

Problem analyses in redefining the examination system of the Open University of Tanzania(OUT) towards exams on demand

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Problem analyses in redefining the examination system of the Open University of Tanzania (OUT) towards exams on demand.

Report on visit 13-17 September 2010
to Open University of Tanzania (OUT)
P.O.Box 23409,
Kawawa Road, Kinondoni Municipality,
Dar es Salaam,

by Dr. Desirée Joosten-ten Brinke

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I like to thank all the people of the Open University of Tanzania for their kindly welcome to me, especially Dr. Jabiri Bakari, Ms. Margaret Mushi, Ms. Halima Mlacha, Abdillah Abdulrahamani, Said Ally, Dr. Honorata Mushi, and Mr. Paul Kihwelo.

Objective of the visit

On request of the Open University of Tanzania (OUT), the Open University of the Netherlands, department of CELSTEC offers support in planning a road map to develop a system for exams on demand and eventually on-line examinations.

The first step is to analyse the exact problems OUT has in redefining its system. The policy of OUT is to introduce on-line functions in examination. A new technical system with a database of examination questions, to be coupled to each faculty's learning objective is under construction. One of the most acute problems is lack of expertise of examination staff in writing such volumes of qualified examination questions that random sampling of examination questions can be generated from the system.

Another problem is lack of experience in setting up and administering such large systems and redefinition of the examination habits among teachers, examiners and students. CELSTEC will contribute to find solutions for these problems by:

1. Giving a short training to the academic staff on drafting qualitatively valid examination questions, which can be incorporated in the examination database. This provides the staff pilot material to exercise with in the construction phase of the new on-line examination system and will contribute to create a basis for change processes.
2. Explore the details of the examinations systems redesign problems and discuss possible solutions, such as training for question constructors, quality requirements for test questions and possible systems approaches to solve the problems defined. Collect data for problem analyses and perform problem analysis.
3. Write a report and propose the way forward.

Program

The following activities were carried out during the 5-day visit:

Date	Contact	Activity type and topics
Monday 13 th September 2010	Dr. Bakari, director of the Institute of Educational Technology (IET)	- Introduction to the problem, the processes and procedures at OUT. - Issues of Institute of Educational Technology (IET) - Issues of the Directorate of Examination Syndicate.
Monday 13 th September 2010	Abdillah Abdulrahamani and Said Ally, Software development (examination databank system)	- description of the examination processing and procedure - getting the understanding of the use of exams on demand
Tuesday 14 th September 2010	Ms. Magreth Mushi, head of ODEL laboratory and Dr. Honorata Mushi, dean of the faculty of Education.	- the possibilities and restrictions of online testing for OUT - the views on examination from a faculties point of view
Tuesday 14 th September 2010	About 35 staff members from several faculties of OUT	- training on question- and test construction

Wednesday 15 th September 2010	Mr. Paul Kihwelo, head of quality assurance	- relation between the office of quality assurance and examination trajectory
Wednesday 15 th September 2010	University management and heads of departments	- discussion about the examination at the Open University of the Netherlands - presentation of the first findings - further discussion on exams on demand and online testing
Thursday 16 th September 2010		- Report writing
Friday 17 th September 2010	Stakeholders	Feedback meeting with stakeholders and report refining

Structure of OUT

The Open university of Tanzania has 26 (will be 29) regional centres. Currently 12 regional centres have a lab 10 computers each for use by students and 69 study centres. On these study centres, students have face-to-face meetings and they do their exams.

In total there are 33.000 students of which are 22.000 active students.

Full time staff is 677: 331 academic staff, 298 administrative and 48 technical

The examination activities are mainly placed in the Academic division (other divisions are the resource management and the resource services). The academic division consists of the Faculties and the academic directories.

One of the directories is the directory of Information and Educational Technology (IET). This directory has two main group of activities, the ICT and the educational technology. Figure 1 shows the organisation scheme of IET.

