen: GMA; 2012 (Workshop).

van de Kamp F, Camp A, Donkers J, Brass K, Lindner M, Kurtz W, Feistner L, Wojtanowski T, Hochlehnert A, Jünger J, van der Vleuten C. Interuniversitärer Progress-Test als eine niederländisch-deutsche Kooperation. Aachen: GMA: 2012 (Presentation).

Hochlehnert A, Brass K, Feistner L, Kurtz W, Möltner A, Schultz JH, Fischer MR, Jünger J. Interfakultärer Standard für mündliche und praktische Prüfungen. München: GMA; 2011 (Presentation).

Roller D, Lauber H, Ardicoglu A, Kurtz W, Feistner L, Hochlehnert A, Wagener S, Brass K, Schultz JH, Jünger J. Item-Management-System IMS: Ein Werkzeug zur Planung von OSCE-Prüfungen mit Standardisierten Patienten (SP) und zum Management von SP-Einsätzen. München: GMA; 2011 (Presentation).

Hochlehnert A. Brass K. Feistner L. Kurtz W. Möltner A, Schultz J, Fischer MR, Jünger J. Fortschritte durch Vernetzung: Präsentation der aktuellen Entwicklungen im Prüfungsverbund Medizin und Vorstellung der Weiterentwicklungen an der Prüfungsplattform Item-Management-System (IMS). Bochum: GMA; 2010 (Workshop).

org W. Process optimization in medical education by

for medicine (IMSm). Prag: AMEE; 2008 (Presen-

tation).

- Brass K, Hochlehnert A, Jünger J, Fischer MR, Ge-
- the use of an item bank ItemManagementSystem
- Hochlehnert A, Brass K, Schultz J-H, Jünger J, Fischer MR, Georg W. IT-unterstützte Prüfungen mit einem gualitätssichernden System. Greifswald: GMA; 2008 (Workshop).

Brass K, Hochlehnert A, Jünger J, Fischer MR, Holzer 

AMEE 2019 (Vienna, Austria) M. Studiumbegleitende Prüfungen mit einem System: ItemManagementSystem für die Medizin. Hannover: GMA; 2007 (Workshop).

- Brass K, Jünger J, Hochlehnert A, Möltner A, Fischer MR, Holzer M, Georg W, Stieg M. Studiumbegleitende Prüfungen mit einem System: Von der Konzeption ei-
- ner Frage bis zur Archivierung der Klausur. Hannover: GMA; 2007 (Workshop).
- Hampe W, Tolasch C, Weidtmann K, Kuhnigk O. Einführung des Item Management System für die Medizin (IMSm) an der Medizinischen Fakultät der Universität Hamburg. Hannover: GMA; 2007 (Poster).

Haag M, Zschocke J, Bartram CR, Jünger J. Freiwillig

computerbasierte Prüfung mithilfe des "Campus-Prü-

fungsplayers" im Fach Humangenetik: Hohe Akzep-

tanz und vergleichbare Ergebnisse wie im papierba-

sierten Format. Köln: GMA; 2006 (Presentation).

- Briem S, Brass K, Möltner A, Schellberg D, Heid J,

Huwendiek S, Reichert F, Brass K, Bosse H-M, Heid J, Möltner A, Haag M, Leven F-J, Hoffman Georg Friedrich, Jünger J, Tönshoff B. Etablierung von fallbasiertem computerunterstütztem Prüfen mit langen Auswahllisten: Ein geeignetes Instrument zur Prüfung von Anwendungswissen. Köln: GMA; 2006 (Presentation).

# 3. CONGRESSES, CONFERENCES AND MEETINGS<sup>2</sup>

 Symposium Student Selection 2020 (Hamburg, virtual, Germany) • German Nursing Day 2020 (Berlin, virtual, Germany) AMEE 2020 (Glasgow, virtual, Great Britain) Interprofessional Training Congress 2020 (Osnabrück, Germany) • E-Examination Symposium 2020 (Aachen, virtual, Germany) • 10th Leipzig Veterinary Congress 2020 (Leipzig, Germany) Ottawa Conference 2020 (Kuala Lumpur, Malaysia) GMA 2019 (Frankfurt, Germany) • E-Examination Symposium 2019 (Siegen, Germany) • 5th ÖPGK Conference: Digitalisation needs health literacy 2019 (St. Pölten, Austria) UCAN Conference2019 (Heidelberg, Germany) • E-Examination Symposium 2018 (Aachen, Germany) • Ottawa Conference 2018 (Abu Dhabi, United Arab Emirates) • UCAN Conference2018 (Heidelberg, Germany) AMEE 2018 (Basel, Switzerland) GMA 2018 (Vienna, Austria) AMEE 2017 (Helsinki, Finland) GMA 2017 (Münster, Germany) UCAN Conference2017 (Düsseldorf, Germany) UCAN Conference2016 (Heidelberg, Germany) • DKPM 2016 (Potsdam, Germany) • GMA 2016 (Bern, Switzerland) AMEE 2016 (Barcelona, Spain) • Ottawa Conference 2016 (Perth, Australia) • UCAN Conference2015 (Göttingen, Germany) GMA 2015 (Leipzig, Germany) AMEE 2015 (Glasgow, Scotland) UCAN Conference2014 (Heidelberg, Germany) AMEE 2014 (Milan, Italy) Ottawa Conference 2014 (Ottawa, Canada) • UCAN Conference2013 (Heidelberg, Germany) GMA 2013 (Graz, Austria) AMEE 2013 (Prague, Czech Republic) UCAN Conference2012 (Heidelberg, Germany) GMA 2012 (Aachen, Germany)

