Remedial online teaching in theory and practice
online summer course: Balance between summer and course

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Abstract

This paper is based on the experiences with remedial online learning from a national collaboration initiative of University of Amsterdam, Erasmus University and Maastricht University in the Netherlands. Due to increased heterogeneity of enrolments of students, problems arise for both institution and student to make the correct choice. Remedial teaching programmes might mitigate these problems. Although remedial teaching programmes have been around for a long while, the rates of success in terms of students completing the programme are unclear. This collaboration aims to increase motivation by balancing study and leisure time during the summer holiday by using an attractive mix of ICT. Fidelity of students towards each other and the course is stimulated by enabling social constructs.

Assuming sufficient support from the management, most higher education institutions already have the necessary organisational and ICT-structures in place to start an online summer course programme. The experiences at Maastricht University show that it is possible to create an online entry test that allows prospective students to effectively test their prior knowledge. If prior knowledge of a student was considered low, the experiences at Maastricht University show that offering online summer courses to remediate knowledge problems of international students is feasible and effective.

Keywords

lifelong learning, distance learning, fidelity, innovative education practices

Introduction

Acceptance to a bachelor or master programme has traditionally been based on a required (combination of) degree(s), experience and/or skills. However, due to increasing internationalisation of students (e.g. 60 per cent of enrolment at Faculty of Economics and Business Administration at Maastricht University is foreign), the introduction of the Bachelor-Master structure in Europe, and the new accreditation procedures by the Treaty of Bologna, heterogeneity of enrolled students has increased. Although a foreign student formally should be accepted to a study program according to the Bologna Treaty, the actual level of knowledge and skills can be below the level of regular Dutch students. Moreover, for some (international) students, the lack of prior knowledge is too large and remedial teaching before entering a programme is necessary (Brouwer et al., 2004). In addition, most students are unable to judge for themselves whether they possess sufficient prior-knowledge and/or experience to start a bachelor or master programme (Prins, 1997).

In the past, several remedial teaching programmes have been developed in the Netherlands. Van Leijen et al. (2005) argues that remedial teaching programmes are delivered with varying degrees of success in terms of students completing the programme, depending on motivation of students, involvement of teachers and learning environments. In addition, since higher education institutions now have to compete on a European or even global market (Dittrich et al., 2005), regional/national remedial courses in a fixed (physical) location with traditional teaching methods seem inadequate to meet these new challenges. Recent developments in the area of e-learning reduce the limitations of time and place (Vrasidas & Zembylas, 2003) and could therefore help to face these problems.

Based on the experiences from the past and anticipated future changes in higher education in Europe, the University of Amsterdam, the Erasmus University Rotterdam and Maastricht University in collaboration with SURF-foundation, have decided to acquiesce these challenges. The goal of this collaboration is to find successful educational formats focussed on flexible remedial teaching in case of a high level of heterogeneity of student intake (Brouwer et al., 2004).

The goals of this paper can be split up into three interconnected parts. First, how can students assess their current level of mastery before joining a (bachelor) programme? Second, if the level of mastery of individual students appears to be low, how can online summer courses help to tackle these potential deficiencies? And finally, how can online summer courses be designed to enhance motivation and increase completion rates of students? In this paper, the aspects of successful online remedial teaching are described in a model for online remedial teaching. Afterwards, one of the online summer courses offered at Maastricht University will be used as case-study to show how the online remedial teaching model can be implemented in practice.

The online remedial teaching model

According to Bryant et al. (2005), there are many definitions about online and/or distance education. *Distance education* encompasses two important elements, namely distance teaching and distance learning. *Distance teaching* regards mainly the way in which instruction is provided, whereas *distance learning* concerns optimizing student learning behaviour (Keegan, 2002). Various definitions are used for online education. Although in most of the definitions terms like *web-enabled* and *online* point at the way instruction is provided, it does not automatically lead to *distance education* (Bryant et al., 2005). However, in this article the term online (education) is used instead of distance education as the element of distance education is only related to the short time period before students start (physically) at a the regular curriculum.