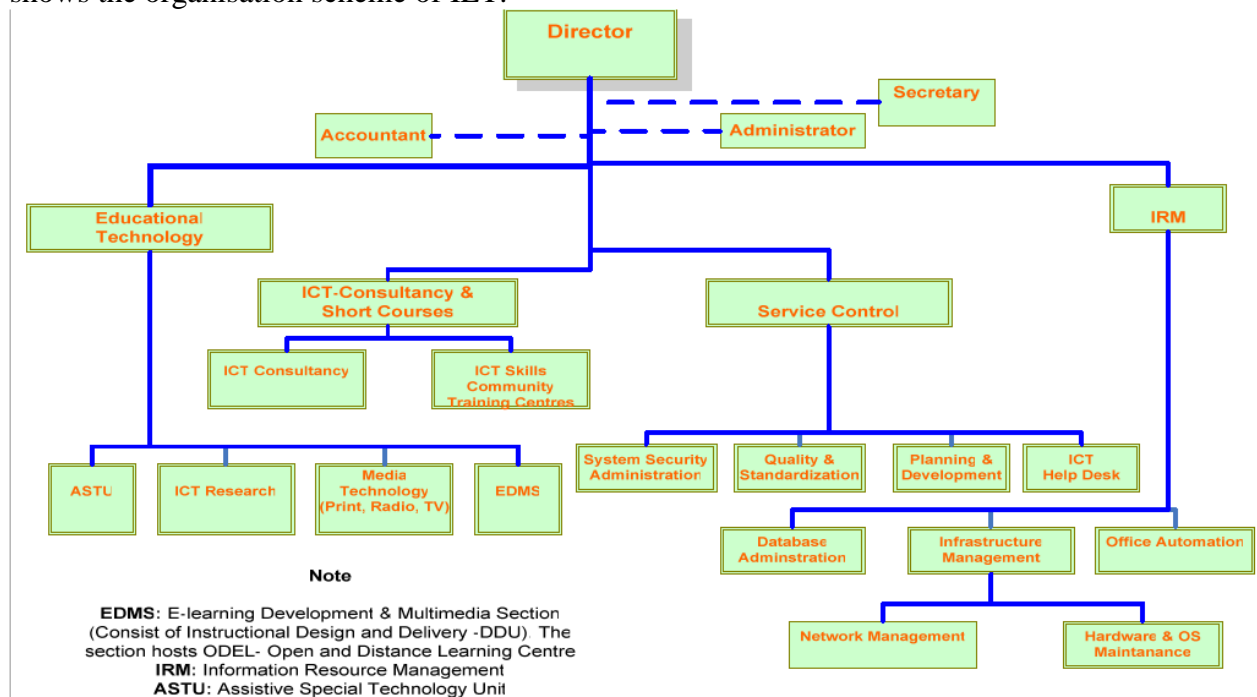


Figure 1. Organisation scheme of IET

The Directorate of Information and Educational technology (IET) has two major responsibilities:

1. delivery and support of all ICT services (network, software, hardware) in the university. Their activities are conditional for the work of the Examination Syndicate.
2. making effective use of technology in Education: E-learning, ELO, making camera ready materials

One goal of the department in relation to examinations:

- exams on demand (not yet online with respect to infrastructure problems). To reach this goal, a large pool of reliable and valid questions have to be available.

The directorate uses only open source software. 48 ICT people are working here of which 6 software developers (4 fte).

There are no specific people available with examination expertise. They are recruiting new instructional designers. These are educational specialists with a technical background. They have to interact with the academic staff.

There is a department for Quality assurance. This is a quite new office. For the moment this department is situated under the Academics division, however there are plans to move this office as a department right under the VC, because of the broad perspective of quality assurance. Quality assurance is not only a matter of the academic division, but also a matter of the Resource management and Resource services.

Main tasks of the quality assurance office is to (1) assure quality and (2) control quality both to all aspects of the organisation, products as well as processes. They are monitoring the whole process from the recruitment process (whether the interviews are confidential, the time frame, the documentation), the course development and the examination process (results, time frame, coverage). This is done by taking samples and by discussing the results with the examination syndicate for example and giving advise. They are aware that they are not the content specialists. Therefore they are working together with other universities.

Complaints of students after exams do not go directly to Quality assurance. The examination syndicate and the faculties are for students the contact points.

