Same Examples of Use of Multimedia in Teaching Practice at University of Mining & Metallurgy – Experience of 2 Latest Years.

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Abstract
DESC at UMM was established three years ago as a unit of the Central administration of the University with mutual support of the European Training Foundation and PHARE funds. The objective of DESC is to aid the university staff (faculties) in the implementation of contemporary method of teaching. Particularly the method based on extensive use of computer aided teaching materials and other non-conventional means of knowledge and skill transfer is considered.

In the two years of its operation 10 titles of teaching materials have been published: 1 conventional textbook, 1 conventional laboratory report, 2 exercise books (one supported by a video tape on which the lecture had been recorded), 3 materials being a combination of traditional text and exercise book with tests prepared for self-check of a student (the materials aimed for distance learning), 1 pre-set notebook combined with slides (HMTL) published in Internet and used in the lectures, 1 computer audio-test in HMTL, 1 download program containing demo and an advertisement of the prepared textbook, 3 virtual exercises in mathematics (in HMTL).

Fairly large extent of various types of materials allows to formulate some general conclusions concerning terms to be fulfilled so that Polish universities could take the advantage of new teaching tools and answer to the contemporary demands of the public.

Some problems of production, propagation and implementation of multimedia teaching support materials into daily practice of the faculties are described. Economical aspects of the new approach to teaching at a technical university using the advantages of nowadays information technology are discussed.

Introduction
DESC at UMM was established three years ago as a unit of central administration of the University with mutual support of European Foundation and PHARE founds. The objective of DESC is to help the University staff (faculties) with the implementation of contemporary methods of teaching, particularly methods based on extensive use of computer aided teaching materials and other non-conventional means of knowledge and skill transfer.

In the paper, only a small portion of the activities undertaken at the University of Mining and Metallurgy in the area of introducing new, non-conventional methods of teaching into education practice has been presented. Nevertheless, the two-year activities in producing and distribution of materials aiding in teaching process, as well the experience of organising various courses of the Lifelong Learning type allow to formulate some general conclusions concerning terms of implementation of the new information conveyance techniques and the education methods known as Open Distance Learning (ODL).
In the paper below, the following has been presented:

- Initial phase of DESC operation at UMM, related with the initiative of the European Training Foundation to create a network of 40 Study Centres in so called ‘PHARE countries’
- Specifics of applying ODL at a university level technical school
- Directions of DESC operation, experience, encountered difficulties and their overcoming
- Summary and conclusions

The point should be made here that many of the problems described below and the remedial actions are not ingenuously original. Many institutions and teams have encountered problems similar to ours. It has turned out, however, that at the beginning of implementing new educational methods at UMM it was necessary to learn - unfortunately - not from the others’ mistakes, but from our own.

The beginning of DESC at UMM

Establishment of our Centre was the result of connecting two events: the initiative of the European Training Foundation (ETF) and the aspiration of both the former and present Rectors of UMM to introduce extensively new techniques of education.

ETF intended considerable funds (90,000 EURO per unit) for the purpose of creating 40 Distance Education Study Centres in the Central and Eastern Europe countries (8 in Poland), which would be an outpost of modern education co-operating with each other (especially in adult education - Lifelong Learning). Distribution of this amount was unfortunately quite inflexible and 55,000 EURO was put down to hardware, 5,000 EURO on a basic library and only 30,000 EURO on training costs and the beginnings of operation of the Centres. At the same time (for additional money) the Centres, in co-operation with partners from EU, started production of 29 didactic materials. These materials and the courses based on them were to create economical bases for further functioning of the DESC newly called into being.

In case of Poland, 8 centres were created (4 State Technical Universities, 1 private economy university and three secondary schools for adults), but each of those is of a different character. Only DESC at UMM is a unit supporting the whole university. At other universities they are independent units or units connected with a singular institute or university chair.

The prepared materials may have brought some benefit to the producers. So far we have not been able to use any of them. The reason seems to be the unclear legal status (copyright ownership, licensing charges, etc.), difficulties with evaluation of the works (no reviews) and no allowance for translations. Since we had been expecting difficulties in using the materials prepared within the initiative, we slightly altered the terms of the contract and spent most of the money planned for the Centre starting on preparation of our own didactic aids.

