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Simulating International EDI Trading: the TREAT Experiment

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Executive Summary
We developed a teaching laboratory called TREAT (Teaching Realistic EDI and Telecommunications) to investigate whether and how practical-based education/training can address the slow rate of EDI (Electronic Data Interchange) acceptance by small and medium-sized enterprises (SMEs). A major component of TREAT is a business simulation which is intended to give SME owner/managers the opportunity to explore in a risk-free setting the potential EDI has in their organisation.

The paper discusses how TREAT has evolved and matured during three trials with university students. Our intention with these projects was to test the technical and operational aspects of the laboratory environment and to determine issues which might be important for the commercial version of TREAT which will be used with SME owner/managers. We discovered the importance of, for example:

- introduction sessions, where participants learn the fundamentals of EDI, the use of the laboratory software and the purpose of the business simulation comprising TREAT;
- practice sessions, which give players the opportunity to learn the basics of the simulation game and the operation of their assigned organisation;
- providing detailed, step-by-step documentation which describes the laboratory environment, the simulated organisations, the trade cycle (or procurement) activities and the EDI software; and
- implementing an information system which will automate the services facilities comprising the business simulation (including the bank, warehouse and freight forwarder).

The paper then outlines the different expectations of business people and university students and how these factors have influenced the design of the commercial version of TREAT. For example, university students are more likely to benefit from a course which focuses on providing wide-ranging knowledge and skills concerning EDI (see Ramsden 1992). Business people, however, require courses which provide them with material to be used directly in their company; and which argue the business case for EDI (see Gibb 1983; Hoberman and Mailick 1992).

The paper concludes by summarising the topics and activities which will be completed during the commercial version of TREAT. This course will comprise three versions - a three day intensive, a 10 week classroom-based and a 10 week distributed course - from which participants can choose. In this way, business people will be able to attend the laboratory sessions while not interfering with the commitments to their organisation.

Abstract
We developed a teaching laboratory called TREAT (Teaching Realistic EDI and Telecommunications), incorporating a business simulation, to investigate whether and how practical-based education/training can address the slow rate of EDI (Electronic Data Interchange) acceptance by small and medium-sized enterprises (SMEs). The paper discusses how TREAT evolved during three trials with university students and how these trials allowed us to determined issues which might be important for the commercial version of TREAT which will be used with SME owner/managers. The paper also outlines the different expectations of business people and university students, and how these factors have influenced the design of the commercial version of TREAT.

Introduction

The business community's adoption of EDI has been delayed by a general lack of understanding of the potential strategic benefits which can accrue from its effective utilisation (Parker and Swatman 1995b). Many organisations, indeed, appear to regard this technology as providing only a faster mail service, rather than offering an infrastructure suitable for strategic initiatives such as business reengineering (van Kirk 1993; Swatman 1994). These companies therefore tend to implement EDI only to the extent required by the initiator (for example, receiving documents electronically and printing them out) (van Kirk 1993).

This EDI acceptance problem is particularly noticeable amongst small and medium-sized enterprises (SMEs), which are not joining EDI schemes as rapidly as was anticipated (Pfeiffer 1992; see also Iacovou, Benbasat and Dexter 1995). This situation will ultimately have an effect even on larger organisations because the full benefits of adopting technologies such as EDI can only be attained when their (smaller) trading partners also adopt (see Pfeiffer 1992). There is a growing belief that education/training of SMEs owner/managers is one way in which to address the EDI acceptance problem by, for example, raising an awareness of the benefits which can be gained from the effective use of EDI (Pfeiffer 1992; see also Morell, Neal and Fries 1995).

In Parker and Swatman (1995b) we suggested that educational approaches based on practice may be more effective than seminars or lectures in teaching business professionals (SME owners/managers in particular) how EDI can be applied by their organisations and, thus, may help to promote the adoption of this technology. Other authors also consider business people's practical experience of the concepts being taught to be important: *"Without both theory and experience in application in the work venue, there is far less chance that the theory will ever be applied in the work venue"* (Hoberman and Mallick 1992 :59).