Tools for quality assurance are questionnaires for library computer lab users, for needs assessment curriculum, for functioning ICT and structure and for student care. Data of the examinations are a report of the results.

ODEL (Open Distance Electronic Learning) is an office that supports the faculties and students in using ICT for teaching and learning. Mainly the faculty of Education is using the lab to use ICT in Education. Lecturers as well as students are using the labs.

The labs are used for ICT practicals. On the computers, all standard software is available.

There is not a specific tool for writing questions.

Twelve of the regional centres have a computer lab. The labs are not over occupied, but they are also used for community training. Internet is not a problem at the examination centres.

The problem is the electricity and the infrastructure.

There is no direct link between ODEL and the examination trajectory. AVU is serving all students of all faculties.

Study materials for two programmes (Bsc (ICT) and BA (Journalism and media studies)) and some few from faculty of education are online, other programmes are undergoing clusterisation process before developing materials online. There are materials developed in cooperation with other African countries through AVU and are used with science teachers enrolled under the faculty of education. Users of these materials can adopt or adapt them.

There are six faculties: Law, Business management, Science, technology and environmental studies, Education, Arts and social sciences and the Institute of continuous education.

The faculty members, lecturers, are composing questions because they are the specialists on their own area. They moderate them between their own faculty and there is external quality control by members of other universities. There are guidelines for writing questions, but they are not very strict. Mainly it depends on the learning objectives. A large part of the questions are open. The marking after the exam takes place in panels. The faculties have to hand in questions including marking schemes.

In the course materials there are online guiding questions and quizzes. There is no exam available for rehearsal that has the same structure and coverage of the final exam.

A problem within the faculties is the tight timetable. There is a lot of work to do and examination comes at the end. They already came back from five testing moments to three. Faculties don't take or have the time for training, although in most of the faculties expertise on question- and test construction lacks. However, the faculty of Education, department of curriculum and instruction, has that expertise.

The use of technologies in the faculties is not well developed.

The examination process

There are two types of exams, the Time Tests (TT's) and Annual examinations (AE).

TT's are planned two times a year, in January and in June as Special Timed Test for those who missed in January.

In total OUT has 482 courses to be examined by a paper and pencil test, which means in total 1803 exams a year (see Table 1).

Table 1. Overview of the number of courses and exams per faculty in one year

Faculty	Subject	# courses	M-TT total	AE total	M-TT + AE total
Law	Constitutional and international law	5	8	7	15
	Economic	7	10	10	20
	Criminal & civil law	6	12	12	24
Business management	Accounting & finance	28	56	56	112
	Leadership & governance	42	80	80	160
	Marketing & entrepreneurship	27	54	54	108
Science, techn. & environmental studies	ICT	22	44	44	88
	OBL	8	16	16	32
	OBT	5	10	10	20
	OCH	13	26	26	52
	Environmental	22	44	44	88
Education	Policy, planning & administration	11	16	16	32
	Educational foundation	12	24	23	47
	Psychology and special education	22	42	42	84
	Curriculum and instruction	17	34	34	68
	Adult & distance education	7	13	14	27
Arts & social sciences	Journalism	29	44	44	88
	Developmental studies	4	8	8	16
	Economics	18	36	36	72
	Geography	15	30	30	60
	History	13	26	26	52
	English and linguistics	13	26	26	52

	Literature	8	15	15	30
	Philosophy	14	0	0	0
	Political science and public administration	16	32	32	64
	Sociology & social work	32	62	62	128
	Kiswahili	13	22	22	52
	Tourism	12	24	24	48
Institute of continuous education	Foundation courses	12	24	24	48
	CYP diploma	13	26	26	52
	DPTE papers	16	32	32	64

Faculties deliver the exam (a set of questions including the introduction text and correct answers) to the examination syndicate. The exam is formatted in Word. For every session two sets are composed. Finally, the examination syndicate has a minimum of eight sets of exams at a minimum for one course. The examination syndicate formats the exams before they are being printed.

The computer system (EDMIS) selects an exam for an examination date and after that the exam is not used again.

