
Administering a Web-Based Course on Database Technology

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Abstract

This article presents a managerial experience with a web-based course on data base technology for enterprise management. The course has been developed and managed by a Department of Industrial Engineering in Brazil in a Public University. Project's managerial experiences are described covering its conception stage where the Virtual Learning Environment (VLE) was designed until the present moment with student's enrolment and instructional activities. Managerial challenges related to carrying out the web-based course are discussed in this article and involve tasks such as advertising efforts to enroll new students, interaction with the web-environment, learning evaluation from instructional contents and customer satisfaction with the learning outcomes. Conclusions taken from managing such a course are presented regarding technology requirements, financial results and market possibilities are presented and aim at helping institutions willing to invest on similar web-based learning projects.

Introduction

Distance learning through the Internet is changing educational paradigms. Learning approaches, teaching methods, students' expectations with instructional activities and financial expectations are issues that challenge professionals and educational institutions (O'Donoghue et al., 2001; Parikh & Verma, 2002).

The growing availability of Internet at working places and residences in addition to a global market where education is a competitive advantage are reasons for keeping the growth on investments in information technology for distance education. The distance education commercial arena is currently involving universities, governments and general educational institutions. Individuals and companies keep investing in educational programs for professional qualification or even for keeping employees up to date with new technologies and market opportunities.

The number of research projects and publications reporting experiences with distance learning and education has also been growing. It is an interdisciplinary matter coping with investigation in

areas such as Information Technology (IT), telecommunications for exchanging data, educational approaches, instructional techniques and learning preferences. However, managerial and administrative aspects of distance education experiences are still difficult to find in the literature reporting issues such as attracting students enrolment, financial results, evaluation of students satisfaction with instructional contents and tutoring methods related to distance educational initiatives. Institutions and managers dealing with distance courses are challenged by decision-making situations where no much support is available from neither experts nor literature reporting practical experiences.

As cited by Aretio (1997) and Hasebrook (1999), there are several aspects pointing to the advantages of Internet education for individuals and enterprise. This case describes an experience with managing an Internet distance education course highlighting examples of situations faced through the course life cycle. The contents of this article aim at providing insights for professionals and institutions willing to set up similar projects.

Distance Education in Brazil

The first initiative for distance education in Brazil goes back to the foundation of the Radio Society in 1923 (Nunes, 1994). It was followed by the foundation of the Radio-Monitor Institute in 1939, which used broadcasting technology for transferring specialized knowledge for well-defined professional and working activities. Initiatives for greater audience using radio broadcasting was established in the 60's by a Federal project aiming at teaching basic read and writing skills for people living in areas of difficult access (Duque, 2001). This project was called Movement for Basic Education it was later replaced by television broadcasting in the 70's.

Through partnership between Government and private media entities such as TV channels and studios, educative activities such as soap operas and TV-courses have reached a expressive numbers of students in Brazil (Belloni, 2002). It has involved a considerable amount of money, though there is no detailed information regarding financial investments and results taken. This long distance educational approach is still used in some areas in the north and northwest of Brazil. During the 80's the data-communication technology started using satellites, which allowed reaching further distances and even Portuguese speaking countries and communities worldwide.

In the 40's was created in Brazil an institute for mailing education. It was designed for providing individual education and mostly financed by the army for training people who needed instruction to join the professional arena at the end of the Second World War (Gomes, 2000). This institute is nowadays the biggest in long distance education in Brazil and it has been using computer network technologies to offer Internet tutorials and interaction by email, chat and virtual conference chatting.

These initiatives of long distance education have given a decisive step for today's Internet education in Brazil. Following worldwide trends in digital distance education technology, Brazil has several private and public educational institutions providing a wide range of courses. It has also required professionals to developing and managing such projects.

Public institutions for education in Brazil are still making efforts in developing long distance projects. Nowadays there is a legislative regulation setting this issue as priority in Brazil and indicating funds for developing distance education projects (Neto, 1998; Maia, 2001). For instance, there are ongoing projects such as in the University of Brasilia and the Laboratory for Distance Education at the Federal University of Santa Catarina, offering a range of graduate

courses since 1996 (Martins, 2000). In the year 2000 the UNIREDE project was launched and it currently involves more than 70 public educational institutions working as a unique Public Virtual University in Brazil (Duque, 2001).

