ARAŞTIRMA MAKALESİ /RESEARCH ARTICLE

THE IMPORTANCE OF PROCESS MODELLING AND A CASE STUDY USING IDEF0

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ABSTRACT

Process modelling is very important within process analysis as it visually represents the work flow of processes. Therefore, it is beneficial for clearly understanding the processes. This paper has the purpose of showing the importance of process modelling and presenting a case study in which problem based learning system of Dokuz Eylül University, Department of Statistics is modelled. For the case study, Integrated Definition Function Modelling (IDEF0) method is used for modelling processes as it is a powerful technique for being hierarchical and giving as many details as necessary.

Keywords : Process analysis, Process modelling, Process mapping, IDEF0, Problem based learning system.

SÜREÇLERİN MODELLENMESİNİN ÖNEMİ VE IDEF0 İLE BİR ALAN ÇALIŞMASI

ÖZ

Süreçlerin akışını görsel olarak sunması açısından süreç modelleme, süreç analizi içerisinde önemli bir yere sahiptir. Dolayısıyla, süreçleri açıkça anlamak için faydalıdır. Bu çalışmanın amacı süreç modellemenin önemini göstermek ve Dokuz Eylül Üniversitesi İstatistik Bölümü'nde uygulanan probleme dayalı öğrenim sisteminin modellendiği bir alan çalışması sunmaktır. Alan çalışmasında süreçleri modellemek için, hiyerarşik yapıda olması ve gerektiği kadar fazla detay vermesi açısından güçlü bir yöntem olan Fonksiyon Modelleme için Bütünleşik Tanım (IDEF0) kullanılmıştır.

Anahtar Kelimeler: Süreç analizi, Süreç modelleme, Süreç haritalama, IDEF0, Probleme dayalı öğrenim sistemi.

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1. INTRODUCTION

Process modelling is a concept which has an important place in process analysis. In order to make reliable and accurate analysis of a process, the first thing to do is to completely know the flow of the process, the activities constituting the process and their interrelationships.

There are many techniques used for modelling processes. Integrated Definition Function Modelling (IDEF0) is one of them. IDEF0 is effective in detailing system activities and consists of very simple graphical tools.

The aim of this paper is to examine process modelling and draw the maps of problem based learning system which is used in the Department of Statistics of Dokuz Eylül University, using IDEF0.

2. PROCESS ANALYSIS

A process is defined as a collection of activities that converts inputs into outputs. Using this explanation, process analysis can be defined as describing how a certain series of events occur (Duncan, 2007). It is actually an approach that helps to improve the performance of process and business activities (Trischler, 1996; UCF Operational Excellence and Assessment Support, 2007).

The purpose of process analysis is to explain how a process is conducted and to help increase and improve its performance. The steps in process analysis can be listed as defining the process boundaries, constructing a process map that shows the flow of a process including process activities and their interrelationships, determining the capacity of each activity in the process, identifying the bottlenecks and finally, improving the process (NetMBA Business Knowledge Center, 2007).

3. PROCESS MAPPING AND MODELLING

Process mapping is an hierarchical method for displaying processes. It can be defined as identifying, documenting, analysing and developing an improved process. It is a visual representation of the work flow in a process, showing all the steps in it. One of the most important characteristics of a good process map is that; any person that does not know anything about the process should understand its work flow by looking at its map (iSixSigma, 2007; Anjard, 1998; Şahan Vahaplar and Şen, 2006).

3.1 Importance of Process Mapping in Process Analysis

The first step in process analysis for improving a process is to clearly understand its activities and their interrelationships (NetMBA Business Knowledge Center, 2007). "One of the most common errors made during process analysis is mixing up the order of a process or forget a crucial part" (Duncan, 2007). Therefore, in order not to make such mistakes, process mapping is very important and it ensures great advantage in this aspect. Also, process mapping makes the organisation notice the areas in which a change in processes will have the greatest impact on improving quality (Anjard, 1998).

3.2 Integrated Definition Function Modelling (IDEF0)

Process maps are used to represent processes in such a way that it is easy to understand them (Peppard and Rowland, 1995). There are many techniques used for mapping processes, one of which is IDEF0. Integrated Definition Function Modelling (IDEF0) is a method designed to model the decisions, actions and activities of an organisation or a system.

The graphical tools used in IDEF0 are very simple; boxes representing actions and arrows representing interfaces between the actions (Feldman, 1998). The general form of an IDEF0 model can be seen on Figure 1. Also, Figure 2 shows the IDEF0 diagram of a system consisting of 3 activities (Bal, 1998).