To apply this theory in practice, we developed a laboratory environment called TREAT (Teaching Realistic EDI and Telecommunications) which includes an EDI business simulation. During the game participants adopt the role of companies within a simulated international supply chain, purchase abstract/fictitious input materials from their suppliers, manufacture end-products and sell these goods to their customers. A variety of EDI messages (including purchase orders and invoices) are exchanged amongst all companies via the Internet[1] to facilitate the procurement of input materials and the sale of end-products (Parker and Swatman 1995a; 1995c).

TREAT is intended to be a teaching tool which we will use to investigate whether and how laboratory-based education/training can address the slow rate of adoption of EDI by SMEs. We believe that TREAT will provide SME owner/managers with the opportunity to experiment with and see the relevance of EDI to their situation in a "safe" environment, in addition to promoting the adoption and acceptance of this technology.

Three action research projects with university students have been completed to trial the technical and operational aspects of TREAT, as well as to generate ideas for alterations and extensions to the original design of the laboratory environment and allowed us to test these changes. In addition to refining the design of the laboratory environment, the projects have also allowed us to determine issues which might be important for the commercial version of TREAT.

We have now prepared for the next phase of this research, in which we will investigate the use of TREAT using SME owner/managers. Three variations to the structure of the commercial version of TREAT will be investigated during this phase, including one intensive, 3-day course and two longer courses running over 10 weeks (one "in-house" and the other enabling access from participants' own premises).

This paper will:
* provide a brief description of the design of TREAT and the simulation game comprising the laboratory environment;

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[1]   Please note that participants use a commercial EDI translation package called STX (developed by Supply Tech International) to create and exchange their EDI messages. We developed communications modules for STX which allow it to access the Internet, both in a Novell Server and in a modem-based PPP context. The second technique will be most applicable to real organisations using modems and PPP or SLIP to connect to the Internet via an Internet Service Provider and will be used during the commercial version of TREAT.

- describe how the university-based studies have led to the refinement of TREAT and to development of the commercial version of the laboratory;
- discuss how the tertiary and business versions of TREAT will need to differ, to satisfy the disparate needs of the two types of participants; and
- outline the proposed laboratory activities envisaged for the EDI education/training programme for SME owner/managers.

Overview of the TREAT Laboratory

The business simulation which is played during the TREAT Laboratory is based on imaginary toaster/frypan manufacturing industries. Participants in the simulation adopt the role of a manufacturer or component supplier (see Figure 1) within these industries and trade fictitious input materials and end-products with their respective suppliers and customers. Figure 1 illustrates the various organisation types comprising TREAT and shows which of the company types interact with one another (please note that all company types use the warehouse, the freight forwarder and the bank depicted in Figure 1).
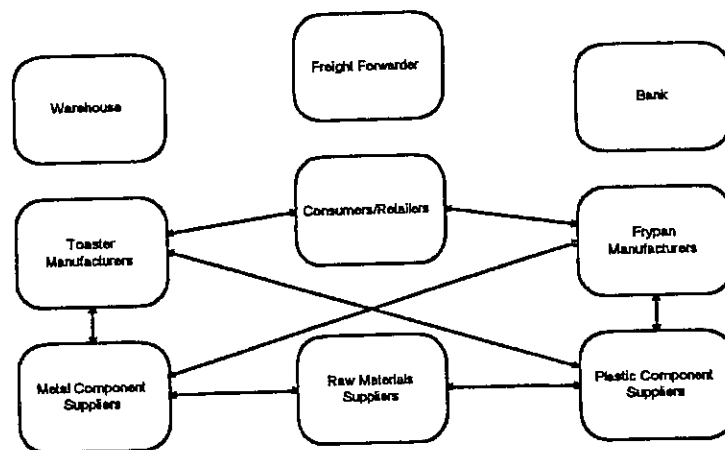
Participants are also required to complete other activities associated with operating their assigned organisation, which include:
- setting prices for their end-products, while taking into account such expenses as freight forwarding and manufacturing costs, and competing for market share;
- predicting customer demand for their end-products and, consequently, purchasing enough input materials to manufacture these end-products; and
- exchanging EDI-based documents (such as purchase orders and invoices) via the Internet to complete the procurement activities comprising a simulation trade cycle.