In February 2001 the Department of Industrial Engineering at the Federal University of Rio Grande do Sul (UFRGS) keeps an Internet distance education course in using database for Enterprise Management. The choice for Database and Enterprise Management as course subject was result of staff background. Classroom experience, research development and consulting activities have shown that students and professionals in Brazil lack skills in using database software for business management.

Organization Background

UFRGS is located in the southernmost state of Brazil and has been ranked by the Federal Ministry of Education between the 7 biggest universities in the country. This rank only considers the number of students, since the university has almost 20.000 enrolled in undergraduate courses and about 6.000 registered in graduated courses in the year 2000 (IFES, 2002).

UFRGS initiated its activities by the end of the 19th Century operating with a small number of independent faculties. In 1950 this set of faculties was denominated Federal University of the Rio Grande do Sul (UFRGS) and its administration was passed to the Brazilian Federal Government. From this time the UFRGS has been taking a position of prominence in the national scenario. In the year 2002 it ranked in the first place between Federal Universities in Brazil considering the number of scientific publications.

Within the Industrial Engineering Department, the Laboratory for the Optimization of Products and Processes (LOPP) works with research in association with the Graduated Course of Industrial Engineering. It carries out academic activities and technology developments for the industry and it currently accounts for 15 lecturers mostly with the PhD degree, 41 Masters students, 22 Ph.D. students and 10 support staff.

Information Technology (IT) is one of the research areas within the Industrial Engineering Department. It has been developing research and training professionals on database technology and Management Information Systems (MIS). Due to requirements for more specialized instructions on using databases and Database Management Systems (DBMS), an Internet-based course was developed. Further details on conceiving the course and carrying out instructional and management activities are further described in this case.

Developing the Virtual Learning Environment

Personnel for developing this project involved lectures with IT background, undergraduate and Masters students carrying out administrative activities, helping students with the instructional practices, keeping the system running and developing research on the issue. So far, nineteen groups of students have enrolled the course, making a total of three hundred and fifty students.

Two working teams were assigned to develop this project. The first was responsible for building the web-based Virtual Learning Environment (VLE) and the second for developing the knowledge base and instructional practices.

The option for developing the VLE rather than using a commercial tool was based on aspects such as achieving the skills for building Internet Systems, assuring that the system would be able

to fit specific course requirements and having a tool for further course developments. This team involved two part time programmers for three months and a part time interface designer for one month. Programming tasks involved tracking students' evaluation throughout instructional activities, self-correcting exams for learning evaluation, tools for interaction between students and tutors (chat rooms, video conferencing and on-line forums) and an administrative area restricted to systems' administrators allowing on-line course management and contents maintenance. For the VLE students' interface it was considered issues related to both website design and computer-based learning requirements. The VLE is a web-based system with all necessary activities for providing course information, students' enrolment and tracking instructional practices. A user-centered approach has been followed for developing the VLE (Blythe, 2001), which includes special requirements for database software training instruction.

The second team involved one part time student and a full time lecturer for 2 months. The instructional activities were developed following recommendations of research results on computer-based learning (Hasebrook, 1999; Sheremetov, 2002) and constructivist theory (Vygotsky, 1989; Tenenbaum, 2001; Huang; 2002). Instructional contents have been elaborated using a range of digital media, such as hypertext, images, video and animation. The course has been designed for 16 hours and divided in eight lessons. The lessons involve four or five instructional activities, each requiring no longer than 20 minutes to be taken. Tests and exercises are given at the end of each instructional activity to evaluate students learning. According to test results, students may be advised for revising specific contents. At the end of each lesson a more elaborated test is given and, according to students' achievements, they will be allowed to move to the following stages.

Practical multimedia exercises with commercial database software enrich the instructional activities. The VLE automatically shows test results and can also provide expert advice considering students' answer to questions and the expected right solution. To complete the online course it is required to develop a system prototype that copes with several instructional issues approached in the course. This prototype is reviewed by the tutoring staff who gives feedback to the students. Once the students' prototype achieves courses requirements, they are notified and a conclusion certificate is sent by post.

A system component that is also part of the VLE deals with tools and graphical reports for course administration and maintenance. It allows the management staff to carry out online administrative and maintenance activities. For instance, it allows checking students performance prior to answering a question, time required for taking a specific (or a group of) instructional activity, imputing (and altering) tests for learning evaluation and checking financial results. Graphical reports are also available for helping management activities such as evaluating students' profile, comparing financial results and students' satisfaction with particular (or a group of) instructional activities. Also, quantitative evaluations are available for comparing financial results regarding advertisement media, satisfaction with learning outcomes and students profile including age, professional activity and gender.