"IDEF0 describes a business process as a series of linked activities, each with inputs and outputs. External or internal factors control each activity, and each activity requires one or more mechanisms or resources. Inputs are data or objects that are consumed or transformed by an activity. Outputs are data or objects that are the direct result of an activity. Controls are data or objects that specify conditions which must exist for an activity to produce correct outputs. Finally, mechanisms or resources support the successful completion of an activity" (Fülscher and Powell, 1999).
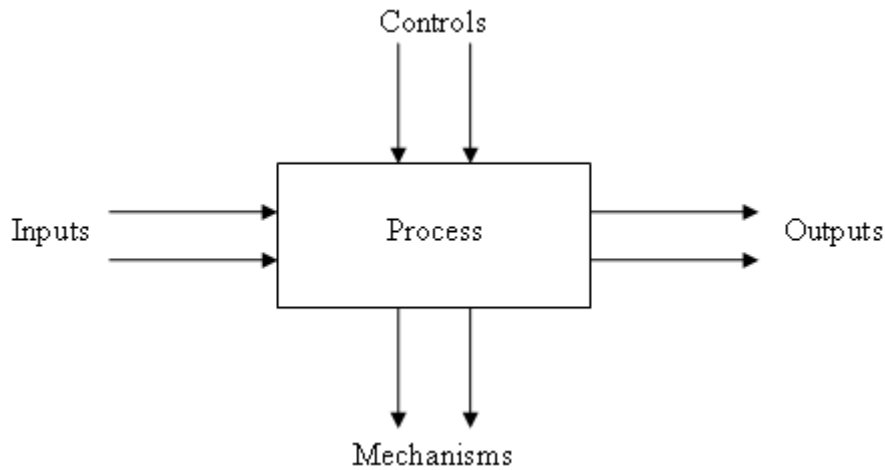
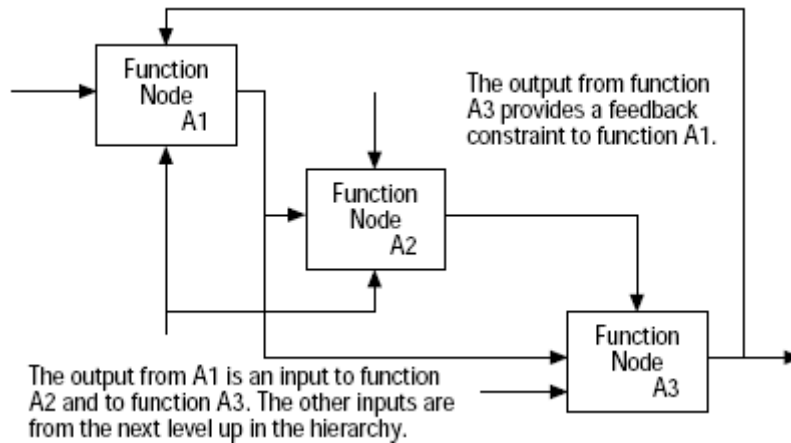Figure 1. General form of IDEF0 model

Figure 2. A sample IDEF0 model consisting of 3 activities (Source: Bal, 1998, p. 344)

The most important strength of IDEF0 is that; it is effective in detailing system activities. The activities can be refined into greater detail until the model is as descriptive as necessary (Knowledge Based Systems, Inc., 2006). "The essential principle of IDEF0 is that complex systems can be described by a set of activities. These activities are decomposed progressively to express further detail until the required definition of the system will be reached. In addition, its simple modelling rules are very helpful for easy application and the plain scheme at each level to grasp a whole idea quickly without trapping into too precise details" (Shimizu and Sahara, 2000; Shimizu, Kainuma, Nunomura and Kitajima, 1999).

4. PROBLEM BASED LEARNING SYSTEM

"Active learning is a student-centered approach to education that brings an alternative model to the traditional teacher-centered education". There are many techniques used for active learning one of which is problem based learning. Problem Based Learning (PBL) sessions support students to question, discuss and investigate the issues raised in the reading comprehension texts and worksheets given to them in each session (Dokuz Eylül University, 2007). Therefore, by PBL the students learn how to learn, working cooperatively in groups to find solutions to real world problems. These problems make students become curious and learn the subject. As a result of PBL, the students start to think analytically and use appropriate learning resources (University of Delaware, 2006).

