EXPERIENCE WITH TEACHING OF COMMERCIAL APPLICATIONS IN LOGISTICS

Waldemar Czuchra, Walter Fedderwitz

ABSTRACT
The syllabus of the Transport Engineering and Logistics Diploma Course at the University of Applied Sciences at Bremerhaven (Hochschule Bremerhaven), Germany, contains a subject called Data Processing Systems in the Transport Industry. The goal of this subject is to provide the students with the present state of the art of data processing in the transport industry and gain experience with software applications used currently in companies operating in this field. The students will be enabled to evaluate the possibilities of using available applications for every day tasks and special problems. We have explored two approaches to achieve these goals. The first one consists of a series of invited software presentations of the commercial applications for the transport industry done by its developers. The second approach demands the students to make use of the software and evaluate the applicability with respect to some operational procedures. While the first approach allows to present more applications and wider overview the second approach supplies deeper insight into the subject within the same time but of smaller amount of applications. Is there a perfect solution of this dilemma? The paper gives a detailed description of both approaches and tries to discuss this problem.

KEYWORDS
Education of commercial applications, applications in logistics, applications in transport engineering

INTRODUCTION

The course programme of the Diploma Course in Transport Engineering / Logistics at Hochschule Bremerhaven is designed to keep up to date with modern processes and organisation schemes applied in all fields of logistics and transport engineering. The diploma graduate in Transport Engineering / Logistics has attended a programme of a broad range with one integrated semester of industrial placement. Herewith the graduate will be enabled to integrate expertise of various disciplines in order to realize joint projects.

The programme consists of a basic and a main course. There are introductory subjects in the basic course of 3 semester duration. The subsequent main course includes 5 semesters. Within this course the 5-th or the 6-th semester is the semester of industrial placement. Based on this experience a further specialisation is offered in the higher semesters. In case studies complex problems of logistics taken from different realistic industrial situations are to be solved in teamwork. In the main course the student must choose one of the two specialisations: distribution & supply logistics and production & purchase logistics

The syllabus of the course programme consists of approximately

- 40 % natural sciences and technology,
- 25 % economics,
- 15 % law and foreign languages and
- 20 % computer sciences.

Data processing and communication are treated as interdisciplinary and integrating domains and appear partially within almost all other courses too.

Logistics depends heavily on data processing and computer science. Logisticians need a sound understanding of data processing in order to judge possibilities of computers in the context of logistics as well as for their own use and organization of work. Such modern technologies as Supply Chain Management, e-Procurement, Trace and Tracking (to name only a few of them) cannot be applied at least with some extent of effectiveness without deeper skills in computer science. That is why we have incorporated besides subjects that train in well-known office software (text processing, spreadsheet, presentation, etc.) also lectures with a theoretical part of the domain and practical usage of corresponding software packages in data bases, workflow management, industrial process simulation, project management, computer programming, data mining and software engineering (CASE tool). With this knowledge and respective skills the graduate of our diploma course is able to apply IT in every day business processes and to communicate with IT-experts if it is desirable.

The majority of above mentioned software packages can be applied generally, not only in logistics. However, during all the computer science lessons we take real-life examples from the domain of logistics. There are of course processes that are unique in logistics and software that is tailored for this purpose. That is why we want to provide students with the present state of the art of data processing in the transport industry. He or she should be enabled to evaluate the possibilities of using available systems for special tasks, to define necessary developments and adaptations, to create links to workflow methods and formalisation of operational procedures. This is the reason for incorporating the subject called “Data Processing Systems in the Transport Industry” into the syllabus of the diploma course.

The subject of concern has been offered to the students of distribution and supply logistics specialisation in winter semesters since 1998. At the beginning we arranged the subject as a series of invited software presentations of the commercial applications done by its developers. Later the students have had to prepare and publicly present a critical comparison of advantages and disadvantages of the introduced software packages. In Section 2 we present this approach in detail.

We used this phase to make up our minds for the next step. We had some kind of market overview of the existing software. We were also financially able to purchase some software packages and offer to students for usage. The students have to make use of the software and evaluate the applicability with respect to some operational procedures. They use a manual of the software specially tailored to the scenarios to be explored. We had to choose only main functions because of time restrictions. Students have to summarize the results in a public presentation at the end of the semester. This approach we present in Section 3.