Evaluations of students' profile and satisfaction with the course have been used to improve general aspects of the VLE. Students have been considered as customers and data taken from their interaction with the VLE is the main information source for improving course quality (Brookhart, 1999; Moskal, 2001; Moss & Hendry, 2002). Quantitative questionnaires for evaluating students' satisfaction are applied at the end of each lesson and cope with aspects such as navigation, relevance and applicability of course contents. Qualitative questions are also applied asking for comments and suggestions for further developments.

Project Development

Two years after kicking off the distance education project, it could be described as comprising six stages. These stages were chosen considering the number of students that actually enrolled the course as it represents the project's customer-oriented approach and course's financial outcomes. Two dimensions were considered for describing these stages, as shown in Table 1. The first deals with Marketing and Management activities such as pricing, advertisement and financial return. The second deals with learning performance and instructional activities design, involving aspects such as learning evaluation, course contents, students' satisfaction and technology in the VLE.

Table 1: Description of project stages' analysis dimensions

Dimension	Course Aspects	Description
Marketing and Management	Pricing	Strategies for setting the right price and paying method considering staff requirements, technology and clients' (students') profile.
	Advertisement	Choosing media for reaching clients to enroll the course and evaluating cost effectiveness.
	Return of Investment	Clients profile evaluation according to the number of subscriptions that actually enrolled the course and general financial analysis.
Learning and Instructional Design	Learning Performance	Learning evaluation throughout the course instructional activities, tests and final practice, taking the clients and tutors point of view.
	Instructional Contents	Evaluation of general aspects related to course contents such as language adequacy, multimedia usage, timing for taking the lessons and learning preferences.
	VLE Technology	Evaluation of the technology used in the AVE for joining the course, accessing instructional contents and interacting with tutors and students.
	Client Satisfaction	Evaluation of general aspects of clients' satisfaction and suggestions for further developments.

A short description of the course life cycle through its stages is presented in Table 2, identifying the students' groups, enrolments in each group, media used for advertising the course, financial investments in each stage and general course results.

Project Planning

This first stage involved activities to develop the web-based tool and instructional activities. It took the last three months of the year of 2000 and involved definition of course objectives considering the Department's mission of *"providing advanced knowledge to build a high skilled workforce, enhancing the national industry, in accordance to federal government interests, as well as providing scientific publications for further research developments and economic growth"*.

A market analysis was first carried out to evaluate clients' profile and industry interests for such a distance-learning course. Engineering students and professional managers were identified as possible clients and interviewed to identify learning interests on distance education and database technology for business management. It allowed the identification of a lack of skills in using database and information technology. Though most potential clients were quite skilled with

computers and spreadsheet tools (mostly Excel), they lacked knowledge on database technology, though recognizing its potential role for supporting management decisions.

Table2: Summary of the project life-cycle

STAGES	Stage I	Stage II	Stage III	Stage IV	Stage V	Stage VI
Description	Project Planning	First Launch	Commercial Launch	Ups and Downs	Recovery	Balanced
Groups	Test	1 st	2 nd to 5 th	6 th and 7 th	8 th to 10 th	11 th to 17 th
Students	25	28	72; 51; 75; 52	23; 28	42; 72; 30	15; 8; 16; 17; 14; 7; 18
Advertisement	None	Personal Indication	Regional and National Newspaper	E-mail, Regional Newspaper, Personal Indication	E-mail: Focused Mailing List	E-mail: Broad Mailing List
Expenses	Test	High	High	Medium	Low	Very Low
Efficiency	-	Medium	Medium	Low	Medium	Low

Once the targeted client segment was defined, activities to evaluate general requirements for developing such a course were carried out. General IT requirements were identified including software, hardware and professional skills for developing and keeping the VLE. An evaluation of available computer standards and Internet access for the targeted client helped setting the technology that would be used for building the VLE and running instructional activities. It helped the definition of course contents, goals and the whole project planning before starting with the working activities.

The time originally planned as required for developing the VLE and instructional activities was underestimated. Unexpected difficulties, especially regarding tests for learning evaluation, were the main reason for the delay. Questions and exercises in the VLE for practicing with the instructional activities and capable of providing feedback to assure learning objectives, required quite sophisticated programming as well as finding new instructional approaches for the same subject. Although capable of developing fairly complex websites, tracking students' performance with the instructional activities was a challenge for the programmers.