Finally, to summarise PBL process shortly, learning starts with a problem in the scenario. The students come together in small groups with a facilitator and use the problems in the scenario as a basis for the study. They share their existing knowledge on the subject, and discover what they need to learn. Then, they study together their learning objectives and share and discuss the things they learned

with their friends (The Higher Education Academy, 2006).

5. CASE STUDY

5.1 Aim of the Case Study, the Model and the Modelling Methodology

Problem based learning is a systematic process but it can be complicated for the people not applying it. The aim of this paper is to draw maps of this complicated process by IDEF0. The top-down break down structure of IDEF0 makes it a very suitable tool for the visualisation of such complex systems (Bal, 1998).

5.2 Organisation of the Model

The map of problem based learning system in Dokuz Eylül University, Department of Statistics starts with an A-0 map which is called context diagram. This is a single activity map summarising the whole process, as seen in Figure 3.

Following this, detailed maps which are called decomposition maps of this single activity are given in Figures 4, 5, 6, 7 and 8. Besides, Table 1 gives the hierarchical breakdown of the model. The activities whose detailed maps are drawn are shown with an asterisk on the table (Björk & Hedlund, 2004).
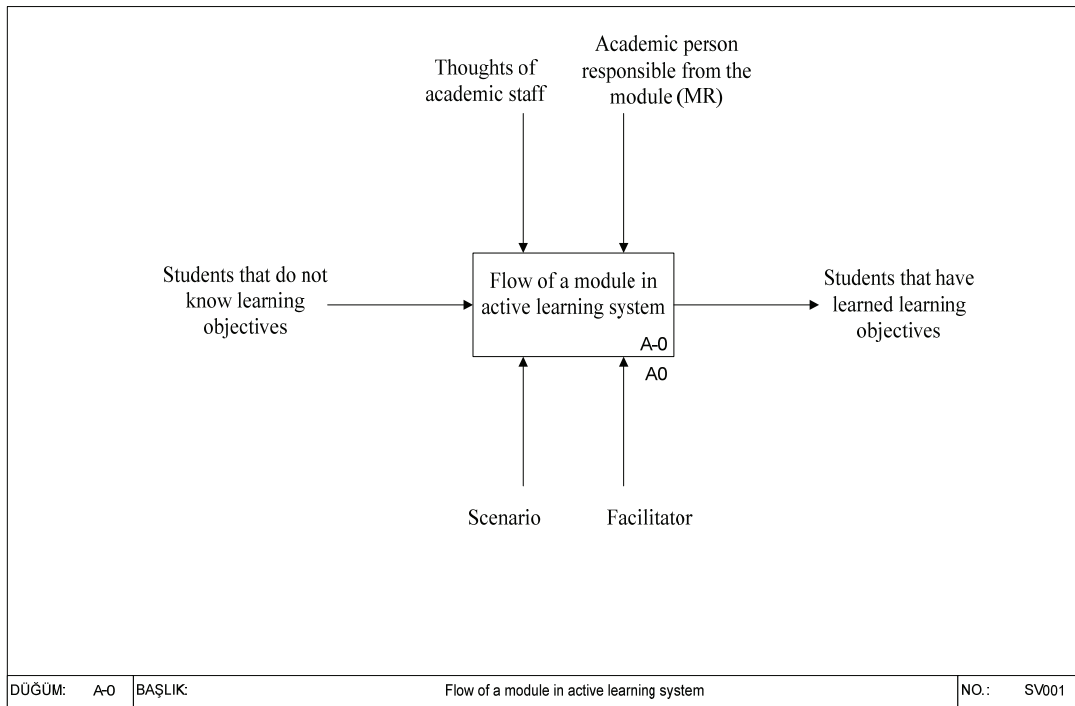
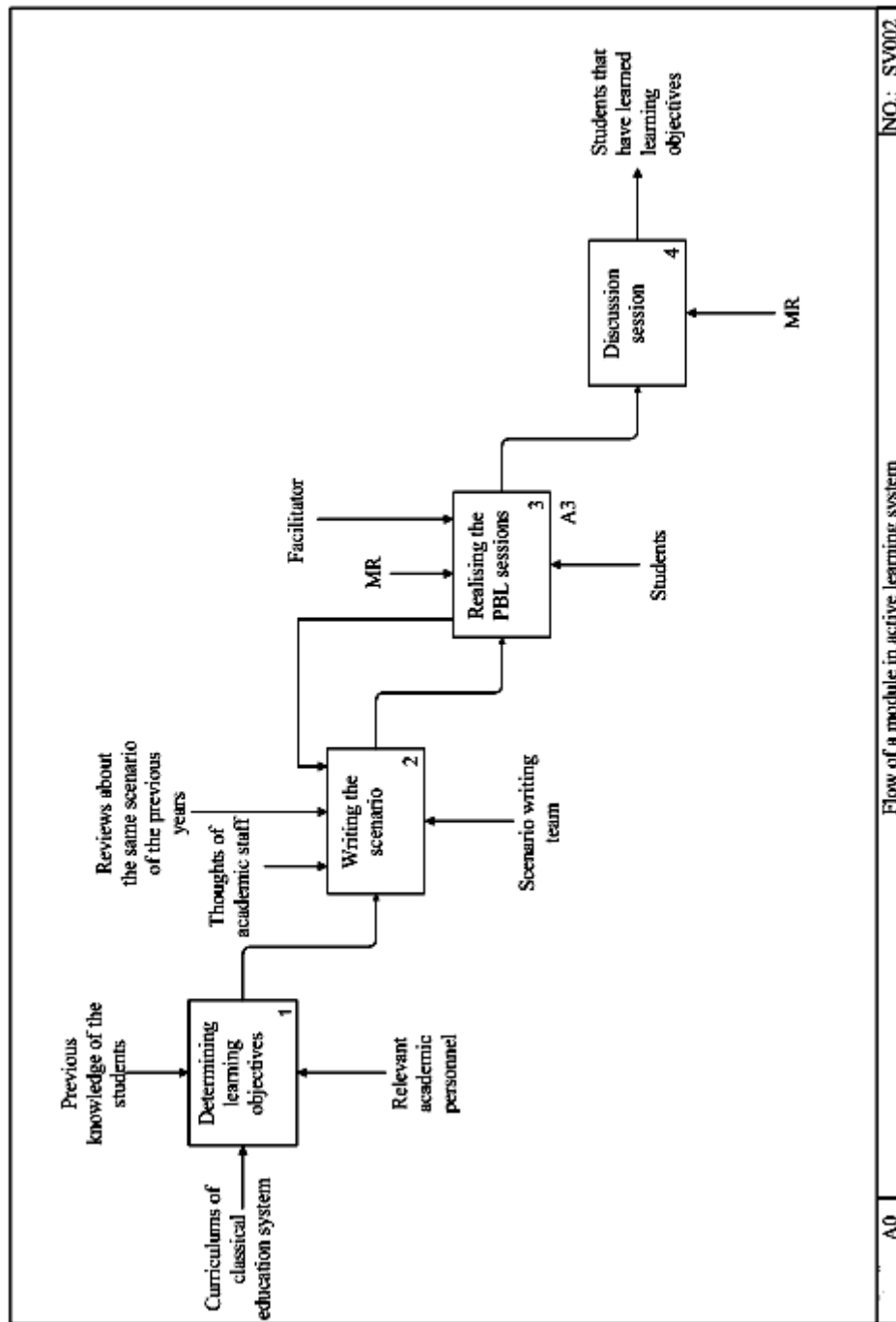Figure 3. A-0 diagram of IDEF0 map in case study