Development of TREAT: Trials with University Students

The original version of the TREAT Laboratory was developed at the Department of Computer Science, Curtin University, 1993. TREAT has subsequently been used with three groups of university students over the past three years:
- Computer Science students at Curtin in second semester 1993, who had technical backgrounds rather than extensive business/management experience—even the part-time students from the public or private sectors were engaged in technical occupations; and
- Information Systems students at Monash University in 1994 and 1995, who had business backgrounds, in contrast to the more technically-oriented Curtin students (Parker and Swatman 1995a; 1995c).

In all three cases a real "international trade" perspective to the business simulation was provided by students from the School of Organisational Sciences, University of Maribor, Kranj, Slovenia (Parker and Swatman 1995c). Some of the TREAT participants were therefore given the opportunity to trade with genuine global trading partners and to gain more realistic experiences with international commerce. During the 1995 study we had a larger number of participants, so that we were able to simulate the international perspective by dividing student companies (customers and suppliers) into two classes running at different times or "time zones".

TREAT participants in all three studies were encouraged to provide constructive suggestions for

improving the effectiveness of the laboratory sessions - both verbally throughout the semester and by means of a questionnaire at the conclusion of the course. We found the participant feedback enormously useful - indeed, this input from students has resulted in refinements to many components of the TREAT Laboratory (such as the introductory/practice sessions and the participant documentation) to help us develop a professional education/training environment for SME owner/managers. In addition, these studies have allowed us to identify aspects of TREAT which we believe will be important during the commercial version of TREAT, such as the need for a laboratory management system:

Introductory and Practice Sessions of TREAT

Students were first introduced to the concepts underlying the TREAT business environment and were given the opportunity to practice all the necessary skills prior to the commencement of the real international business simulation - more specifically, the game was preceded by:

- *introductory sessions*, where the purpose of the game was explained and participants learned the fundamentals of EDI and the use of the EDI software package STX; and
- *practice sessions*, where players learned the basics of the business simulation and the operation of their assigned organisation by completing a dry run of a trade cycle.

The number of laboratory sessions which could be devoted to the introductory/practice sessions varied between the three studies because of two factors: the number of laboratory sessions in a single semester and the duration of an individual session. Table 1 shows how these factors influenced the overall structure of the laboratory environment. Our main intention during the three studies was to ensure that each group of students had the same number of "real" global trade cycles because we believe that this is the minimum number of cycles necessary to provide students with adequate opportunities to experiment with EDI in a realistic setting.

Structural Component of TREAT	1993 Version	1994 Version	1995 Version
Total number of TREAT laboratory sessions	12	6	8
Number of laboratory sessions per week and duration	1 x 1-hour class	2 x 1-hour class	1 x 2-hour class
Number of *weeks* for the introductory/practical sessions	8	2	4
Number of *hours* for the introductory/practical sessions	8	4	8
Number of weeks for the "real" global trade cycles	4	4	4
Number of weeks devoted to a single global trade cycle	2	2	2

Table 1: Structure of the TREAT Laboratories

Table 2 shows that the introductory sessions in 1993/94 were more lecture and discussion oriented and were directed largely by the TREAT coordinator rather than participants. In 1995, however, a student-oriented approach was used—with self-paced, step-by-step instructions on the use of the software facilities and the learning of EDI. This technique had the advantage of giving students practical experience with the EDI software while they learned about EDI (and conversely for the 1993/94 approach), although it did limit the opportunities for student discussion, because students tended to work alone on the tutorial material.