Students who are subscribed for a course receive about a month before the exam a message that they can register for the planned exam. The students register in ERIS (Examination Registration Information System)

After the closing of the registration time, the examination syndicate obtains the number of candidates for a specific exam and prints these exams on paper. By a packing and labelling system (DES) the right numbers of exams are put together in bags for each examination centre. The distribution over the examination centres is done by their own organisation. The exams take place in January and June. On each examination centre there are three sessions on one day: 8:30 – 10:30, 11:15 – 13:15 and 14:00 – 16:00.

After the exam, the papers are sent back to the head quarter and are marked by the faculties. In one week all the lecturers are together and mark the answers of the students in panels.

Future perspective: Exams on demand and online testing

The policy of OUT is to introduce on-line functions in examination. Two steps in this process are distinguished. The first step is Exams on demand and the second step further on the horizon is Online testing.

Exams on demand

‘Exams on demand’ in the context of OUT means that the examination syndicate has the opportunity to compose an exam by the computer based on an ordered pool of questions any time they want.

Advantages of exams on demand:

- it fits to the basis of the Open Universities to be open: freedom of time.
- more flexibility for the student; possibility for more sessions of exams
- less dependent on the delivery of exams by the faculty

Prerequisite:

- a fore structured question pool for each course
- questions should be based on the lectures;
- for each learning objective one or more questions should be available.
- Questions have to vary in mastery level, so there have to be easy questions, moderate questions and difficult question.

- Language of the questions have to be learner friendly

At OUT different questions appear to this innovation:

- Questions on quantity: How to populate the database? How to collect these questions from the faculties? What are the necessary number of questions in an question bank?
- Questions on quality: How to create a database with questions valid to the learning objectives of the courses? How to construct objective questions? How to construct the question banks? How to use the computer to compose reliable and valid exams? How to manage the combination of open ended and closed questions? What is possible with open ended questions? The questions have to be good, meaningful, contextual. What about security? What about the probability that the whole question pool is known by the students? How to score? For example weight of the questions in the total exam. Is it possible to automate the marking?
- Questions on organisation: How to moderate? What about the marking of the open ended questions? Is panel marking still possible. Time scale. Students expect their results within two weeks after the exam. How to motivate people? Is it possible to use questions from other universities (f.e. OUNL).

Online testing

Online testing means that students are doing their exams behind the computer. Questions are selected from a database. Question results are stored in the database and marking of open ended questions is done on the computer screen.

At OUT, everybody agree that online testing is just one step too far.

When time is ready ODEL should play a role in this. For online testing, all the examination centres should have enough capacity to deal with the exams. This means a optimal relation between number of sessions and number of computers (if you have many computers, you need less sessions, and vice versa).

For online testing at this moment there are two main problems:

- the electricity (solar solutions are investigated and already used)
- power, infrastructure

SWOT-analyses of OUT in relation to examination

Based on the given information, here a SWOT analyses is presented. The strong and weak points, the opportunities and threats of OUT are evaluated in relation to the objective of obtaining Exams on demand or Online learning at OUT. Strong points are those issues which are internal the organisation and are favourable to the objective, weak points are also internal, but unfavourable to the objective, opportunities are external factors favourable to achieve the objective and threats are external factors unfavourable to achieve the objective of exams on demand or online testing.

Strong:

- OUT is open for students all over the country
- The educational system fits with exams on demand: open and flexible learning
- OUT is the only university in Tanzania with a central examination syndicate
- Through centralisation of exams in the examination syndicate no leakage of questions to students anymore.
- The organisation is used to the centralised organisation round exams
- Faculties are open to deal with contemporary aspects.

- The faculty of Education, department curriculum and instruction has experts on question and test construction.
- Teachers are motivated to care for the development of OUT.
- IET is technical able to deliver all the answers to question about functionalities, software, network, reports.
- The examination syndicate in cooperation with the faculty of science, technology and environmental studies started with one pilot on exam on demand: a exam of the course OCP 100.
- Exams on demand are applicable for all courses with closed and open ended questions
- Exams on demand fits into a global trend
- Attitude at IET towards exams on demand is positive
- teamwork in marking examinations
- Faculties are used to deal with contemporary aspects.
- Specific strong points in relation to online testing:
 - o availability of several ODEL labs
 - o reliable internet connectivity
 - o students has access to a computer outside OUT
 - o attitudes towards computers by the students; Students have good ICT skills and are open to exams on demand