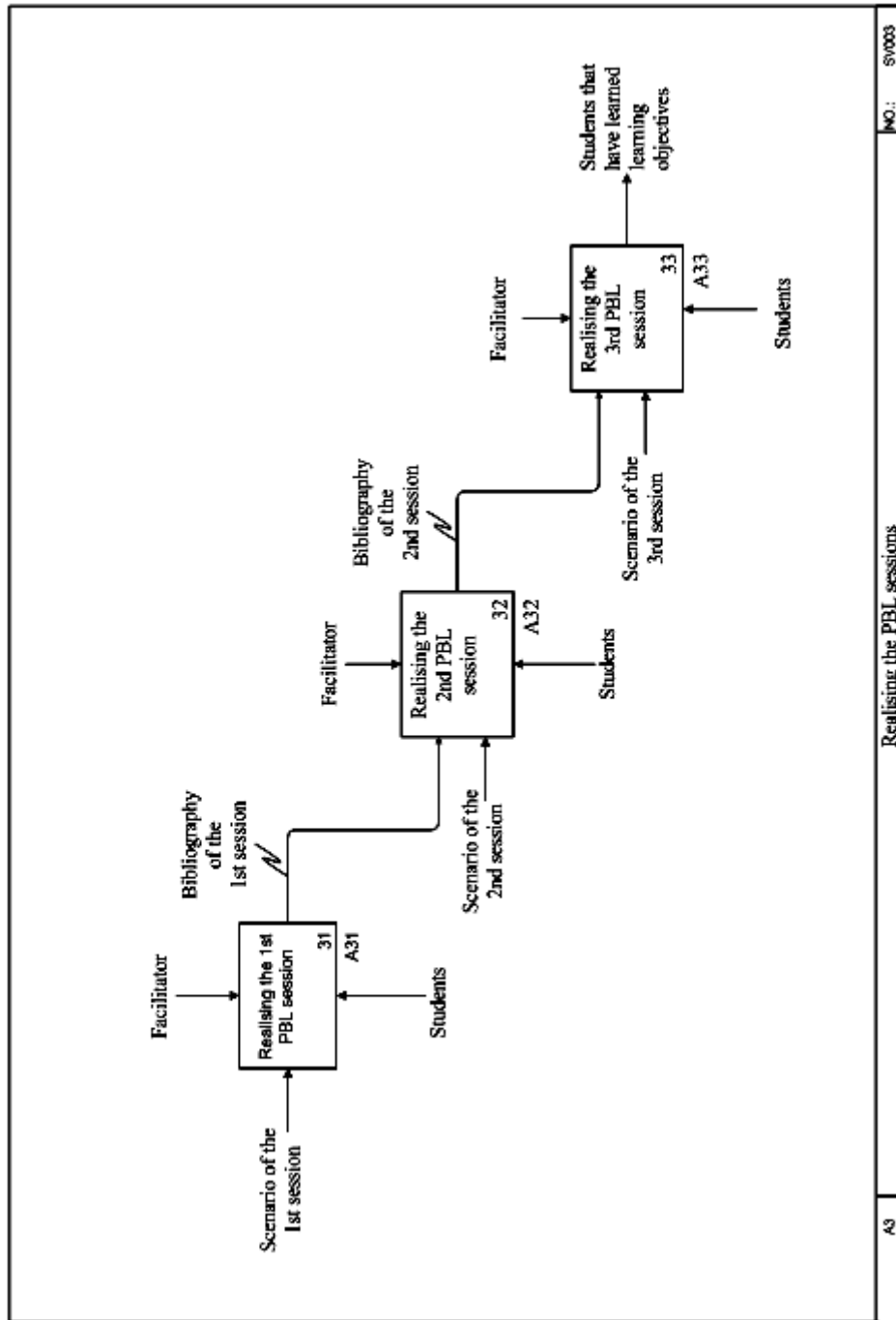Figure 4. A0 diagram of IDEF0 map in case study