In comparison to *face-to-face education*, in a 100% online course it is harder to transfer communication elements like body language or intonation. Therefore, online courses have to make more intensive use of the available interaction methods (Roblyer & Wiencke, 2003). Interaction is not just a technical mechanism; it also is a social and psychological way to generate relations. By forming small groups, students will experience peer-pressure, which forces them to interact more intensively. At the same time, group processes and learning processes remain clear and manageable for tutors. In this model, it is assumed that tutors together with students are responsible for stimulating interaction as well as stimulating the learning process.

Van Leijen et al. (2004) conducted research in various remedial teaching programs in the Netherlands. A programme offered during the summer period induces an *incentive problem* as most graduated high school students have a strong preference to do other things besides studying. Hence, the challenge arises to construct a programme that achieves a balance between study time and time for summer activities in such a way that it provides sufficient motivation to keep students engaged in the course. Therefore, an institute planning to design and implement an online remedial summer course should consider the following aspects:

i.   *Accessible and available 24/7 online*: Use of internet helps to overcome the barriers of time and place, and thus enables participants to work anywhere they like and at times that suit them most (Vrasidas & Zembylas, 2003).

ii.   *Adaptive*: Each student is in a sense unique. Hence, the programme should ideally allow for an individualised learning path based on prior knowledge, learning style and preferences of the student (Falmange et al., 2004, Abdullah, 2003).

iii.   *Rapid feedback*: Besides the fact that it is pedagogically better to provide rapid feedback on performance (Draaijer, 2004), it is also important because the period before the course starts is short and often fully planned with other activities. Furthermore, rapid feedback stimulates interaction in an online course (Vrasidas & Zembylas, 2003).

iv.   *Interactive*: "A fundamental component of distance education is the communication medium" (Bryant et al., 2003, p. 257). Being solely available online, the course and learning environment should stimulate interpersonal contact in order to motivate participants to remain engaged (Ronteltap & Van der Veen, 2002).

v.   *Flexible learning methods and assessment*: Given the fact that learning and assessment methods are subject to change, the programme should be flexible enough (Segers, 2004).
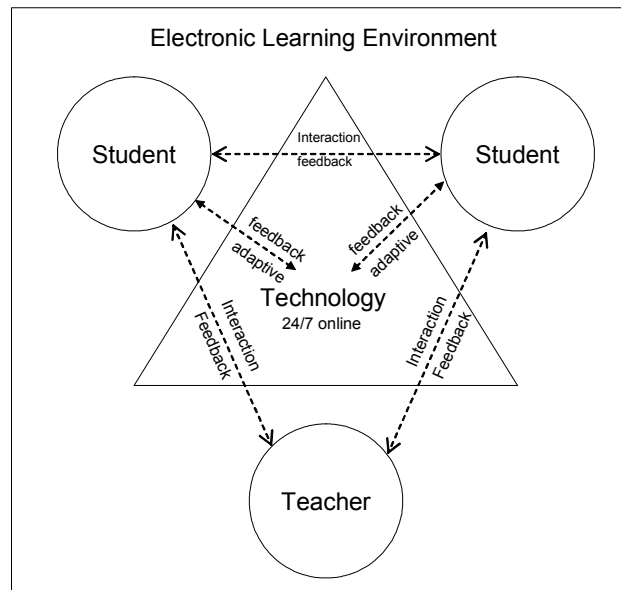
Figure 1: Online remedial teaching model

According to Roblyer and Wiencke (2003), electronic learning environments (ELE) that effectively make use of communication and interaction tools will offer unique opportunities to engage students and gain learning results. In Figure 1, our online remedial teaching model is illustrated by the aforementioned aspects and their interrelations. The model makes a distinction between technology and (electronic) learning environment. Depending on the educational vision of an institute, different aspects of the model can be emphasized. In a more teacher-centred educational vision, communication between students will be less important, whereas in an educational vision of collaborative learning, communication between students will be emphasized. In other words, the model in Figure 1 can be applied to different educational settings depending on the educational vision.