Weaknesses

- receiving well designed questions (reliable and valid).
- delivering of exams on time
- No evaluation/analyses of the questions' quality after the exam
- No evaluation forms for the student to fill in after examination.
- training programmes for staff on question and exam construction are not available
- The faculties are scared to loose their work
- Part of the staff may not be interested in exams on demand
- Attitude in the faculty towards exams on demand; Faculties want to be sure that validity is not threatened.
- No extra funding by the government available for training
- Specific weak points in relation to online testing:
 - o Accommodation
 - o Infrastructure
 - o Electricity
 - o Computer literacy of the staff; Afraid of the technology

Opportunities

- If question pools are available, too late delivery of exams is no longer an issue
- Exams on demand may create more flexibility (more independence of time and place)
- Time is now ready
- automated marking and scoring of the closed questions
- to be implemented: qualification units for staff
- May contribute to OUTs image as an innovative institution
- sharing of best exams on demand practices among staff
- teamwork in constructing questions
- Exams on demand may create study discipline

Threats:

- Training is not available

- By giving the questions with the student after the exam, the questions will get known for other students
- Budget / resources for writing enough questions
- Part of the students may not be interested in exams on demand
- Specific threats for online testing:
 - o Number of computers
 - o Infrastructure
 - o Availability of broad band
 - o Lack of ‘online testing’ support/help desk
 - o Modernization (ICT, online testing) is often equalled to the negative aspects of globalisation; decrease of personal contact

Conclusion and Recommendations

OUT is ready to make the next step in the development of Exams on demand. Online testing is not appropriate for the moment, but will be for the future.

These first observations have led to the following recommendations:

Valid exams

Exams on demand will not be a threat for the reliability or validity of the exams. Quite the opposite can be established: if questions are constructed according prescribed rules and a blue print the exams become more consistent over time and that involves the reliability. By using blue prints for an exam, the validity increases. A blueprint consists of a chart representing the number of questions you want in your exam within each topic and objective level. The blueprint identifies the learning objectives and skills to test and the relative importance given to each. The blueprint ensures that you obtain the desired coverage of topics for your assessment.

Example of a blueprint:

Cluster	C1	C2	C3	C4 <i>IA</i>	C4 <i>6D</i>	Total
Level						
Know	3	3	2	5	-	13
Insight	2	3	3	1	1	10
Use	1	-	3	-	1	5
video	-	1	1			2
Total	6	7	9	8	2	30

Usable and reliable exams

For the usability, it is important that the exam can be completed within the timeslot of each exam. This means not too many questions.

However for the reliability, as much questions as possible are required.

Guideline: For a 100-hour course, in one exam 40 4-choices question or 80 true-false questions or 10 – 20 short answer questions or 5 – 10 essay question. Combinations of question types involves the number of question in each exam.

Construction of question pools

The number of questions to be developed for a question pool depends on whether the questions are open for publicity for a student after he/she has finished his exam. An question pool for which the questions can be kept secret may be smaller than a public question pool. The Open University of the Netherlands keeps the following rule for the size of a secret question pool: Factors of influence are the life span of a course (at the OUNL 3,5 years), the numbers of exams in a year (OUNL: 3) and the allowed overlap between test and retest (OUNL: 25%), the number of questions in an exam. This means for 40 questions in a test a size of 280 questions in the pool and for 80 questions a size of 480. For public question pools these numbers should be at least doubled.

Lack of staff time

Most of the exams exist of a combination of open ended questions and multiple-choice question or true-false questions. Staff time is used for construction and marking. All the marking is now done by hand in panel sessions.