There was also a challenge with tutoring approaches for Internet distance education. Classroom experience with the subject was used for building the instructional activities. Aware that a lecturer would not be present to push the students, instructional contents were segmented in activities that would take no longer than 20 minutes to be completed. Theoretical issues were followed by practical exercises picturing working situations faced by managers and challenging students to achieve the instructional goals. Exercises were followed by learning evaluation tests with ten single-choice questions and requiring eight correct answers to go further with instructional activities.

By January 2001 a course prototype was launched for testing with undergraduate engineering students. Students' feedback allowed improving several aspects in the VLE. Although few programming bugs and misspelling were detected, the most criticized aspect was the learning evaluation tests. Some questions were identified as confusing and difficult to get the right answer, requiring too much time for answering and getting to the next stage. Data taken from the VLE showed that about 75% of the time required with the instructional activities was actually spent with the tests. Therefore, the questions were reviewed and are currently coping with five

questions with simpler texts and objectives.

Taking the experience with the prototype and considering that general students' satisfaction levels with the VLE and course contents were satisfactory, the course had its first commercial launch in February 2001.

First Launch

At this stage questions were raised regarding commercial strategies for the course. As described in the previous sections, several improvements had been made over the VLE and instructional contents. However, the first group of students did not pay to get access to the course and used the VLE from computers within the university and fast Internet connection. Therefore, doubts remained whether the VLE technology would work properly from remote computers, possibly with lower Internet speed access. Moreover, users' interface for delivering instructional activities was only tested with engineering students who are expected to be quite skillful with web systems.

It was thus decided to promoting the course for a limited group of persons who would be willing to pay half-price for the course, but having the task of providing feedback on general quality aspects. A list of former students currently working in private companies was used to advertise the course. Letters and email were sent providing information on the distance learning project and actual objectives. It was defined that the maximum number of students would be limited to 25. The return was above expected and soon after sending the mails students subscribed and 25 paid the fee to assure the enrollment.

Comments and suggestions taken from that group were especially important for the project. Students got involved in helping the initiative and several changes were made over the VLE interface and instructional contents. Most changes were quickly done and informed to the students, allowing them to know their comments were considered. They were also asked to review the changes and provide new comments and suggestions, thus creating a continuous cycle of improvement and evaluation.

General results of this stage are further discussed through the evaluation of clients' satisfaction. Right after students enrolled the course there were loads of changes being made on the project. After two months the amount of suggestions, updates and changes in the system declined. Thus, by end of March it was decided that the course was ready to be launched in the commercial arena.

Commercial Launch

The next stage took place from April to September 2001. It was decided that the course would not be open for continuous enrolments. Although allowing subscriptions, access to the course contents were open only in certain dates. It compelled students to be part of a group and allowed chronological evaluations of clients' satisfaction. Students were stimulated to interact with other students within the group and help each other with the contents. It also allowed exchanging experiences related to practical applications with the subject. It was expected that students would push each other towards finishing the course together.

At this stage, course administrators were not worried about opening new groups very often. During this six-month period the course launched only four groups, identified as groups 2, 3, 4 and 5. The major concern was related to solidifying the proposal on aspects such as VLE reliability, quality of the instructional contents and clients' satisfaction. A total of 250 students

subscribed for the course during this period, though 168 actually paid and joined the groups. Thus, more than 65% of the subscribers found it worth to pay for.

At the end of this stage, technical problems appointed by students in accessing the VLE almost ceased to exist. However, a private Internet provider was hired to host the VLE, since it was not possible to repair any problem with the university's Internet server during weekends or holidays. Evaluation of clients' satisfaction presented in Table 3 show that the efforts in improving general course quality did pay off.

Table 3: Evaluation of clients' satisfaction on Stage III

Group Number	Average Satisfaction Rate (from 0 to 10)	
	Quality and relevance of the Instructional activities	Facility to navigate through the VLE and accessing instructional contents
2	6,97	7,92
3	7,67	8,85
4	7,44	8,14
5	7,63	8,70

Commercial aspects were also an issue in this stage. Improvements made on the VLE and instructional activities were crucial to the success achieved in this stage. Fees for joining the course were considered adequate to cover initial investments and maintaining administrative staff. Although a 30% discount was available for university students and staff, almost 80% of the students were professionals from private companies and no many complaints were received regarding prices.