Prior knowledge tests and online summer courses in practice

As most students in the bachelor curriculum of the Faculty of Economics and Business Administration at Maastricht University have (some) problems with Mathematics and/or Economics, the first prior knowledge tests and online summer courses were specifically developed for tackling these problems. In the remaining part of this paper, the implementation of the prior knowledge test and the summer course for Economics will be described.

How can prospective students assess their current level of mastery?

Prospective students at Maastricht University were given the opportunity to make an *online entry (diagnostic) test* in order to assess their prior knowledge of economics. The online test was available and accessible 24/7 on the Internet. The test was a combination of exercises in open-question type form and self-assessment in terms of mastery of knowledge (Tempelaar & de Gruijter, 2004, Sclater & Howie, 2003). Anyone who filled in the online entry test received elaborate feedback via E-mail from an expert.

Overall, the test was viewed 379 times and 211 prospective students from 34 different countries, ranging from Spain to Peru, Australia to Kazakhstan, completed the entry test in Economics. If the results were deemed to be below a pre-specified threshold, students were invited to take part in the online summer course to remediate this apparent deficiency. Surprisingly, 151 (75%) prospective students scored below the threshold level. If the student was willing to invest 60 to 80 hours to remediate his/her deficiency, the student was enrolled in the summer course. However, only students registered for the bachelor programme at the Faculty of Economics and Business Administration were allowed to take part in the summer course.

How can online summer courses help to tackle deficiencies?

The course was offered twice in English in the summer of 2005. This allowed for more flexibility, which promoted the balance between a student's efforts to tackle possible deficiencies and other summer activities. Important to note here is the fact that participation was completely voluntary and in no way related to the official admission procedure of the university. Students and tutors never met (physically) during the course and the only reward was a (unrecognised) certificate at a graduation ceremony. Moreover, participation in the

summer course was free of charge and costs of the course were funded by Maastricht University and SURF-foundation. In total 2 Dutch and 48 foreign students were willing to join the online summer course economics.

Online summer course: Economics

The online summer course was an electronic version of the collaborative "Problem-Based Learning" (PBL) approach used at Maastricht University. The course was given over a period of 6 weeks in which students were assumed to work for 10–15 hours per week. There were neither obligated meetings nor a schedule of appointments. The students themselves decided when to work on a task. They discussed 6 tasks that covered introductory topics of economics in general (e.g. economic way of thinking), microeconomics (e.g. demand and supply model) and macroeconomics (e.g. gross domestic product, inflation and unemployment). The 50 participants were divided in three groups (depending on the time of enrolment) of 14–18 students. All groups were guided by two tutors. Because the participants had no experience with the *7-jump method* of PBL (Moust et al, 2002) and most of them were unfamiliar with using an E-learning environment, a lot of emphasis was placed upon training PBL-skills and the use of the E-learning environment. This was a challenge since there was no face-to-face contact between tutors and participants.

In the first week of the course, a questionnaire was distributed to see what students were expecting of the course. Students were asked to express their opinion on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). In total, 43 of 50 students completed the questionnaire. Students were mainly joining the course since they were not satisfied with their level of mastery in economics (4.0 (0.8)). The students indicated that they liked working online to remediate their knowledge (4.7 (0.5)) and at the same time liked the opportunity to contact other students as well as the tutor (4.5 (0.5)). In general, the participants indicated that they received sufficient information about the goal and context of the course (3.8 (0.6)). Furthermore, the students clearly expressed their preference for teamwork instead of working alone (3.9 (0.7)).

Electronic learning environment

In order to participate in the discussion of the tasks, the students were given access to the electronic learning environment (ELE), in this case 'Blackboard'. Regarding functionality, Blackboard is comparable with other ELEs, such as WEBCT or Netschool, and is used in many Higher Education institutes (Tempelaar & de Gruijter, 2005). Furthermore, the functionality of Blackboard is in line with the five aspects described in the online remedial teaching model. Within the ELE it is possible to let students do quizzes and give immediate feedback on their results and learning process (Rienties & Woltjer, 2004). In addition, the ELE has various interactive communication tools like discussion-boards and E-mail (Ronteltap et al., 2002). As primary learning materials, an electronic version of a first year Economics book from Parkin and Bade (2004) was used, which includes chapters of the book, videos and animated graphs.