1. Efficiency in constructing can be arranged by working in the same panels as used for the marking. Time is blocked and teamwork motivates.
 - a. Using questions of other universities (for example the OUNL) should be investigated.
2. Efficiency in marking can be obtained by digitalizing the marking and scoring of the closed questions. There are possibilities to make the marking of the multiple choice questions digital. The student still gives the answer on paper (optical readable forms) and afterwards these forms are read by a scanner and stored in a database. As a first step this can be done at the examination syndicate, a next step should be a scanner on the examination centres.
 - a. Advantage: marking of the multiple choice and true-false question is no longer hand work
 - b. Advantage: the information stored in the database gives a tool for quality improvements on the multiple-choice or true-false questions.
3. When possible try to develop some exams with only multiple-choice question. These exams can be answered by the student on specific mark papers. It is possible to read these marked papers in a computer on the examination centre with a temporarily score directly after the exam.

Efficiency

Exams on demand becomes a cost inefficient way, when just a little number of students is attempting the test. It should be considered whether it is possible to keep the exams secret after using it for just a few student. A manner to take care that all the exams including the questions will come back to the examination syndicate is to give room under the question for the student's answer.

Training

Question construction and test construction needs training. In the Faculty of Education, lecturers have the expertise on question- and test construction. I'll recommend to use this

expertise not only for their own courses but create time for those lecturers to train the lecturers of the other faculties.

Quality assurance

The results of the students on every question gives an enormous amount of information of the quality of the questions. With statistic analyses the closed questions as well as the open ended questions can be evaluated.

The road ahead

I recommend the following steps on the roadway to exams on demand:

1. Further elaboration of the pilot study at the faculty of science, technology and environmental studies on course OCP 100. This means:
 - a. start with setting up the Blue print for the exam
 - b. build a database structure
 - c. Construct questions
 - d. Develop software to randomly select question from the prestructured database
 - e. Random selection of items
 - f. Print exam on demand at the examination syndicate
 - g. Evaluate the pilot
2. Define a training program on question and test construction by the faculty members of Education
3. Broaden the results of the pilot to other courses
 - a. Setting up blue prints for each exam
 - b. Database structure
 - c. Question construction (find partners) for question pools

Enclosure. Flexible testing at the Open University of the Netherlands

The testing tradition at the Open University of the Netherlands (OUNL) started in 1984 when the Open University was established. Each course with the volume of 100 hours of study was finished with an exam. All these exams were taken by paper and pencil. This testing system became very expensive and the first ideas about an automated test service system arose. The testing system should be flexible, so every student is free to choose an own preferred time to make the finishing test.

The development of an individual automated testing system started in 1987, named SYS, was divided in several stages (De Roode, 2009). In the first stage, the computer selected a random set of question numbers. These question numbers correspond with questions, only multiple-choice questions, in a question book. The question book consisted of all the available questions. The next stage was the automation of the question books. The selection of question numbers and questions was now automated, but the delivery to the students was still on paper. With the exam, the computer produced an optical readable form on which the students gave the answers to the question. This form was read by a scanner and translated in a (tentative) score.

Sys covered the question construction, test construction, and reporting phases of the assessment process. The delivery phase was still on paper.

Sys-procedure for the student:

Student:

- registers online via website
- chooses course, date and study centre
- receives a confirmation of his booking by mail
- Go to the study centre and the 'sys-manager' of study centre controls student information
- Takes place at a table and receives exam (exam introduction + questions) and an optical readable form

After finishing the exam, the student contacts the 'sys'-manager

'Sys-manager' scans the answers of the student

Student receives (tentatively) score. Questions have to be handed in.

Sys-procedure for the organisation:

- Lecturers write question according a blue print (number of questions is 7 x the number of questions in a regular exam)
- Questions are stored in a database. The structure is conform the blue print
- Study centres publish their opening hours for sys on the OU website
- The manager in the study centre prints the exam on demand when the student is there
- After the exam the manager scans the answers and the result is given to the student
- Results (totals and scores per question) are stored in the database
- Lecturers receive statistic information about their questions
- Questions are improved if necessary

In 2007, the board of the OUNL decided that the development of computer-based assessment belongs to one of the main cornerstones of the university. A project team was set up with people of different departments of the Open University. The first project assignment was to make a well-considered choice for question banking software.

Based on an extended comparison between different software packages, the Open University choose for Question Mark Perception (QMP). Although, this package did not cover all the requirements, it was the best fit.

The implementation strategy then comprised first two small pilots including an evaluation of the pilots. At this time, 44 courses are examined fully online.