Summing up, it can be stated that realisation of the ETF has brought the benefit smaller than intended due to unsatisfactory adjustment of its terms and conditions to the realities of Polish technical universities, and what is more due to unsatisfactory co-ordination of the undertaken actions in the international scale. Despite that, in case of UMM the received funds have allowed to have DESC started and to gain the basic experience.
Specifics of applying ODL at a Technical University

When considering the role of computers and Internet in contemporary university education and analysing possibilities and effects of the latest computer techniques application, different points should be noticed:

- Using Internet and e-mail by an individual teacher
- Providing access to teaching materials by an educational institution (a university chair, university department) through computer network
- System appliance of the technology called Open Distance Learning for teaching carried out by at least a University Chair or Institute with the use of multi-media teaching aids.

In the first case we are dealing with so far unquestioned right of an independent university teacher to form their methods of knowledge conveyance freely within the approved curriculum. If the University authorities are interested in development of those methods, then the only thing to be done is to encourage the teachers to make efforts within the scope of their teaching duties. Apart from the lack of time and, sometimes, editor using skills, nothing should be an obstacle.

To carry out the second point is already a more complicated matter. It makes it necessary at least to:

- buy the copyrights from the author and provide their protection
- provide appropriate quality of contents
- make sure that the material will not be withdrawn from the net without the owner’s consent - the server administration lies with the owner
- make sure that the born expenses find response in the benefit obtained

The university bears both the responsibility and costs, and so it should be gaining profits respectively. Therefore it becomes necessary to carry out the calculations of profitability and to create professional service. There arises a question of payments for the materials rendered. With the range of application growing, the economical question will be more and more pressing for solution.

The third stage is the systematic introduction of the techniques known as Open Distance Learning into the teaching methods’ arsenal. It may be appropriate to point out that only some of the contemporary universities have made this technique their main teaching method. Many of them, however, apply its elements aiming at increasing effectiveness and decreasing the costs of teaching.

In the ODL technique, multi-media didactic aids are used widely and extensively. A packet of such materials - learning resources - usually consists of a self-study workbook, an audio-cassette and support audio-cassette, support videos (linked with other studying means), various types of software, and a student guide with references to Internet addresses. Also, video conferences and TV - often cable TV - are often included, both for information conveyance and for contact and consultations with the learners.

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1 E.g. Competition for the notes presented in Internet, organised by UMM; http://www.oen.agh.edu.pl/mdydaktyczne.html
2 In a few words, it is a method of teaching which does not require constant teacher-learner contact, directed at the learner’s needs and rendering access to knowledge
3 e.g. Open University, Fernuniversität
4 Used names after “World-class learning resources from The Open University - the 2000 catalogue”
Undoubtedly, out of all distance learning techniques this is the most effective one, which is being proved by the rapid development of the institutions applying it.

The success of introducing ODL, and especially of teaching with the use of the Internet and other techniques using computers and electronic carriers of information, depends largely on big groups of learners being included in such teaching.\textsuperscript{11} It is entailed by the necessity to provide economical profitability of the undertaking, which faced with the big investment costs of learning resources preparation, considerable hardware costs and organisational expenses, requires largest possible groups of students.

The consequences are aiming at unification of programs (curricula) and requirements, as well as organising educational institutions in a way similar to market enterprises’ organisation.

Distance learning, if it is to lead to formal certificate of the acquired knowledge and skills of a learner, must be connected with a testing system (tests and exams) of a different character than the traditional. The teacher-student contact, laboratories, seminars etc. also need reorganising.

The above requirements can be met relatively easily in mass education at a secondary school level, and also when applied to basic subjects in a technical university/college (mathematics, physics, chemistry, languages etc.), although it requires some effort. It is, however, very difficult - and cost-consuming - to do so for technical subjects, particularly when they consider only a single department or even a single university.

At present teaching curriculum at Polish technical universities is excessively differentiated and divided\textsuperscript{5}, and both ambitions of particular teachers and lack of bodies co-ordinating the teaching process, the contents and methods of conveyance at a university or department scale make creating rational policy very difficult.