Session	1993 Version	1994 Version	1995 Version
Introductory	**Approach:** (4 weeks in duration, or 4 hours) • Discussion on EDI standards and their structure and use in firms, as well as on Internet protocols (TCP/IP) and facilities (e.g., ftp, telnet, etc.) • Demonstration of STX and its relevant features • Students experimented with STX and the Internet. **Strengths:** • 100% of the students stated that the discussion session enhanced their understanding of EDI • The experimentation session allowed students to learn STX so that they could use STX effectively and competently. **Weaknesses:** • Students found the demonstration of STX unhelpful. They wanted an STX manual instead • The inclusion of Internet tools and protocols was too technical given the business focus of TREAT • Students wanted to explore how to create trading partner profiles, design EDI subsets, etc.).	**Approach:** (1 week in duration, or 2 hours) • Discussion on EDI standards and their importance, structure and use in firms • Demonstration of STX and its relevant features • Students experimented with STX. **Strengths:** • 100% of the students stated that the discussion session enhanced their understanding of EDI • Students were given more detailed documentation on the use of STX (see Table 3) which allowed them to use the software quite effectively and competently, especially given the time constraints. **Weaknesses:** • The demonstration was still found to be unhelpful • Students wanted more time to learn STX because there was limited time in which to experiment with the software.	**Approach:** (1 week in duration, or 2 hours) • An EDI tutorial replaced the EDI discussion but introduced the same material and stepped students through the relevant features of STX • The tutorial included details on how EDI subsets are formed and trading partner profiles are created. **Strengths:** • Students could learn STX and the EDI concepts and issues at their own pace using the tutorial • 65% of students stated that the tutorial gave them a sufficient introduction to EDI. **Weaknesses:** • Only 50% of students stated that the tutorial was preferred over a similar lecture (23% were undecided) • This finding suggests that a combination of the two approaches is needed.
Practice	**Approach:** (4 weeks in duration, or 4 hours) • Overview of the game and trade cycle activities • A dry run of a trade cycle for three weeks before the real game commenced. **Strengths:** • Students would not have been able to play the game without these practice sessions. **Weaknesses:** • Students wanted a longer period to practice a trade cycle than three hours • Students wanted documentation which stepped them through the trade cycle activities (see Table 3 for more detail on the TREAT documentation).	**Approach:** (1 week in duration, or 2 hours) • Overview of the game and trade cycle activities • A dry run of a trade cycle using email rather than STX to learn the activities of the game. **Strengths:** • The email session meant that students were not required to absorb too much material at once (i.e., learning STX and how to play the game) • Students would not have been able to play the game without these practice sessions. **Weaknesses:** • Students wanted a longer period of practice • Students wanted documentation which stepped them through the trade cycle activities.	**Approach:** (3 weeks in duration, or 6 hours) • Overview of the game and trade cycle activities • A dry run of a trade cycle using email rather than STX due to success in 1994, followed by a two week dry run using STX. **Strengths:** • Students would not have been able to play the game without these practice sessions. • The practice period was sufficient. **Weaknesses:** • The email session caused confusion because some students continued to exchange quotation messages using email during the dry run.

Table 2: Development of the Introductory and Practice Sessions (adapted from Parker and Swatman 1995c)

We believe that combining the coordinator-driven and participant-driven teaching approaches will allow us to maximise the benefits of both methods. The 1996 version of TREAT therefore starts with an initial discussion on the fundamentals of EDI, which is followed by an EDI tutorial requiring participants to use STX to investigate how EDI works in software. This approach to the introductory sessions will be particularly important during the commercial version of TREAT because we expect that the SME owner/managers will need to be familiarised with the basics of EDI and translation software. More emphasis during this period will be required, however, on giving participants the opportunity to discuss the business issues/problems which EDI addresses - during the real trade cycles they will investigate how EDI can achieve these objectives.

Table 2 also shows that the practical sessions in all three studies have included an overview of the business simulation followed by a practice trade cycle. We found that this component of TREAT was essential because students would not have been able to operate their "companies" effectively during the "real" game without adequate dry runs of the trade cycle activities. We believe that business participants will also need to complete a practice trade cycle using the STX software[2] to ensure they understand the operation of the game and its purpose.

Participant Documentation
During all three TREAT studies with university students we found that good quality, sufficiently detailed documentation of the laboratory environment, the simulated organisations, the trade cycle (or procurement) activities and the EDI software was important. We found that students were not able to carry out the tasks associated with TREAT without such an explanation of these aspects of the laboratory (Parker and Swatman 1995c).

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[2] The email-based trade cycle used in 1995, prior to the "dry run" with STX, will not be used in future TREAT Laboratories because of the confusion it created. We believe participants will gain more benefit from using STX while practising a trade cycle, because this will give them additional opportunities to learn the package.