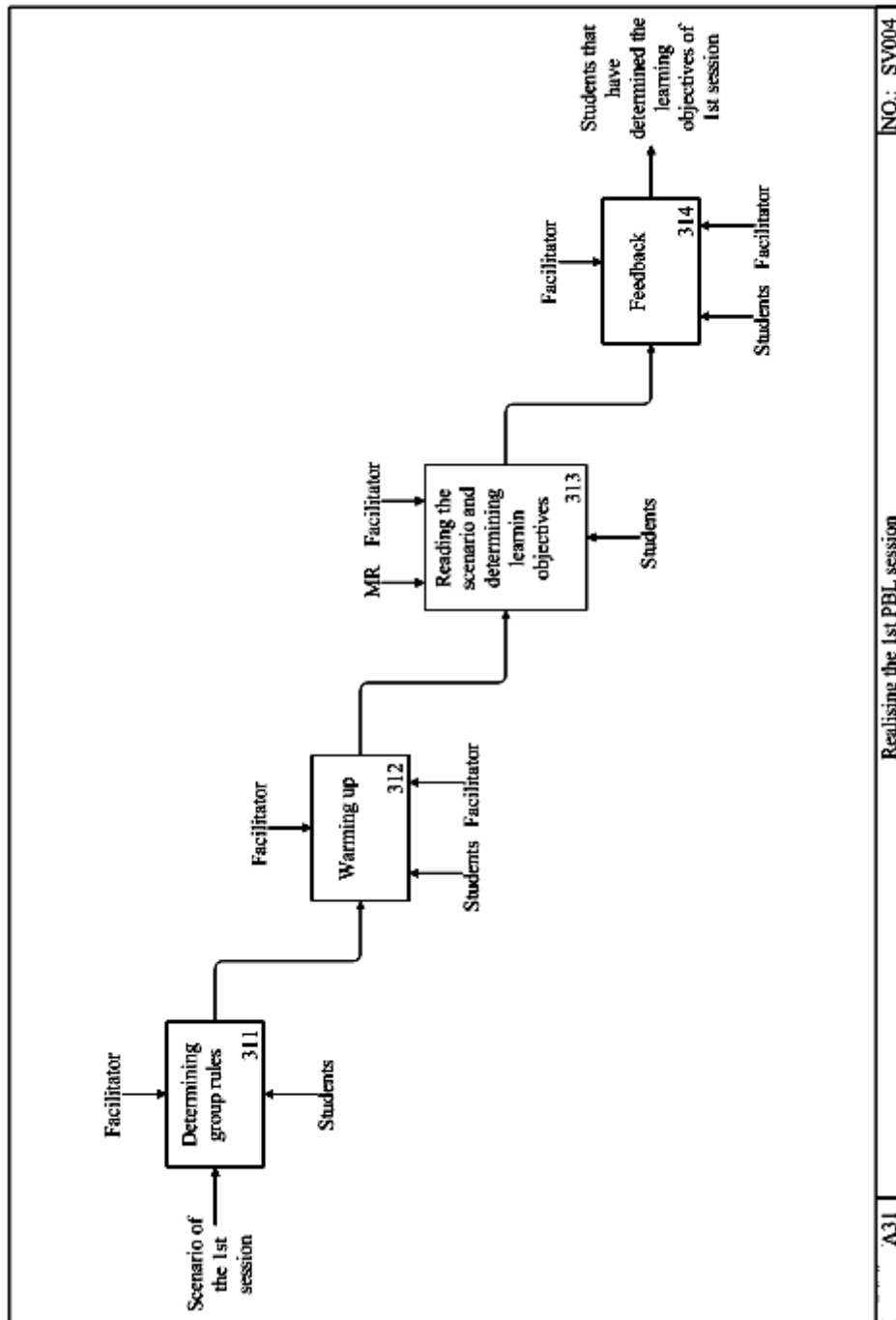Figure 5. A3 diagram of IDEF0 map in case study