Promotion of teachers depends very little on quality of their teaching (promotions depend almost entirely on the scientific research results). This factor is made stronger by the State university financing system: subsidies for education are distributed automatically, notwithstanding the results achieved by the students, referring however to their number and the scientific research results of the teaching staff.

At most technical universities there are additional Extramurial Studies courses, partly payable for (based on different rules; accounting for up to 40% of all students)\textsuperscript{6}, held simultaneously with the free, traditional stationary courses of studies.

**Distance Education Study Centre Experience**

Only with the above background can the experience acquired by our DESC be presented.

Having analysed the outer conditions and possibilities of the Centre, it was decided to make it a priority task to break the teaching staff habits and to increase considerably the knowledge about the hidden opportunities of the new approach towards university teaching, as well as to create an active group of the University staff around the Centre to support the new techniques’ implementation in the UMM education process.

\textsuperscript{5} not rarely at one faculty there are 5 specialisation, which provide for students about 120 modules in 4 years.

\textsuperscript{6} They are courses organised in Saturday - Sunday meetings at a university, generally based on the same programme and being the same duration as the traditional stationary course of studies.
A simultaneous task is to acquire experience and work out standards for multi-media teaching materials production and teaching process organisation. This applies both to the DESC employees (all of which, except the director, were employed directly after graduation) and to the teachers co-operating with the Centre.

According to the ETF recommendations, at the very beginning of the DESC operation - 1997, 1998 - a series of seminars and workshops with participation of British experts were organised. In 1999 a DESC employee graduated from a ODL management course organised in a distance learning manner\(^7\). The interest of UMM employees was minute, and the results unexpectedly small when faced with the incurred expenditures - especially time.

Therefore it was decided that courses and training may be effective in future for those already active in the ODL. Before then, however, some indirect actions are necessary, particularly presenting ODL as a source of additional income, and at the same time giving examples of self-realisation opportunities arising from providing students with quality learning resources.

The obvious source of additional income and at the same time an easy one to advertise for and to use were the Lifelong Learning type courses and preparation of scripts for them. The only contribution to implementation of the ODL techniques was the requirement for the prepared materials to be suitable for self-studying. For all the interested parties the obvious addresses seemed to be the Extramural Studies students and the industry employees.

In October 1997 repetitories in mathematics and physics for the newly registered students of the Extramural courses were organised. Appropriate collections of tasks and tests were prepared and published and 20 hours of repetitory classes in mathematics were recorded on a Video tape. The tape, after post-production, contains the total of the repetitory in four cassettes, three-hours each.

Unfortunately, the DESC financing system - the funds delivered have to be used and accounted for in the calendar year without the possibility to transfer the profits into the following years - results in the necessity to have the investment returned in profit in the year when they were incurred. The expenditures on buying copyrights of printed and recorded materials as well as printing and production of video-cassettes were considerably high, and so the price of the resources was then too high. Assuming the whole action to be of a promotional nature, it was agreed to lower the course price to the incurred production cost level (without the copyright and post-production costs), covering the rest of the expenditures from the PHARE funds. Despite that, the number of applicants was smaller than expected (about 100) but big enough for the authors of texts and teachers to consider the offer interesting. The key to obtain profitability of the printed learning resources was the rule to pay the Authors high royalties at low copyright sale rates.

We have also become convinced that acquiring a video of acceptable quality requires at least twice the expenditures hitherto incurred and also our own filming team. Co-operation with the Public Educational Television does not yet seem possible since the prices asked are too high and there is a tendency to dictate terms not withstanding the DESC ideas there.

This first attempt to produce our own printed teaching materials resulted in publishing 7 titles in 1998 and 1999 in co-operation with three UMM Departments: Physics and Nuclear Engineering, Mining, Foundry Engineering. Two of them have already had their second edition.

\(^7\) LOLA course organised by ETF
This activity has proved to be profitable and, which seems more important, has resulted in considerable growth of DESC co-operators’ circle, from two in 1997 to 29 in the end of 1999.