The following Section 4 discusses the advantages and drawbacks of both approaches. This comparison should be done from both points of view – that of a student and that of a teacher. The students’ assessment will be not available until January 2003 and will be presented at the conference session. Thus the paper presents only our (namely teachers’) experience.

We finish with some final remarks on future development of the subject in Section 5.

Approach A – industrial presentations

The students of distribution and supply logistics specialisation of the winter semester 1998 were the first ones for whom the subject Data Processing Systems in the Transport Industry was introduced. We invited chosen software vendors to present their products that deal with logistics processes and businesses. In Table 1 we list the companies that had the opportunity to show their software packages, the names of products and a short description of the application domain.

Table 1. Visitors in 1998 - 1999

Year	Company	Product	Domain
1998	ptv	Map&Guide, Intertrip	Trip planning and scheduling
1998	WeissBlau, MikroSped	MikroSped, MikroSped M2	Distribution, Transport
1998	TRANSDATA	Komalog	
1998	SolutionLine CSS	BAAN IV Transportation	ERP-system with modules for logistics
1998	TECHCOM	New Logistic Systems for Fleet Management	Overview – Prerequisites in urban development for logistics
1998	PROLOG	ALS AOP	Container stowing Commissioning
1998	Schencker	Individual solutions	Communication with driver
1999	Dr. Städtler	LogistikPROFI TRAMPAS FuhrparkPROFI	Distribution Trip planning Fleet management
1999	CAS	LogControl, L.O.S.	Warehousing
1999	Soloplan	CarLo, Counter, FuhrparkManager, WinTrip	Freight calculation Spedition Trip planning
1999	XGATE Logistik Projekte	DV-Support für Logistik im Land Bremen	Data processing support for Bremen State
1999	Logistik Software	DISPED	Car disposition
1999	BLG	CVS	Container disposition
1999	TELEROUTE	Internet-Frachtbörse	Internet transport exchange

As it could be seen from Table 1. we tried to cover a broad spectrum of logistics tasks by a variety of profiles of the invited companies. All product demonstrations took approximately two periods of 1,5 hour duration. Only in one case (Schencker, 1998) we were to see the software system at the company's location (an excursion to Hannover).

The firm representatives used mainly two approaches. One group of them presented the whole spectrum of their company products with emphasis on one chosen product and the demonstration of its truly main functions. This type of presentation could be called a promotion event. The second group of representatives focused on one product and demonstrated its possibilities and restrictions in detail. The first group used mainly computer presentation software while the second run the program under consideration and demonstrated on line its inputs and outputs.

The whole semester group of students (about 20) was divided in 3-4 person teams. Each of them was obliged to prepare a short summary of one chosen software product as if they were reporting to their boss making decision to purchase or not this particular product. These short summaries were hold at the end of the semester and given marks for quality and correctness.

Approach B – case studies

The experience gained from the demonstrations in 1998 and 1999 as well as the market research carried out at the end of 1999 allowed us to make the purchase decision of four products: one by ptv AG other three by Dr. Städtler GmbH. We ordered only standard configurations of all products. Below short descriptions of these programs follow.

SOFTWARE PRODUCTS

Map&Guide

Map&guide [2] is the professional tool for planning routes at home and abroad. Current and detailed maps help to reach the destination without any time-consuming and annoying search for it. Any street could be easily found in Germany. Even smaller villages are taken into account with a complete city map. map&guide finds also the right address in all European countries. The last version comprises the following countries: Belgium, Denmark, Great Britain, Luxemburg, The Netherlands and Switzerland. map&guide integrates a costs and toll calculator for all European motorways and typical cars, optimises business trips and takes all appointments into account. map&guide 8 is available for single work places, networks or intranet applications, depending on the individual user's requirements.

Dr Staedtler Software

Dr. Staedtler TC [3] implements programs and systems for logistics in distribution and supplies as well as fleet management, route planning and haulage contractors. We are using three major programs of Dr. Staedtler TC, that is

- Logistik Profi /2
- TRAMPAS
- Fuhrparkinformationssystem FIS /2

and a few supporting tools to administrate the above mentioned programs. The application areas of the three programs overlap. Normally a company would not buy all three products.