Manual Type	1993 Version	1994 Version	1995 Version
Software User Manual	**Approach:** • Insufficient time and resources to develop suitable STX manuals for the students • The TREAT coordinator emailed general, brief instructions on the use of STX during the semester **Strengths:** • During TREAT we were able to determine exactly what students needs were and provide email-based documentation to match from week to week. **Weaknesses:** • This *ad hoc* approach meant that students did not have the information they required to begin with • Students wanted detailed instructions on STX usage so that they could rely less on the TREAT coordinator for answers to their questions.	**Approach:** • Printed versions of the material used in 1993 were given to the participants at the start of the game • More detailed instructions on STX usage was included to improve on the 1993 manual. **Strengths:** • Students used the manual to operate their firms effectively, especially given the short introductory and practice sessions prior to the game. **Weaknesses:** • Students wanted more detailed instructions on STX usage to decrease demand on the tutor.	**Approach:** • Step-by-step instructions were given on how to use STX to create a quotation message • Generic, field-by-field descriptions of the other message types were given to increase the usability of the manual at universities not using STX. **Strengths:** • The self-paced material resulted in less of a demand on the TREAT coordinator • Students operated their companies effectively using the documentation provided. **Weaknesses:** • Students had difficulty using the generic section to create the other business documents using STX.
Organisation/ Simulation Manual	**Approach:** • Overview of the game and the simulation industry • Description of the participant's company, its trading partners, input goods, end-products, etc. • List of business documents (in the order to be sent/received) which comprised a trade cycle • Role of the service facilities and their fees. **Strengths:** • Students would not have been able to operate their organisations without this documentation. **Weaknesses:** • Students wanted examples of and hints on such tasks as price calculations and estimating customer demand for their end-products • Students wanted more detail on how to create each business document in a trade cycle and what information must be included in each.	**Approach:** • The 1993 manual was used in 1994 • No changes were made to the manual because we wanted to determine whether CS and IS students would have different opinions. **Strengths:** • Students would not have been able to operate their organisations without this documentation • Students had less difficulty with, for example, calculating prices and understanding how to use the business documents comprising the game. **Weaknesses:** • Students did, however, want more detail on how to carry out these activities, where we believed that providing examples would reduce the number of questions asked of the TREAT coordinator.	**Approach:** • The 1993/1994 manual was used again in 1995, except examples of price calculation and customer demand estimating were provided • The manual included detailed descriptions on how to use each business document in a trade cycle. **Strengths:** • 85% of students believed that the documentation provided sufficient information which allowed them to operate their organisations effectively • Students had much less difficulty using each business document when compared to previous TREAT participants. **Weaknesses:** • Students found the manual too descriptive, so that the step-by-step instructions were hard to follow and find.

Table 3: Evolution of the TREAT User Documentation (adapted from Parker and Swatman 1995c)

Table 3 describes the development process of this participant documentation during the three studies involving university students. The user manual was initially an *ad hoc* collection of information and, over the past three years, has evolved into a more professional document which is useful to and used by the game players. An appropriate user manual will be even more essential when TREAT is used with business people because of the wide variety of experience possible with this group. We cannot even assume a working knowledge of computers, let alone EDI or a simulated supply chain environment. Enhancements which have been made to the 1995 documentation and incorporated into the 1996 version of TREAT include:

- step-by-step instructions on how to use STX to create all TREAT business documents rather than just the quotation message and to perform document turnaround;
- screen captures of the STX software to help the players see more clearly how the various STX-based procedures are carried out; and
- a combination of the software usage manual and the game/organisation descriptions to form single, company-specific tutorials which lead participants through all the trade cycle activities comprising TREAT, including the calculation of prices for end-products.

Price (1984) suggests that software user manuals need to be presented in a professional manner, with diagrams and appropriate wording for the intended target group. Our experiences with the university students supported this assertion because we found that students would not have been able to play the business simulation effectively without it. We anticipate, however, that the quality of user manuals will need to improve still further for the commercial version of TREAT. The course will also need to overcome possible negative views of EDI held by participants and the documentation provided will therefore need to be of the highest quality and readily usable.

A Laboratory Management System

The university-based studies of TREAT have also highlighted the need for a Laboratory Management System (LMS) to oversee the environment for the business game coordinator. We found that operating the service facilities of the laboratory (such as the bank and warehouse) was a time-consuming duty for the facilitator, in addition to the other roles this person was required to fill. An LMS which will automate the various service facilities is therefore under development, so that the facilitator can spend the laboratory period interacting with participants, rather than having to focus on the operational aspects of the trade environment. This will be particularly important during the commercial versions of TREAT, because we believe that the coordinator should focus on facilitating discussions amongst participants and on encouraging the exploration of EDI related issues, rather than on operating service facilities.