Formative and summative assessment

The course used various formative as well summative assessment forms. According to Marshall (1999), *formative assessment* supports the learning process of students without grading, while *summative assessment* gives insight in the (end) level of a student with an accompanying mark. The students had the opportunity to make three formative tests and they could themselves decide when to take the tests. These tests were used to provide the student with feedback on the level of mastery of the learned subjects. The course was concluded with a final online summative exam, in which the student had to work on a problem similar to the ones discussed during the course.

Interactive communication

With regard to the problem of ensuring continuous motivation, interaction tools proved to be a very attractive mechanism. The use of a discussion-board makes communication *a-synchronous,* by automatically saving messages and allowing messages to be viewed at a later time of preference. This creates a substantial degree of flexibility, allowing students to actively participate in a discussion at their preferred time, without running the risk of missing vital parts.

Synchronous communication, such as chat or MSN-messenger, requires all participants to be online at the same time. When students live in different time-zones or when there is not a predetermined schedule of appointments, this will reduce flexibility. Discussion-boards make it possible for students to interact with each other, share new insights, and help in case certain aspects need clarification. Moreover, it allows for group dynamics that are missing when a student has to follow a remedial course alone. The role of the tutor was process-based and less content-based (Blok, 2004). In essence, a discussion-board can be used as a formative assessment tool.

Students placed daily threads and reacted on each others' contributions. In six weeks' time, an average of 370 threads per group were placed, which can be seen as a rough approximation of the intensity usage. However, there were differences between groups: Group 3 posted only 224 threads, whereas Group 2 posted 559 threads. The so-called "Café/Small talk section" was intensively used for students to get acquainted with each other, as recommended by Roblyer and Wiencke (2003). In addition, it was used for arranging practicalities such as "how to find a room?" or "where do I apply for a grant?". The online course also contributed to the establishment of fidelity within the group and with the institution. According to Wieland (2004), students who are more convinced about their choice of study will commit more to the institute and will put more effort in their study. By early fidelity of students towards the institute, the chance that a student will get isolated in a new environment and ends the study preliminary is thus reduced.

Structure online summer courses, motivation and completion rates

In total 35 students filled in the evaluation at the end of the course. Of these 35 students, 10 students filled in the evaluation but did not receive a certificate (and they were aware of this when they filled in the evaluation). On a scale from 1 to 10, students were very positive about both the functioning of the instructors (8.0 (1.4)) as well as the online summer course as such (8.3 (1.3)). More specifically, on a Likert scale from 1 to 5, students felt that the course had offered them a lot (4.0 (0.8)) and enabled them to remediate their knowledge to such an extent that they feel ready to start in Maastricht (3.6 (0.6)). Students worked over a period of six weeks on average 13.4 hours per week for the summer course. The group of students that did not receive a certificate only worked for 6 hours per week. With regard to the electronic learning environment, students found the digital materials to be of very good quality (4.3(0.6)). Moreover, one can find evidence that students liked the fact that they could collaborate with each other in this summer course. The students thought that it was fun to make use of discussion-boards (3.9 (1.0)) and they perceived the general atmosphere in the group to be friendly (3.8 (0.9)). Furthermore, students had a strong feeling that this teamwork setting helped them in their process of tackling their knowledge gaps (3.7 (0.7)). The observation that increased interactiveness in distance education is related to higher student satisfaction (and therefore higher passing rates) has already been acknowledged by Roblyer and Wiencke (2003).