Our software installation is the basic version Staedtler normally uses to derive the customized versions from. Of course this means that we as the teachers had to undergo some learning steps. This is one reason why we do it as a tandem of two teachers. We both have a general knowledge of all the programs we use in the course and then we specialize into different programs.

All three programs can be used in a multi-user environment. This is the standard situation in a company. As an example once an order is linked to a specific trip, the other disponents have to be aware of this fact and not deal with this order again. A multi-user environment is a problem as soon as we deal with customisation. A customisation step affects the program as such and is visible to everybody else unless we go for individual installations. This would not happen to a company customer for the reasons already explained.

The GUI look and feel of the programs is at some places different from the expectations of a “normal Windows user”. But Staedtler products are consistent within themselves. So the students need to learn it only once for all products. The reason for the differences are due to the fact that there are simply new or other requirements for user interaction.

Fuhrparkinformationssystem FIS/2

“Fuhrparkinformationssystem” means fleet information system and this is what the software does. The user may collect all sorts of master data about his fleet from type of car and car (as an instance) with all the common attributes one needs. This covers types and instances of spare parts and maintenance types and intervals. Also there are provisions to define measuring devices for fuel consumption, distance and some other information. Transactional data is collected for distances, fuel, use of spares and so on.

FIS is probably the least complex program of the three. This together with the fact that all the reports are via customisation makes this program the preferred choice to demonstrate customisation.

LogistikPROFI /2

 "LogistikPROFI /2" means logistics professional. This program addresses the distribution of goods and the related costs. It does not deal with the forwarding process as such. The point of view is from the producer of goods who wants his products transported to his customers at least cost and to predefined terms. Master data dealt with are addresses and geographic locations of production facilities and customers. Also parameters of the products like weight and volume which influence transportation costs belong to the master data. Transactional data describe the individual consignments.

For the students the main challenge is in the first place to understand the terminology and working of the program with respect to costing and then to map this to the requirements of the company. This task is less of an informatics task but primarily a genuine logistics problem. This again points out the role of customisation of software and the role a consultant would play in most cases.

TRAMPAS

The application area of TRAMPAS is tracking and optimisation of the transport /distribution process as such. Master data cover the fleet to the extent needed to do the trip planning. That is types of lorries and lorries are modelled, their capacities and sizes. Also the home base (/depot/) is modelled where the trip starts from.

Transactional data consists of orders mainly. An order defines how many goods (in terms of weight and ‚transportation units' have to be moved from a distribution centre to a customer. The main application area of TRAMPAS are distribution trips from central store to different customs – in contrast to transports from customer site to another customer site. Customers' addresses are part of the master data. There is also more than one distribution centre.

Orders have to be done within defined time intervals. The planner using TRAMPAS sees the orders as well as the trucks and the time slots where these are still available. He or she may then try to define trips by manually assigning orders to trucks until some limit (weight, transportation unit or time used) is exceeded. TRAMPAS will take care of the limits. It uses a map to calculate distances and time based on actual roads available not only air distance.

CASE STUDIES TO SOLVE

Due to limited volume of the paper we present briefly only two of four case studies that we have prepared for students. They comprise problems to be solved with one of the programs described in Section 3.1.

Case study for map&guide

Situation: You are transport company IFAS GmbH situated in Bremerhaven. You have been informed that 6 „Yamaha" pianos arrive from Japan to the port of Rotterdam. These instruments should be carried to 6 music shops in and around Bremen / Bremerhaven. The data for the lorry you can use to transport the pianos are given below:

Purchase price [€]	117 000
Residual price [€]	35 000
Utilization period [year]	5
Depreciation [%]	10
Mileage [km / year]	150 000
…	

and so on.

The loading and/or unloading of a piano needs manual operation and takes half an hour (in port as well as at the music shop). A driver is obliged to comply with all regulations as to work time breaks and relaxation time (this information is given in a hand out).