Nevertheless, in spite of undoubtedly favourable balance of the whole undertaking, some mistakes and imperfections have been noted:

- Not entirely satisfactory adjustment of the texts to requirements of distance teaching. The reason was the lack of experience and also free time which could be spent by the authors (who are usually very busy) on studying exemplary solutions, at that time not acquired yet by DESC.
- The coincidence was that out of our seven published positions five were written by physicists employed at the same Department. In one case materials of similar contents aimed at the same client were published, in the second case - materials already published by another author in Internet. Since the costs were covered by the Department, DESC has not suffered a loss, but the expenditures have not been born effectively.
- Three publications, despite the reviews and authors’ proof-reading, contained unacceptably high number of printing mistakes. Looking for the means to limit the expenses, proof-reading was being done on electronic copies of made-up columns. It turned out that in some cases the version sent for the proof-reading was different from the printed one. In next publications the organisation of the process was changed (the final proof-reading by the author is done on printer’s foils), and the problem has disappeared.

The indirect result of the publishing action was getting in contact with mathematicians and having three pieces of teaching materials prepared by them in TEX format, transferred then by the DESC employees into HTML format and now accessible at: http://www.oen.agh.edu.pl.

Graphic quality of those materials is still low since they were made accessible right after their transformation from TEX to HTML. At present the HTML files are being processed in order to enhance their quality.

In the course of preparation and rendering the materials in Internet some technical and legal-financial problems have been encountered:

It has been concluded that the material prepared by an academic teacher has to be processed further in order to:

- give it an attractive form
- adjust the organisation of the contents to the self-studying requirements, and sometimes also to complete it with the way of using it, commentaries, etc.

It is not necessary to have it done by the author of the text - even if they have the required skills. The consequence would be a question concerning the rights to the work accessible in the net - do the designers of the text shape and lay-out have a part of the author’s rights?

Another, so far unsolved, problem is the value of the work in the author’s publications’ list - according to the hitherto existing rules such a publication does not count when promotion for university degrees and titles is considered. It would count, however, if the same text was published in print.

Finally the third difficulty connected with preparation of the electronic materials ordered by the Centres (DESC) is the return of the born expenses.
It seems practically impossible if they are not ‘sold’ in the fee paid by a student or a tax-payer\(^8\). It is very unlikely that many students would buy the password if the material were not obligatory, and even then dishonest omitting the limited access will be quite easy.

Indirect implication of the above is impossibility of shifting some part of the author’s rights onto the royalties, which makes DESC spend significantly larger sums in one lump than in case of printing. In this way one of the important advantages of net publication is lost.

We are trying to tackle this last problem by completing the materials provided in Internet with special notes (workbooks) sold to the public. The results of the experiment will be only known in the next term.

Irrespective of the listed difficulties, placing the described three positions in the net has started the extremely important part of our campaign aiming at updating the knowledge conveyance at UMM and the Centre promotion. Its components, apart from producing and making the mentioned three WWW mathematics pages accessible, are:

- Preparation of automatic task-test in physics taught at the secondary school. The set will be operated entirely by a computer.
- Placing slides presented during the physics lecture in the net and, as mentioned above, linking the Internet resources with a printed note book. It has been designed to have a slide on one side of the page and a space left for the notes from the lecture on the other.
- Placing in the net a draft of the Mechanical Systems Identification Methods lecture. In this case the financial problems have been avoided, since the author has carried out the work of writing the text in the HTML format assuming it to have been paid within the university teacher’s salary.
- Management of the learning resources created as a result of the competition announced by the UMM Rector, professor R. Tadeusiewicz, for placing notes from the lectures made by the students in Internet.
- Creating a library of references to Internet accessible materials placed on various UMM servers.
- Courses of opening WWW pages for UMM employees and connected with it action of placing teaching materials in the net. Both initiatives, actively supported by the Rector Prof. Tadeusiewicz, have been enjoying considerable popularity - in 1999, 56 persons graduated from the course, in 2000 already 23. Two authors have already placed their works on our server.

Different than for the not very satisfactory results of the courses organised by DESC, participation in conferences\(^9\) (especially the ones abroad) have brought a series of benefits.