Moving TREAT out into Industry

Our work with university students has allowed us to trial and refine the operational and technical aspects of TREAT to ensure that the design of the education/training programme is sufficiently professional before using the environment with SME owner/managers. We realise, however, that university students and business people differ in terms of both their prior experience of PC-based Electronic Commerce (EC) systems; and their motivation for participating in TREAT. In addition, business people are likely to have different preferences regarding whether the laboratory sessions should be spread over a number of weeks or compacted into a few days. The commercial version of TREAT will therefore need to be different to the university-based programme to address the disparate requirements of business people and university students:

Pedagogic Needs of University Students vs. Business People

The profiles of the Information Systems and Computer Science students who participated in the initial TREAT laboratories suggest that, in particular, university students are more likely to benefit from a course which focuses on providing wide-ranging knowledge and skills concerning EDI, which can be applied in a variety of situations and which will be beneficial to their chosen vocation (see Ramsden 1992) - as compared with solutions focused on specific business problems. We therefore concentrated on introducing students (particularly those having no prior business experience) to business-related issues and concepts such as the importance of shortening lead times and improving customer responsiveness. We found that we needed to spend a significant period of time introducing the principles of EDI and its application to supply chain management.

Business professionals and, in particular, SME owner/managers, however, require courses which:
- ensure that the course content can be used effectively when they return to their company;
- are as specific as possible to the needs of their organisation, so that the course avoids

introducing content which is not directly relevant or applicable to their situation; and
- give them the opportunity to share ideas and problems in a small group environment with other owner/managers so that they can gain from the experiences of other, similar organisations (Gibb 1983; see also Hoberman and Mailick 1992).

The commercial version of TREAT will therefore need to concentrate on identifying and encouraging discussion about the specific business problems and issues being experienced by the participants and on presenting the business case for EDI and how it can address these problems. The course will need to offer solutions and alternatives for using EDI which can be employed in the participants' business. For example, participants will need to be given the opportunity to explore the implementation issues associated with EDI, including cost and techniques of conducting an implementation project.

This challenge of "selling" EDI will be difficult if the owner/managers:
- have been forced to adopt this technology by their larger trading partners;
- cannot see how their company might benefit from using the technology; and
- believe that their organisation does not have any internal or external communication problems which can be addressed with the effective use of EDI.

Participants (particularly those who have been forced into EDI use) might well have a negative view of EDI when compared with the university students - who do not have a pre-conception of EDI's use and usefulness.

We believe that practically-based exploration of EDI facilities will enhance the business case being presented, because it will allow business people to see and experience the benefits which this technology can bring to their company (Parker and Swatman 1996). We anticipate that a "hands-on" demonstration of the benefits to each participant's own organisation and the role which that organisation plays in the participant's own supply chain will be more effective than the common practice of running seminars/demonstrations of EDI software which do not relate the material in an applied fashion.

Structure of the TREAT Laboratory
The structure of TREAT used during all three studies with university students was based on a the typical course structure—practical sessions were held for a few hours each week over a single academic semester. The commercial version of TREAT, however, needs to be structured in such a way that business people will be able to attend the laboratory sessions while not interfering with their commitments to their organisation. It is therefore not clear whether the commercial version should be offered as:
- a two or three day programme where participants spend approximately 6 hours per day in a laboratory completing the TREAT activities and engaging in group discussion;
- a 10 week programme, where participants attend two hourly sessions each week in a laboratory completing the TREAT activities and engaging in group discussion; and
- a 10 week programme, where participants attend two hourly sessions each week, primarily at their company premises, completing the practical activities associated with TREAT.

In Parker and Swatman (1996) we summarised the major advantages and disadvantages identified by the literature for each approach and concluded that "... *each alternative has the potential to allow participants to see the relevance of EDI to their company, thus encouraging its adoption and promoting a strategic, proactive attitude toward this technology.*" This realisation gave us the impetus to design and explore the use of all three implementations of TREAT to determine which of the approaches will be most effective under what circumstances.

Design of the Commercial Version of TREAT

The findings resulting from the university trials of TREAT and the discussion on the pedagogic expectations of SME owner/managers have a number of implications for the overall structure for all three types of these EDI education/training programmes. Table 4 summarises the topics/concepts which will be covered and the activities which will be completed during TREAT. For each of these components the table shows in which session they will be addressed during the three day and 10 week versions of the EDI education/training programme.