The overall task description: You have to plan the transport with respect to time and cost.
Detailed steps are:

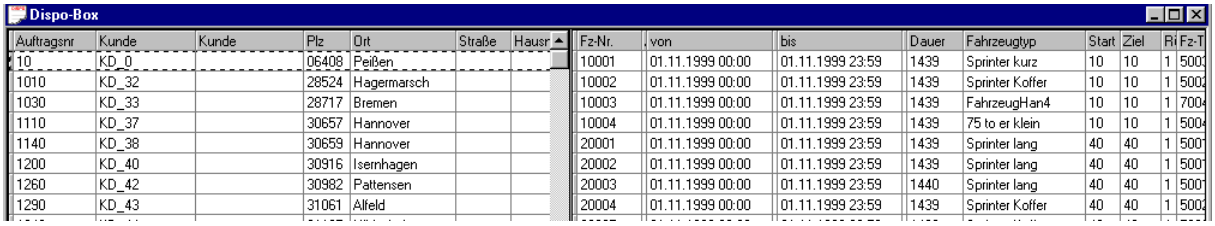
1. You leave your garage in Bremerhaven and drive to Rotterdam. The pianos can be loaded in port onto your lorry only from 6:00 until 22:00. Due to the value of your load you are not allowed to make sleep stops on the way – you park the lorry back at your company yard. Next, pianos shall be distributed in a round trip to all music shops. The shops are open from 8:00 until 19:00. The round trip sequence should be optimised automatically and/or manually corrected if needed. The optimisation parameter is 80% of the velocity.
2. Prepare an alternative route for the case of traffic jams on the main route.
3. Calculate the costs of the trip.
4. Prepare a detailed list and map of stops (marked with red star) for the driver of your lorry.
5. You have an agreement with DEA - Oil Company and you can take advantage of bargain at its petrol stations. Prepare a map with the DEA - petrol stations close to determined route with petrol stations marked as blue circle on it.

Case study for TRAMPAS
When using TRAMPAS the main goal within the course is to demonstrate the route planning capability of TRAMPAS.

Students start using TRAMPAS with some preliminary tasks in order to familiarize themselves with the layout of forms and user interaction in TRAMPAS. These first steps include entering and manipulation of some master data (e.g. description of trucks in the fleet) as well as customer data and order processing data. Then we turn over to use predefined data already contained in the database. TRAMPAS has a concept called ‚periods'. Every single transaction dataset belongs to a period, that is some time interval. We run the preliminary tasks within one period, then switch over to another period with the predefined data. Therefore these are guaranteed to be unaffected.

It is not possible to have the students to key in all the data because we need a few hundred individual orders for demonstration. We don't use the data import interface of the product in the course. We point out the existence of the interface to avoid the false impression that manual data entry is the only possibility.

Students already have some general knowledge of route planning. They know why it is necessary to do it and they have some basic understanding of simple heuristics (like the „sweep method"). The major difference between this and the situation here is that TRAMPAS takes a lot more parameters into consideration. The major new parameter is the time of delivery. This results in completely different planning results when compared to a no restrictions situation. The starting situation for the planner (or the student in this case) is a list of orders and truck availabilities (see Fig.1.).


Dispo-Box

Auftragsnr	Kunde	Kunde	Plz	Ort	Straße	Hausr
10	KD_0		06408	Peißen		
1010	KD_32		28524	Hagermarsch		
1030	KD_33		28717	Bremen		
1110	KD_37		30657	Hannover		
1140	KD_38		30659	Hannover		
1200	KD_40		30916	Isernhagen		
1260	KD_42		30982	Pattensen		
1290	KD_43		31061	Alfeld		

Fz-Nr.	von	bis	Dauer	Fahrzeugtyp	Start	Ziel	Ri	Fz-T
10001	01.11.1999 00:00	01.11.1999 23:59	1439	Sprinter kurz	10	10	1	5001
10002	01.11.1999 00:00	01.11.1999 23:59	1439	Sprinter Koffer	10	10	1	5002
10003	01.11.1999 00:00	01.11.1999 23:59	1439	FahrzeugHan4	10	10	1	7004
10004	01.11.1999 00:00	01.11.1999 23:59	1439	75 to er klein	10	10	1	5004
20001	01.11.1999 00:00	01.11.1999 23:59	1439	Sprinter lang	40	40	1	5001
20002	01.11.1999 00:00	01.11.1999 23:59	1439	Sprinter lang	40	40	1	5001
20003	01.11.1999 00:00	01.11.1999 23:59	1440	Sprinter lang	40	40	1	5001
20004	01.11.1999 00:00	01.11.1999 23:59	1439	Sprinter Koffer	40	40	1	5002

Figure 1. List showing orders and truck availabilities

Then we encourage students to do some manual trip planning. Students select orders and trucks and place orders onto trucks. TRAMPAS will show the trip on the map and calculate arrival times and total

trip time. Also TRAMPAS keeps track of the load restrictions. If a planning step violates a restriction a message box pops up.