A permanent evaluation of students profile was used to help choosing the correct media for advertising the course. Quite heavy investments were made with adverts on local and regional newspapers where the university's name and reputation is well known. It was an important issue for bringing credibility to the course. This promotional strategy did work well, since around 60% of the students who actually joined the course pointed the newspapers as the medium that brought them to the course. A very limited number of emails were sent to advertise the course. A few brochures were also distributed in the university. However, only 10% of the students indicated these two advertising medium as responsible for bringing them to the course.

A more ambitious attitude was taken investing with adverts on national newspapers. It did not pay back since less than 20% of this stage's students were from outside the state where the university is located. It was supposed that the national reputation of the university and the industrial engineering department was not strong enough to bring students from distant locations.

By the end of this stage, investments with ads on newspaper revealed further suspicions. Numbers were showing that every time a new group was starting, fewer students pointed this medium as responsible for the enrolment. Although heavier investments were spent with newspapers, subscription rates were showing it was not paying off and started compromising general cost for keeping the course. The next stage presented as follow shows the influence of these results on future editions of the course.

Ups and Downs

From October to November 2001 two new course editions started with groups 6 and 7. Only 51

students joined these two groups, representing a turn down in comparison to previous editions. Moreover, only 43% of the subscribers actually paid and joined the course.

It has been assumed that the promoting strategies, rather than dissatisfaction with the VLE or interests with the course subject, caused these results. Actually, evaluation of clients' satisfaction was still growing and technological improvements were still being made in the VLE. New tools to provide online interaction between students and tutor were included allowing real time video conferencing. Moreover, an instrument was added to the VLE allowing students to send the final system and tracking whether it was received, corrected by the tutors and the conclusion certificate posted.

Suspicious were raised regarding the effectiveness of advertising in newspapers. It was possible its potential for bringing new students was quite over, since less than 35% of the students were brought through it and this number was 65% on the beginning of the previous stage. It was also noticed the number of students who joined the course through personal indication was raised in this stage from 10% to 35%. Students living nearby the university, i.e., in the same state as it is located, were still a majority of 75%. Though investments with national newspapers were higher than regional, the number of students brought was not paying off. However, the number of academic students was raised from 8% to nearly 20% as a result of adverts on academic institutions. At this time, ads on newspapers were still responsible for 35% of the total subscribers, though only 20% actually paid and enrolled the course.

By the end of this stage, course administrators realized that changes were necessary for recovering the course. The number of students in each group and pricing for enrolling in the course required attention. Ads on newspapers were no longer paying back and should go down, requiring finding new media for promoting the course. Lower cost alternatives were tried such as sending email messages to academic mailing lists and folders to other universities, highlighting discounts for academic personnel. University policies did not allow sending unsolicited emails with commercial interests, limiting email marketing approaches. Previous students were also emailed and encouraged to bring new students by forwarding messages to people they believe could benefit from course contents.

Recovery

The Internet distance learning course was successfully recovered in the beginning of 2002. From January to April 2002 the course opened subscription for joining Groups 8, 9 and 10, receiving 144 subscriptions and 81 enrolled students. Changes on the advertising strategy were recognized as the reason for this recovery. Though previous students would not return, they could help by introducing new students. Ads on newspapers were no longer an option for 2002 as the cost was too high. Email marketing, brochures and bulletins broadcasted through academic institutions did work quite well at this stage. Also, a national distance education network website was used for promoting the course. Discounts were offered to university students and academic staff nationwide through academic mailing lists. Following this strategy, subscriptions from outside the state were raised, reaching 45% of the students in this stage.

Considering course maturity with the VLE technology and the high quality of instructional activities, subscription fees were raised by 30%. Even though the growth of academic students paying lower fees occurred, there was a financial hit enhancing project's health as expensive ads on newspapers went down to zero and low cost advertising via email was adopted.

New tools for online real time interaction were added to the VLE as well as options for paying

the fees in installments. Improvements in the VLE interface were added and agendas for discussing general issues related to IT business have been appointed in chatting rooms. Also, an instant messaging software was built-in the VLE. Satisfaction evaluation showed the students were getting well along with the project. Students from prior stages who did not conclude their activities also noticed changes for the better. Unfortunately, the positive financial results obtained in this stage were not repeated in the following stage, as shown next.