Some contacts have been established and some first hand information on methods and problems connected with ODL implementation acquired. This is a much more effective - although more expensive - method of enhancing qualifications and promotion of DESC activities than the formalised courses. A significant role seems to be played by the pleasure of social contacts during such meetings. It appears to be suitable to have the largest possible number of the university employees from outside the closest circle of those already connected with DESC sent to such conferences.

\(^8\) This is the method commonly practised by the units teaching in distance education.
\(^9\) So far the total of 9 UMM employees have taken part in 12 conferences, out of whom 4 not of DESC
The second, after the production of the learning resources, area of activity, the benefits of which are not questioned by anyone, is organising courses of the lifelong learning type for the employees of business companies. DESC has also involved itself in this kind of operation as it is a kind of activity expected of Distance Education Study Centre.

Several short courses have been organised (12 hours, two days) and three long ones (40 hours carried out for a few weeks). The aim was to collect funds and, as in the cases described above, to connect more teachers with DESC. Unfortunately, so far this action has not been developed successfully yet.

It has been established that:

- Students attend these courses which are extensively advertised by their teachers. The DESC staff is too small and inexperienced in marketing activities.
- The courses of technical (professional) profile have a small group of participants by their nature, whereas their preparation and realisation is quite cost-consuming. Hence treating them as a considerable source of income seems unreasonable, unless their number was big and the preparation costs were distributed over a long period of time. Success in lifelong learning seems to consider a mass customer, and so at a level lower than university level.
- Among the teachers of the university there is some reluctance to invest time in preparation of a course unless its customer and the expected income is known beforehand. This in turn practically excludes advertising since it is difficult to advertise a course which has no curriculum, programme, teachers, learning resources, materials, etc. As a result, the vicious circle closes, and the profits are of a margin significance.
- A significant obstacle is lack of market research and professional marketing. Elimination this drawback would depend on creating a team of specialists.

Summary and Conclusions

The three-year long operation of Distance Education Study Centre at University of Mining and Metallurgy seems to have proved usefulness of this kind of unit in the process of updating education methods in technical universities. A series of mistakes has been made, some of which have been successfully eliminated. A lot has been learnt, but still it is too little to have the critical point of the phase change behind us and so that it could be said that the University applies Open Education Learning.

There are many various obstacles on the path to this aim. The basic one, however, may be considered non-profitability of the teaching staff involvement in the innovative actions. Non-profitability both in the financial and career meanings. The solution to this problem does not lie with the university.

Nevertheless, the short history of our DESC presented above shows that even in these conditions a lot can be achieved if a good will of teachers is encountered and supported by extensive help of the University Authorities.

Particular experience examples indicate the organisation and co-ordination of activities are the key to provide return of the expenses born and to obtain high effectiveness of teaching. Applying Open Distance Learning by only one teacher, or even by a single group of teachers is excessively cost-consuming and not effective education wise. This technique requires writing it in the teaching system obligatory in the institution.

This quality of ODL has made itself apparent already in the project sponsored by ETF and the PHARE fund. It has not been foreseen that materials prepared in many different languages (English is still not universally used) and not reviewed by representatives of the
countries - members of the network cannot find easy access to potential learners. The materials must be adjusted to the needs of particular universities and precisely co-ordinated with the existing methods of teaching.

It appears that the learning resources should be paid for within the course fee, otherwise they will either be too expensive, or will not do their job - the distance education system requires additional materials to be of a single use and of a common standard for all the students.

The resources placed in Internet may be treated as:

- Author’s presentations of particular teachers, but then should be placed on the author's personal pages.
- As a part of the university library - then ought to be catalogued, reviewed (reviews available for the user) and controlled by the server owner.
- Obligatory, ordered educational materials. In this case the university assumes responsibility for their quality and it should obtain appropriate compensation for their preparation and making them accessible. The easiest solution seems to be determining a part of the tuition fee (no matter who pays it) and intend it for production of the teaching support materials.
- Real profitability can be brought only by systematic joined efforts of many departments, or even better many universities.
- It seems absolutely necessary to determine the conditions and terms allowing us to make the publications presented through Internet equally useful in promotion process as the printed ones are.

References

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