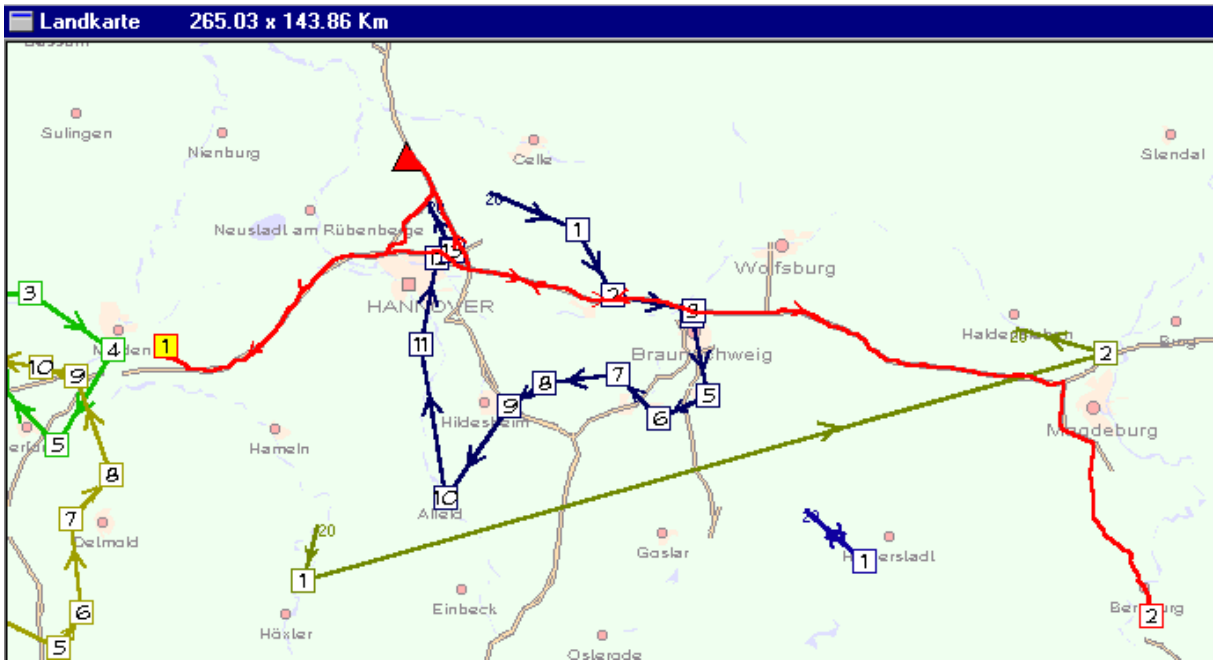


Figure 2. Planning Result

Finally a completely automated planning is started producing a result like in Fig.2. Depending on users selection the route is either displayed as a light of sight polygon or mapped to the actual roads underlying the planning process. Once we have an automated result students are asked to improve the planning result by manual optimisation, i.e. they can pick individual orders and try to rearrange them. This is an interesting point because we know from some in depth analysis we did for other reasons that the automated planning is probably not state of the art. People tend to judge the result by looking at the map display. If this seems unreasonable they refuse to believe the results. But the map display may be misleading especially when time slots for customers are active. So one lesson learned here is that although the display looks ‚strange' the ‚obvious improvements' one tries to do fail most of the time. But if students try hard enough they can improve the result. This is not a surprise as we know the algorithm has weaknesses. But students should compare the time used for this improvement to the time available under real world conditions where planning has to be finished within time.

ORGANISATION OF LESSONS

The form of the course is obviously not strictly following the well known approach with programs dedicated to Computer-Based Training (CBT). We rely on professional software with no provisions for CBT. So to what extent is what we are doing CBT at all?