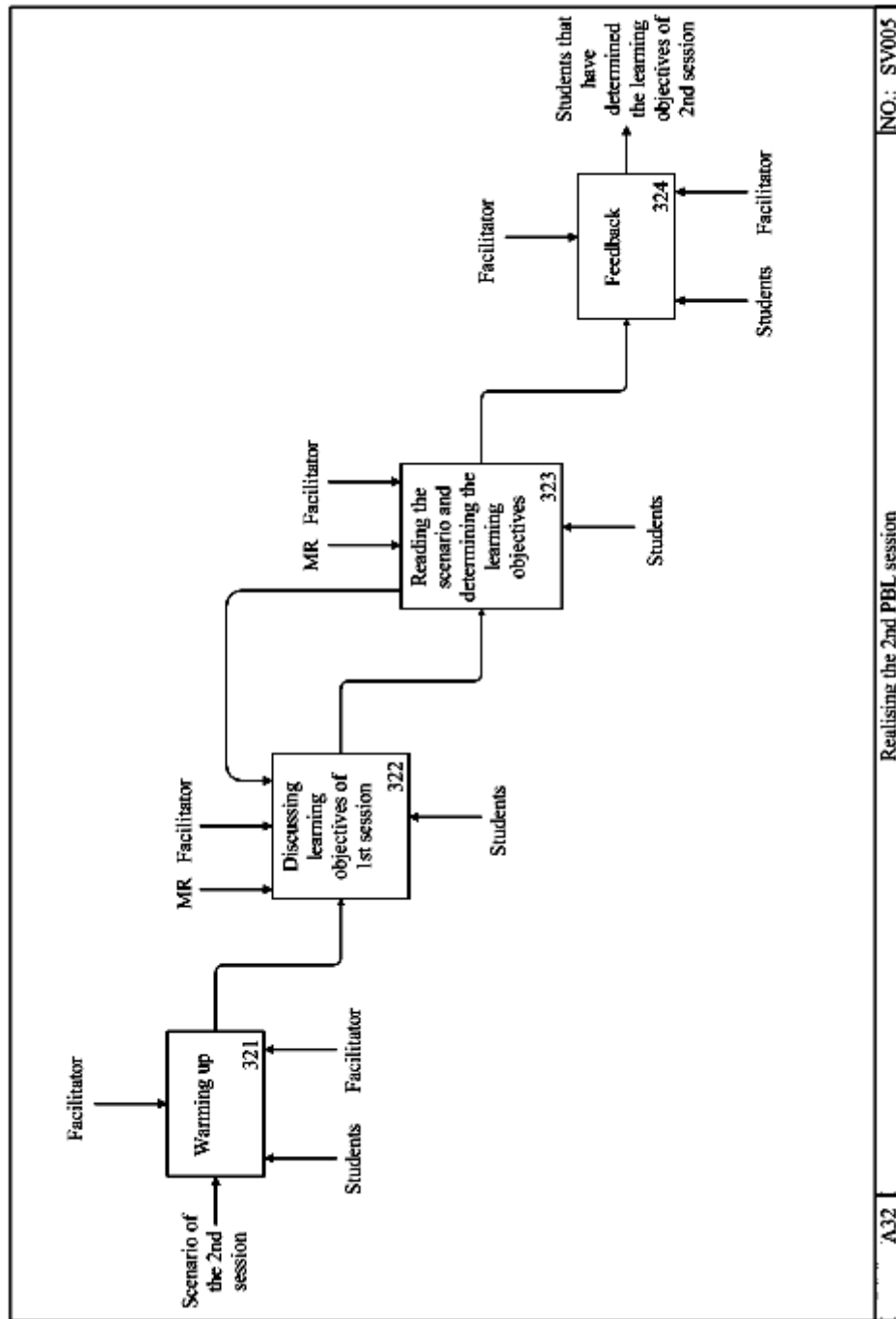Figure 6. A31 diagram of IDEF0 map in case study