[2] Congresses, conferences and meetings are abbreviated as follows: The Association for Medical Education in Europe (AMEE); Jahrestagung der Gesellschaft für Medizinische Ausbildung (GMA); Assessment of Competence in Medicine and the Healthcare Professions (Ottawa); E-Prüfungs-Symposium (EPS); Interprofessioneller Ausbildungskongress (IPA): International Association for Communication in Healthcare (EACH): Deutsches Kollegium für Psychosomatische Medizin (DKPM)

toolbox. Retreat: Interprofessional Collaboration and Communication, 2017 (Waren/Müritz, Germany)

- Curricular integration: Best practice examples and toolbox. Masterplan Medizinstudium 2020. Joint working meeting of the projects "Pilot Implementation of the National Longitudinal Model Curriculum Communication in Medicine" and "National Model Curriculum Interprofessional Cooperation and Communication in Medicine", 2017 (Mainz, Germany)
- Best Practice Examples. 2nd Working Meeting of the National Model Curriculum Interprofessional Collaboration and Communication, 2017 (Heidelberg, Germany)
- Toolbox. Final Symposium of the National Longitudinal Model Curriculum Communication in Medicine, 2016 (Heidelberg, Germany)
- Create and review good MC questions electronically. IMPP working meeting: What does the Masterplan Medizinstudium 2020 mean for the state examinations? 2016 (Erbacher Hof, Mainz, Germany)
- Lecturer qualification. 6th Working Meeting of the National Longitudinal Sample Curriculum Communication in Medicine, 2015 (Heidelberg, Germany)
- ◆ Database for the management of simulation patients.
   UCAN-Verbund, 2015 (Heidelberg, Germany) ◆

- AMEE 2012 (Lyon, France)
- UCAN Conference2011 (Heidelberg, Germany)
- GMA 2011 (Munich, Germany)
- UCAN Conference2010
   (Heidelberg, Germany)
- GMA 2010 (Bochum, Germany)
- UCAN Conference2009 (Heidelberg, Germany)
- UCAN Conference2008
   (Heidelberg, Germany)
- GMA 2008 (Greifswald, Germany)
- AMEE 2008 (Prague, Czech Republic)
- UCAN Conference2007
   (Heidelberg, Germany)
- GMA 2007 (Hanover, Germany)
- GMA 2006 (Cologne, Germany)



### WORKSHOPS WITHIN THE UCAN-NETWORK

- New Media and Online Testing. ZWH Conference, 2020 (Düsseldorf, Germany)
- Taskforce "Technology". UCAN Network, 2020 (Heidelberg, Germany)
- Medtalk Toolbox and planning of the digital teaching unit. MME course, 2020 (Heidelberg, Germany)
- Taskforce "Technology". UCAN Network, 2019 (Heidelberg, Germany)
- Technology and Assessment. Touchstone Institute, 2018 (Toronto, Canada)
- Communication and interprofessional cooperation.
   Innolab, 2018 (Bochum, Germany)
- Mobile Device Management. UCAN Association, 2018 (Heidelberg, Germany)
- Taskforce "Digitisation in Medicine".
   UCAN Network, 2018 (Heidelberg, Germany)
- Taskforce "Technology". UCAN Network, 2018 (Heidelberg, Germany)
- The Medtalk Toolbox. Masterplan Medizinstudium 2020: Kommunikative und interprofessionelle Kompetenzen in Lehre und Prüfung stärken, 2018 (Nuremberg, Germany)
- Taskforce "Technology". UCAN Network, 2017 (Heidelberg, Germany)
- Curricular integration: best practice examples and

# **167**

### IMPRINT



### EDITOR

Institute for Communication and Assessment Research Wieblinger Weg 92a D - 69123 Heidelberg E-Mail: info@cares.institute info@ucan-assess.org Telefon: +49-(0)6221 1867490

**V.I.S.D.P.** Dipl.-Inform. Med. Konstantin Brass

### EDITING AND PROOFREADING

Dr. Saskia Egarter Dipl.-Päd. Anna Mutschler Kerstin Lubik

### DESIGN, TYPESETTING AND LAYOUT

Calimedia, Christian Schega & Myriam Kühn, Kolmarer Str. 33, D - 76829 Landau www.calimedia.de JOTOPIA I Johannes Bayer, Freiheitstraße 87, D - 67434 Neustadt, www.jotopia.de

**PRINT** Flyer Alarm GmbH

**STATUS:** August 2021