Simply put, CBT is the use of computers, multimedia technology and the internet for training in a way that promotes student interest and motivation. Following the definitions of the Institute for the Study of Adult Literacy at The Pennsylvania State University [1] computer-based training techniques use one or a combination of the following techniques:

Tutorial

The most common of all techniques is the tutorial. It is used to introduce new information that must be taught in a sequential manner. It is useful for teaching factual information, simple discrimination, rules, and simple application of rules.

Drill and Practice
Drill and practice provides opportunities for practice when mastery of a new skill or information is desired. It should be used after initial instruction.

Training Games
Training games supplement other instruction and are used to provide motivating and engaging opportunities for practice after a skill or new information is taught. Training games capitalize on the competitive interests of learners and add entertainment value to instruction.

Simulation
The technique of simulation is most often used when practicing a skill in its real context is too costly or dangerous. It provides an opportunity for experimentation, and allows students to test assumptions in a realistic context. Simulations are also used to model real-world situations that are not physically dangerous or costly, in order to build realism and relevance into the training situation.

Problem Solving
One of the most challenging techniques used in CBT is problem solving. It helps students develop skills in logic, solving problems, and following directions, and is generally used to augment higher order thinking skills.

Demonstration/Presentation
Demonstration or presentation is best used to support the introduction of new information. It can also be used as a review tool. (end quote)

Within the course we find the elements of the „tutorial“ as well as „problem solving“ and „demonstration and presentation“ type.

The Tutorial Aspect
First of all we have all the manuals of the software available for the students. The drawbacks of these manuals are however the ones known from a lot of other manuals as well. It is a tedious and at some times frustrating job for a first time user to see how everything fits together.

This is where manuals specifically produced for the course come into play. These documents show the necessary steps to explore the scenarios used in the course. We use screenshots heavily in order to show where and what to do in the software and keep text parts to a minimum. The documentation is to be used while sitting in front of a computer with the software available. So every single step can be tested immediately and ‚on-line‘.

An important point is to prevent the students from simply keying in (or mouse clicking) what the manual says without any efforts to understand what they are doing. So the level of detail goes into single keystrokes or menu selection only at situations where it is necessary. These are interaction steps where the use of the software needs this type of explanation because it deviates from the Windows style guide or uses a specific type of interaction.

Other steps are given only on a coarse grained level and require the students to remember what they have learned from other courses. For instance the manual will simply state that a specific selection has to be done using SQL (Structured Query Language, a commonly used language to query relational databases) because students should know how to do it.

Problem Solving
Students have to apply their acquired knowledge about the software to operational procedures of a (fictitious) company. This enforces that students rethink capabilities of the software and assess the applicability of the software.

Demonstration/Presentation
Demonstration and presentation is clearly present. The software is available and has to be used. The demonstration is however entangled with the use of the software by students. So there are no lengthy demonstration or presentation phases without user interaction. We feel that lengthy presentations without interaction would force the students into a passive role.

CBT is self-paced, flexible, and individualized
Our approach to teaching use of logistics software is clearly an example of CBT with respect to these requirements. Students work their own pace. Within overall time limits they can use as much time as they want for the learning steps. They are required to take ‚deviations' from steps in the manual in order to judge fitting of the software to operational procedures.

Immediate Feedback
Use of the commercial software gives sort of immediate feedback. The software itself is not ‚aware of the learning situation'. So feedback from the software does not try to mimic addressing the student in his/her learning situation and ‚speak to him/her'. The feedback the software provides is at least twofold: work as expected or show an error, eventually it works but in an unforeseen way.

In this situation it is up to the student to draw the correct findings from it and eventually re-think an approach, start over from an earlier step or ask for help. Considering the fact that we address students of a university it should be possible to require the students to do this type of ‚self – evaluation'. The overall situation differs from a CBT course for children (or even adults) missing the insight into necessity of learning or the need for a specific training. Obviously attendees who sit in a lesson because they are forced there need other types of feedback and placement. Of course sometimes students tend to avoid working as well.

Another prerequisite for this type of feedback to work is that the users have a clear cut idea of what should happen; this point is fulfilled here. Beside learning about the software students are required to assess fitness and usability of the software. They do this assessment from a position where they know about the needs and operational procedures in a company.