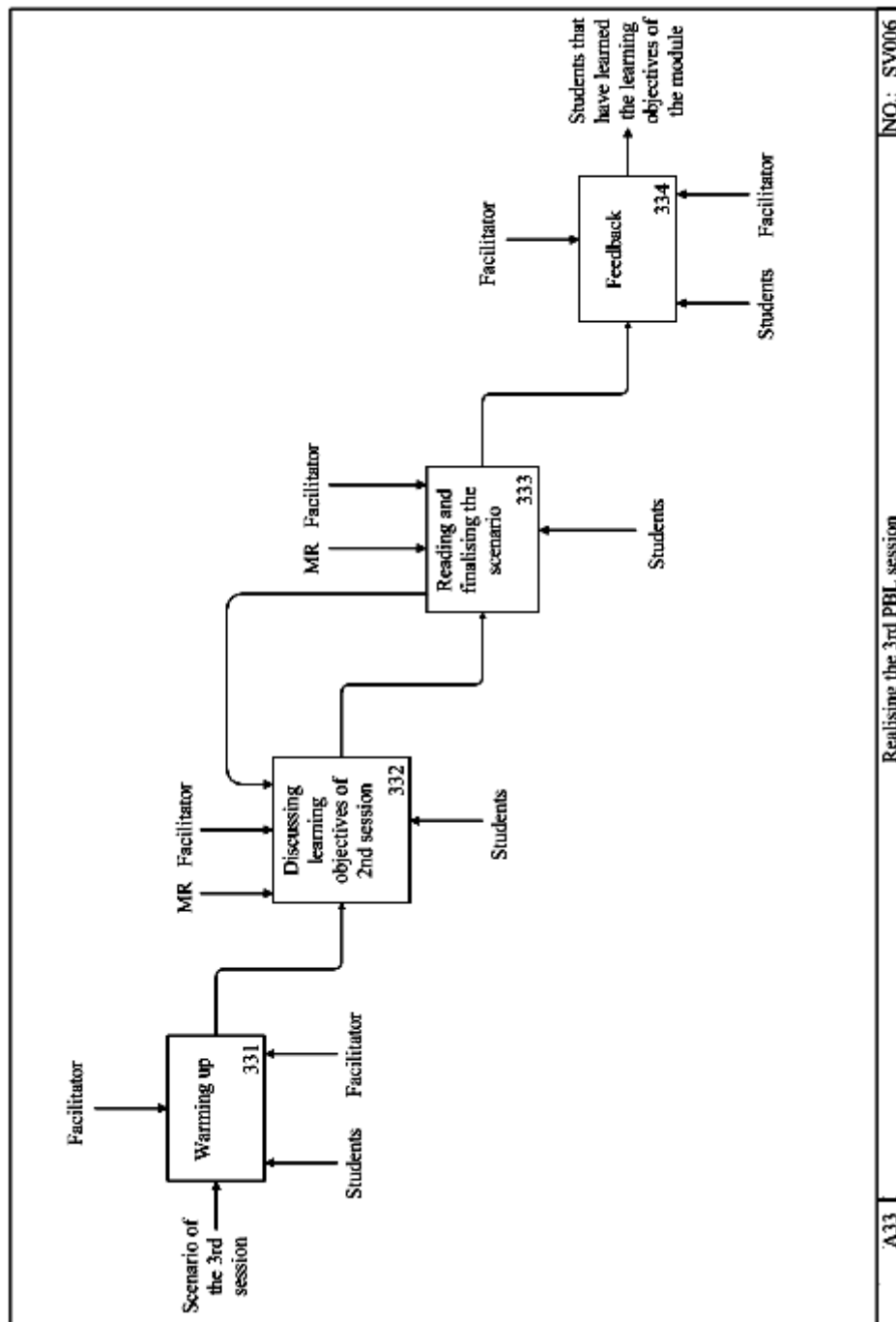Figure 7. A32 diagram of IDEF0 map in case study