Balanced

From May to November 2002 the course was launched in a monthly basis. Groups 11 to 17 were released and subscriptions were declining at each new group. By the end of the year only a few students enrolled the course. This scenario was similar to the last months of 2001 and it is possible that a specific seasonal influence has occurred. The course received a total of 95 subscribers along with the 7 groups, although only 62% enrolled by paying the fee.

For the 1st dimension of analysis (Marketing and Management) there were no significant changes. Advertising approaches defined in the previous stage were kept on using email and contacting educational websites and institutions. The cost to do it was really low and everyday new email addresses and educational institutes for further contact were added to the course contact list. Software capable of searching the web for email addresses having extensions known as belonging to Brazilian universities was used. It was also used a software for testing whether the email address was still being used and soon a large number of academic students and staff were added to the course contact list.

Despite the growing number of subscribers indicating email as the reason that brought them to the course, it was not proportional to the number of emails sent but to the number of new emails found. Nearly 45% of the subscribers indicated email as the media that informed them about the course. News on national academic networks that were quite effective at the beginning of this stage, were quite ineffective.

For the 2nd dimension (Learning and Instructional Design) there were no changes at all. Actually, the number of questions or suggestions sent by students also declined. The VLE was working quite well. It was only going offline for maintenance when no students were accessing the course and for a few minutes. Internet and clients' satisfaction indexes were not presenting any decline on specific items. Table 4 shows the average clients' satisfaction with course contents for each group did not decline.

Table 4: Evaluation of students' satisfaction on Stage VI

Group Number	Average Satisfaction Rate (from 0 to 10)	
	Quality and relevance of the Instructional activities	VLE navigational easiness for accessing instructional contents
11	9,00	8,28
12	8,50	7,72
13	8,20	8,00
14	8,43	7,86
15	9,40	8,90
16	8,42	7,75

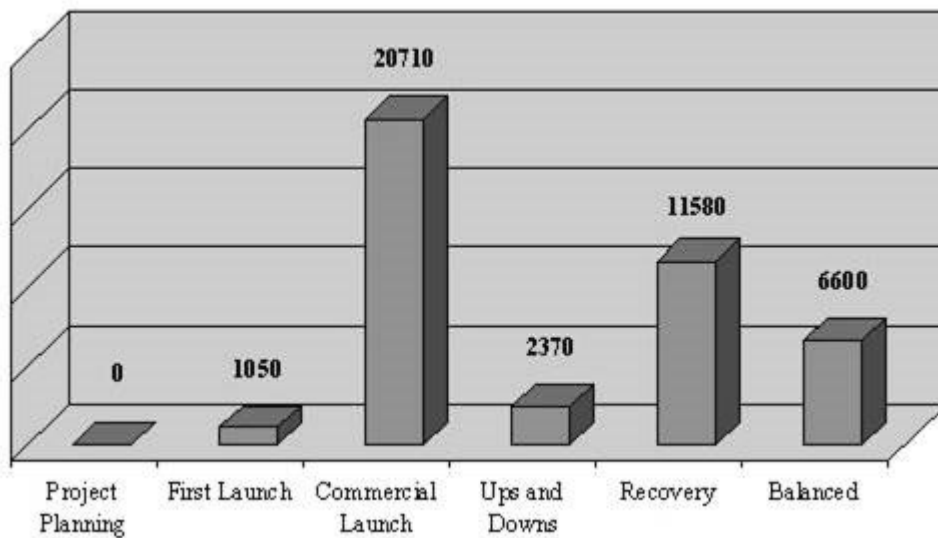
Conclusions

Although the course could not be considered as a commercial success, aspects related to the evaluation of learning and instructional design (2nd dimension of evaluation) from web-based

courses were helpful on providing feedback on clients' satisfaction with instructional activities and learning outcomes. Nowadays the course is capable of providing good quality for long distance education using only the Internet as a delivery medium. It is a technology capable of reaching remote areas within the country and the instructional contents are capable of delivering professional qualification and progress to the national industry.

Figure 1 describes the financial performance through the project stages. It shows that commercial performance was quite a success at the initial stages. However, the image does not shows initial investments required to building and setting up the VLE nor related to the adverts on newspapers. Unfortunately data regarding these investments were not precisely acquired to be shown in the Figure 1.