Placement
There is an examination at the end of the course. Students have to do a presentation and written report about their findings. As for CBT based placements this part is missing. This is an immediate consequence of the fact that we use commercial software.

INDUSTRIAL PRESENTATIONS VS. CASE STUDIES

Students' viewpoint
At the end of the winter semester 2002/2003 we performed a survey among students of this term to gather their opinion on the form of lessons, their advantages and drawbacks. We had all in all 15 students in this term and 10 of them have filled in and returned the questionnaire. Table 2 shows an excerpt from the evaluation of the students' answers.

Table 2. Evaluation of questionnaire

No	Question	Scale	Evaluation of answers
1	How do you assess the contents of the manuals?	1 – too detailed 5 – too rough	Average 3
2	Is the manual sufficient to solve the case study problems?	1 – very good 5 – very bad	Average 3
3	Is the formulation of the case study problems clear and interesting?	1 – very good 5 – very bad	Average 2
4	Is it possible to learn the software application by solving these case study problems?	1 – very good 5 – very bad	Average 2
5	Would you learn the software easier if you were instructed step by step by a trainer?	"Yes" "I do not know" "No"	10 % 40% 50%
6	The case study form of the lessons is more demanding but at the same time more effective than pure instruction. Do you agree?	"Yes" "I do not know" "No"	100% - -

It should be mentioned that the survey was done at a time when the student presentations had already been evaluated by us and the students knew their marks for the subject (of course not all of them gained "very good"). That is why we can be very proud about the students' evaluation of this new form of performing the subject. We are in particular very satisfied with the answers to the 5th and 6th question.

Teachers' viewpoint

We have already 5 years of experience in teaching the subject Data Processing Systems in the Transport Industry. In the two first years we organized industrial presentations and in the last three years students were confronted with some chosen software products in form of case studies. In our opinion this change was a great success with the following advantages:

- Students have to perform many basic operations with the programs to solve tasks formulated in case studies what changes their passive observer role during industrial presentations to an active one in case studies.
- Students learn that using software is not always an easy child game as it may be appreciated while looking at professional demonstrators and deep understanding of the program can only be gained by self experience.
- The case studies give possibilities to map the know-how of other subjects (e.g. supply chain management, cost calculation, etc.) onto computer aided operations.
- All this prepares the students better to define the necessary customisation extent of the software.
- Students have to learn software which is partly different from Microsoft software despite it runs under Microsoft operating system. This will definitely be the situation they will be confronted with in their future company.
- Students work in small teams and can organize their work as in a real company splitting their tasks among team members.

There are obviously some disadvantages of the new form of the subject under concern.

- Despite all programs can be used in a multi-user environment we have to install them locally since erroneous operation of one user can destroy the results of another one.
- Due to financial shortages we can offer only a small palette of programs while the industrial presentations provide greater variety and up-to-date solutions.
- Last but not least – we as teachers have to invest more time and effort in preparing manuals and case studies in contrast to the effort spent on invitating the software vendor representatives.

FINAL REMARKS

Normally a customer would not only buy software but also training and support for the product. A software vendor would go into analysis of the customer needs, adjust the software to the specific needs and thereafter train the customer's employees to use the customised software. Our goals are somewhat different. A major part of the course is to demonstrate the necessity for customizing and how this is done. The students are logistics students. Later on they will face the situation that they have to define and specify the requirements for software with respect to the specific needs of the company they work for. In order to do this they need a thorough understanding of informatics. The course would miss a major goal if we were to hide away the customisation process of the software. Students are required to get a feeling of typical customisation procedures, their capabilities and restrictions.

The further development of the course is a twofold one. Assuming the general situation to be fixed we can modify hand-outs and problems given to the students. The goal is to avoid misunderstandings. It is not a goal however to guide the students too closely.

REFERENCES

www.clat.psu.edu

www.dr-staedtler.de

www.english.ptv.de

Waldemar Czuchra, Walter Fedderwitz
Transport Engineering and Logistics Diploma Course,
Hochschule Bremerhaven (Bremerhaven University of Applied Sciences)
An der Karlstadt 8, 27568 Bremerhaven, Germany
Email: wczuchra@hs-bremerhaven.de, fedderwi@hs-bremerhaven.de