Figure 8. A33 diagram of IDEF0 map in case study

Table 1. Hierarchical breakdown of the model

A-0 Context diagram *
    A0 Flow of a module in problem based learning system *
        A1 Determining learning objectives
        A2 Writing the scenario
        A3 Realising the PBL sessions *
            A31 Realising the 1st PBL session *
            A32 Realising the 2nd PBL session *
            A33 Realising the 3rd PBL session *
        A4 Discussion section

5.3 Description of the Model

As it can be seen from Table 1, the model consists of four main activities, A1-A4, one of which, A3, is decomposed into three sub-activities. At this part of the study, the activities with maps will be described.

A0   Flow of a module in problem based learning system

This diagram briefly explains the flow of a module in problem based learning system. First of all, learning objectives of the module are determined by the relevant academic personnel according to the curriculum of classical education system. Then, scenario writing team writes the scenario of the module paying attention to the thoughts of academic staff and reviews about the same scenario of the previous years. During the flow of modules, the students are divided into small groups and a facilitator is assigned to each group for helping the students throughout the PBL sessions. One of these facilitators is assigned as module responsible who serves as the team leader of facilitators. Then, PBL sessions are realised by students and facilitators. Finally, there is a discussion section where the aim is to make all the student groups become homogeneous. The output of all these actions is the students that have learned learning objectives.

A3   Realising the PBL sessions

There are three PBL sessions in a module in Dokuz Eylül University, Department of Statistics. Using the scenario of the 1st session, the students and the facilitator realise the 1st PBL session. Following this, the students have an independent learning process where they use the bibliography and other sources such as books, papers and internet to learn the learning objectives of the 1st session. Then, with the new scenario, 2nd PBL session is realised which is followed by another independent learning process. Finally, using the last part of the scenario, the students and the facilitator realise the 3rd PBL session which yields students that have learned learning objectives.

A31   Realising the 1st PBL session

The first action in the 1st PBL session is determining group rules. These rules are determined by the students with the aim of having more regular PBL sessions. Some sample group rules may be given as; "we should not interrupt each other's talk" and "we should keep our mobile phones closed during the sessions". After group rules are determined, there is a warming up process in order to get ready for talking during the session. In this warming up section, any subject, such as the latest films, current events or computers is chosen and every group member talks on this subject. Then, the scenario of the 1st session is read all together, the questions are answered and learning objectives are determined. There is a feedback session at the end of each session. In these feedback sessions, the students kindly represent their opinions on the scenario, the group, the facilitator and themselves. Finally, the facilitator gives his/her feedback about the group and the 1st session ends.

A32   Realising the 2nd PBL session

The second session begins with warming up. Then, learning objectives of the 1st session are discussed. Every student in the group is expected to contribute to the discussion of learning objectives. They tell each other their findings and solve the questions on the subject together. When this is finished, the scenario is read, questions are answered and learning objectives are determined. And the session ends with the feedback part.

A33   Realising the 3rd PBL session

The third session also begins with warming up. Then, as it is the same in the 2nd session, learning objectives of the previous ses-

sion are discussed. Because this is the last session of the module, the scenario is finalised. There aren't any new learning objectives in this session. And the session ends with the feedback section.

6. CONCLUSIONS

As stated earlier, process maps and models are visual representations of the work flows in processes, and they have an important part in process analysis as it is not possible to analyse an unknown process. For this reason, with the aim of guiding future process analysis on problem based learning system, process model and maps of this system are provided. IDEF0 is chosen for modelling the process because its application is easy and it represents clear and easily understandable information.

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