Figure 1. Financial Performance – Sales (local currency unit)



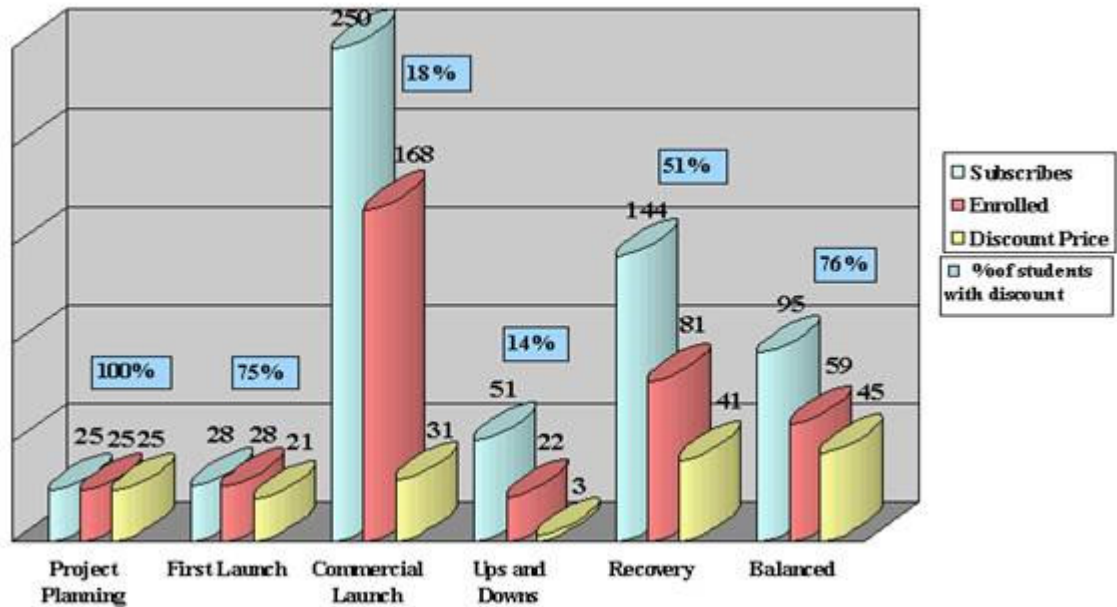
The project cost was fully supported by the Industrial Engineering Department and designed to get profits as indicative of proper management. Marketing research is still being done to help finding better alternatives for promoting the course, improving students' enrolment and whole financial success. It is now a challenge for the staff that could compromise the future of this project. Therefore, questions related to the 1st dimension (Marketing and Management) still remain unanswered and the course future is still uncertain on commercial and financial aspects. Experiences taken from this project are still providing professional expertise to work with Internet business and distance learning. Although educational institutions are heavily investing in this marketplace, the commercial future remains unclear in this project and requiring professional expertise to deal with such initiatives.

Figure 2 shows the amount of students enrolled in each stage of the course. It shows that new initiatives for advertising the course are capable of bringing new students. The first stages were focused on advertising on commercial media such as newspapers and posting brochures to private companies. On the last two stages the focus was on advertising on academic institutions. The percentile of students with discount shows that both approaches could be used. However, by using different advertising focus it is possible to foresee the students' profile and evaluate clients' satisfaction with learning outcomes for each group.

Technological challenges with the VLE were not difficult to overcome. Programming activities for developing the VLE were useful to improve technical capabilities and bring confidence to the

professionals involved. The VLE is currently a sound platform capable of holding courses on different subjects. It also copes with tools for administrative and management activities that could be performed online from any computer connected to the Internet. Security protocols are also included to deny unauthorized access. The VLE is still under development and it may become a commercial tool for further use by institutions and people willing to develop web-based courses with no programming skills.

Figure 2. Students' Profile



All changes and improvements in the VLE and instructional activities were pointed out by students through quantitative and qualitative questionnaires offered at the end of each instructional activity. It was thus a reactive action towards reaching customers satisfaction. A proactive practice towards improving students' satisfaction is currently under development. Course administrators maintain a quite large database capable of providing information on several aspects of the project, since every hit in the VLE is stored. Thus, visitors interacting with the VLE as well as students' interaction with the instructional contents can be closely followed. This database will soon be closely analyzed and it is expected that opportunities will emerge to help taking a proactive approach on managerial and instructional activities to go beyond students' expectations. Further developments in this project also include a number of evaluations of students' profile, learning preferences, clients' satisfaction and financial results.

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