Table 1 Evaluation of online summer course Economics per group

	Group 1 N=12	Group 2 N=13	Group 3 N=10
This summer course offered me a lot	4.3	4.2	3.7
The contents of the summer course were inspiring	4.3	4.0	4.0
The format of the summer course was good	4.2	4.2	3.6
The summer course was well organized	4.3	4.3	3.3
The quality of the digital material was good	4.6	4.5	3.9
The digital material motivated me to keep up with the subject matter	4.1	3.3	3.1
Learning with an E-book is not different from learning from a hard-copy book	2.4	2.2	2.2
It was fun that I could attend this summer course via the internet	4.2	3.7	3.5
I am satisfied with what I learned in terms of knowledge, skills and insight	3.8	3.9	3.3
I gained enough knowledge and skills in economics to start with my study in Maastricht	3.8	3.8	3.4
The group in which I participated functioned well	3.9	4.2	2.9
It was fun to collaborate with others in this summer course	3.9	4.2	3.4
Collaborating with others facilitated my understanding of the subject matter	3.8	3.8	3.4
I think I was motivated to finish this summer course because I could work in my own pace	3.6	3.4	3.1
Give an overall grade for the functioning of the online summer course team (1 = very bad; 10 = very good)	8.7	8.2	7.1
Give an overall grade for the quality of the online summer course team (1 = very bad ; 10 = very good)	8.9	8.2	7.7

Source: Blok and Rienties (2005)

Besides differences between the group of students who passed and not passed, there were also differences among the three groups. This might be due to the fact that in Group 3 fewer students passed the course (only 6 out of 18). In addition, the interaction in the group was considerably less than in Groups 1 and 2. As illustrated in Table 1, Group 1 was the most optimistic group about the added value of the course (4.3 (0.6)), whereas Group 3 was less positive (3.7 (0.7)). In comparison to the others, students in Group 3 thought that the course was less well-organised. Groups 1 and 2 were very satisfied with the acquired knowledge and skills. Group 2 has worked most hours per week (15.4), but this can partly be explained by the fact that there were more discussions in the social café/small talk section.

Eventually, 25 out of 50 students passed the course. In comparison to other remedial courses (Van Leijen et al., 2005) and taking into account that students never physically met one another and that participation was completely voluntary, a passing rate of 50 per cent can be considered to be fairly high.

Conclusion and discussion

In this paper, the question how prior knowledge tests and online remedial teaching courses can contribute to mitigating the problems of heterogeneous enrolment of students was dealt with. First of all, an online remedial teaching model was developed. The five success factors, which an online remedial course developer should take into account, are 24/7 access and availability on Internet, adaptiveness, rapid feedback, interactive, and flexible learning methods and assessment. Next, the online remedial teaching model was implemented in practice at the online summer course of Economics at Maastricht University. Before students were allowed to join this course, they had to make an online prior knowledge test. More than 200 prospective students out of more than 30 countries made use of this possibility. Eventually, 50 students took part in the online summer course Economics.

The methodology of the course was based on an electronic version of problem-based learning. With the exception of the element of adaptiveness, the course implemented all the elements described in the online remedial teaching model. Students worked online in a discussion forum to solve problems listed in tasks and to share each other's views. In addition, the discussion forum was used for arranging practical student affairs as well as constructing a social network. The evaluations at the end of the course were very positive. On average, students were highly motivated to remediate their knowledge gaps and they worked approximately 70 hours for the entire course. Furthermore, students indicated that they now have more confidence of making a good start at the institute. Exactly half of the group of students that started with the course eventually received a certificate.

The case-study of the online summer course Economics and the experiences from other courses offered by the three institutions taking part in the project "Web-spijkeren" indicate that it is possible to construct an online course that continuously motivates students and thereby increasing passing rates. The online course was build with existing ICT-structures that are also available at other institutions. If an institute provide accurate means and expertise for establishing an online summer course programme, it should be possible to mitigate the problems with increased heterogeneity of enrolments of students.

Further research is necessary to prove whether online summer courses have a temporal or structural effect on the (prior) knowledge level of students. In addition, it remains to be investigated whether the participants, in comparison to those who did not take part at the summer course, perform better in the respective courses in the curriculum. Furthermore, it might be that a so-called sample bias has occurred. In other words, further research needs to be conducted to verify these issues.

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