Table 4 shows that the trials involving the university students have emphasised the importance of:

* providing good quality user documentation concerning the laboratory activities so that participants can complete the TREAT activities and use the software facilities;
* giving participants adequate opportunities to experiment with the software facilities and the simulation game before starting some "real" trade cycles; and
* allowing the SME owner/managers to take part in an EDI simulation game which will focus the participants' attention on how the technology can be used in their own company. Through simplified, yet realistic, experimentation we believe that participants will be able to appreciate more easily the documented tangible and even intangible benefits of EDI.

In addition, the profile of SME owner/managers has highlighted the importance of group discussions, which will be encouraged during all three TREAT programmes. We believe that the sessions devoted to identifying participants' expectations, to comparing different techniques for exchanging business information and to analysing the implementation issues associated with EDI will ensure that TREAT targets the specific needs of the SME owner/managers. The sessions and the corresponding group discussions will allow the facilitator to address any concerns which participants might have regarding the impact of EDI on their organisation and, we hope, to promote a proactive, strategic approach to this technology.

It must be pointed out, however, that the structure of the three TREAT programmes outlined in Table 4 is not final—the design proposed is intended to be a starting point only. The action research projects involving SME owner/managers (as was the case with the university students) will give us the opportunity to investigate these initial TREAT designs and make alterations based on feedback from the participants. With each iteration we will also gain a deeper insight into the effectiveness of the three approaches and the circumstances in which each approach is preferred by the participants.

Topic/Concept/Activity	3 Day	10 Week
Discuss objectives of the course and participant expectations.	1st Half Day	1st Week
Explore EDI and its enabled applications (such as JIT/QR) and how it can be used in SMEs.	1st Half Day	1st Week
Discuss ideas/experiences about the potential of EDI in SMEs.	1st Half Day	1st Week
Use software manual to exchange EDI and email messages. Identify the pros and cons of different methods of exchanging structured business information. Present business case for EDI.	2nd Half Day	2nd Week
A walk-through of the activities comprising the simulation and its relevance. Use software/game manual to complete a dry run of a trade cycle.	3rd Half Day	3rd Week to 5th Week
Carry out real trade cycles. Discuss practical experiences with other players.	4th Half Day to 5th Half Day	6th Week to 9th Week
Explore EDI implementation issues (such as EDI software and VAN selection). Assess pros and cons of different EDI solutions available to SMEs.	6th Half Day	10th Week

Table 4: Activity Allocations to the TREAT Laboratory Sessions

The participant feedback will be obtained primarily through focus groups, which will involve a small group (7 to 10) of self-selected participants from each of the three types of TREAT. A facilitator (not one of the researchers) will encourage subjects to explore their ideas and elicit the required feedback - possibly identifying certain trends and generating an in-depth understanding of the laboratory-based approach to EDI education/training (see Krueger 1994).

Future Directions

The university-based investigations into the use of TREAT for teaching EDI to owner/managers of SMEs have left a number of unanswered questions concerning the structure of the course and the way it will be targeted to meet the specific needs of business participants. For example, the design of TREAT might differ depending on whether SMEs are:

- not currently using computers;
- using computers but not currently using EDI; or
- using EDI but only to the extent required by their larger trading partners.

We are currently inviting local SMEs to take part in the new commercial version of TREAT, where we plan to run trials of all three types of TREAT (that is, the three day, the classroom-based 10 week and the distributed 10 week versions). These initial studies will be completed by the end of 1996 and will allow us to assess the feasibility of using such a laboratory-based approach to teach business professionals about EDI. We believe that these participants will provide us with valuable feedback which will be used to revise the design of the commercial TREAT laboratories.

If, as we hope, these experiments provide further support for our belief in practice-based EDI teaching, we plan to consider the next steps towards commercialising TREAT. This process will involve a number of considerations, including (inter alia): the packaging of the simulation so that it can readily be used in other universities and in commercial environments without the need for expert assistance in set-up and maintenance; modifications to allow the package to deal with alternative approaches to document translation, some of which are now beginning to gain considerable interest within the commercial market-place; and additional support for multi-environment versions of the simulation.

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