A RESEARCH ON LINE OF CODE, DATABASE DESIGN AND SOFTWARE COST ESTIMATION RELATION

A MASTER'S THESIS

in

Software Engineering

Atılım University

by

YELDA YEŞİLTAN

AUGUST 2008

A RESEARCH ON LINE OF CODE, DATABASE DESIGN AND SOFTWARE COST ESTIMATION RELATION

A THESIS SUBMITTED TO

THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

OF

ATILIM UNIVERSITY

BY

YELDA YEŞİLTAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

THE DEPARTMENT OF SOFTWARE ENGINEERING

AUGUST 2008

Approval of the Graduate School of Natural and Applied Sciences

Prof. Dr. Abdurrahim ÖZGENOĞLU

Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Asst. Prof. Dr. Çiğdem TURHAN

Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Asst. Prof. Dr. Nergiz Ercil ÇAĞILTAY

Supervisor

Examining Committee Members

Asst. Prof. Dr. Elif URAY AYDIN

Asst. Prof. Dr. Nergiz Ercil ÇAĞILTAY

Instructor Gül TOKDEMİR

29.08.2008

I declare and guarantee that all data, knowledge and information in this document has been obtained, processed and presented in accordance with academic rules and ethical conduct. Based on these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Yelda YEŞİLTAN

ABSTRACT

A RESEARCH ON LINE OF CODE, DATABASE DESIGN AND SOFTWARE COST ESTIMATION RELATION

Yeşiltan, Yelda

M.S., Department of Software Engineering

Supervisor: Assist. Prof. Dr. Nergiz Ercil ÇAĞILTAY

August 2008, 107 pages

The aim of this research is to explore the relation between Lines of Code (LOC) and two database design phases, conceptual design and logical design, of a software and the usability of this relation for software cost estimation. For analysing LOC and database design relation, which is suggested by Assist. Prof. Dr. Nergiz Ercil Cağıltay, 20 sub-modules of Modular Object-Oriented Dynamic Learning Environment (MOODLE) was analyzed. In addition to open Personal Home Pages (PHP) source software MOODLE, 33 sub-modules of an in house development project on Systems Applications and Products/ Advanced Business Application Programming (SAP/ABAP) was analyzed. The data about LOC of each project is collected qualitatively and analyzed by using statistical methods.

The results of this study show that there is a direct relation between Lines of Code (LOC) and two database design phases, conceptual design and logical design, of a software.

Keywords: LOC, Database Design, Conceptual Design, Logical Design, Cost Estimate.

ÖZ

SATIR SAYISI, VERİ TABANI TASARIMI VE YAZILIMIN MALİYET TAHMİNİ İLİŞKİSİ ÜZERİNE BİR ARAŞTIRMA

Yeşiltan, Yelda

Yüksek Lisans, Yazılım Mühendisliği Bölümü

Tez Yöneticisi: Yrd. Doç. Dr. Nergiz Ercil ÇAĞILTAY

Agustos 2008, 107 sayfa

Bu çalışma, yazılıma ait satır sayısı ve veri tabanı tasarımı adımları olan kavramsal tasarım ve mantıksal tasarım arasındaki ilişkiyi ve bu ilişkinin yazılım maliyeti hesaplanması için kullanılabilirliğini araştırma amacını taşımaktadır. Yrd. Doç. Dr. Nergiz Ercil Çağıltay tarafından önerilen satır sayısı ve veri tabanı tasarımı ilişkisi, açık kaynaklı Personel Home Pages (PHP) kodu ile geliştirilmiş olan Modular Object-Oriented Dynamic Learning Environment'a (MOODLE) ait 20 alt modülün analizi yapılarak incelenmiştir. MOODLE'a ek olarak, Systems Applications and Products / Advanced Business Application Programming (SAP/ABAP) ile geliştirilmiş olan bir projeye ait 33 alt modülün analizi yapılmıştır.

Gerçekleştirilmiş olan çalışmanın sonuçları yazılıma ait satır sayısı ve veri tabanı tasarımı adımları olan kavramsal tasarım ve mantıksal tasarım arasında direkt bir ilişki olduğunu göstermiştir.

Anahtar Kelimeler: Satır Sayısı, Veri Tabanı Tasarımı, Kavramsal Tasarım, Mantıksal Tasarım, Yazılım Maliyet Tahmini

To my mother Gürsel

ACKNOWLEDGEMENTS

I would like to express my feelings of gratitude to my supervisor Assist. Prof. Dr. Nergiz Ercil Cağıltay for her skillful guidance, endless patience, encouragement and support throughout this study.

I want to thank to Gül Tokdemir, Mücahit Erken, Mustafa Karli, Cumhur Okan Özoğul to help to improve my thesis work and my team members for their assistance.

I also would like to express my deepest appreciation to my mother Gürsel, my sister Yeşim and my husband Cem who always gave me their love and emotional support.

TABLE OF CONTENTS

LIST OF TABLES

TABLE

LIST OF FIGURES

FIGURE

LIST OF ABBREVIATIONS

LOC	-	Line of Code
SLOC	-	Source Line of Code
COCOMO	-	The Constructive Cost Model
SLIM	-	Putnam Estimation Model (Software Life Cycle Management)
FPA	-	Function Point Analysis
FP	-	Function Point
IFPUG	-	International Function Point User Group
TFC	-	Technical Complexity Factors
UFP	-	Unadjusted Function Point
MOODLE	-	Modular Object-Oriented Dynamic Learning Environment
PHP	-	Personal Home Pages
SAP	-	Systems Applications and Products
ABAP	-	Advanced Business Application Programming
DD&C	-	Database Design & Lines of Code

CHAPTER 1

INTRODUCTION

As the size of software became larger and larger developing, software turned out to be more challenging process. Today for companies, to build an information system, main obstacle is to develop software not to gather hardware, because cost of hardware has declined and their processing capacity has increased where as the cost of developing software has grown significantly [3]. For example in US software development cost increases more than 10 percent every year [3].

According to the CHAOS Report of 2004, by the Standish Group, only %29 of projects succeeded, %53 succeeded with more budget and late delivery or without required functionality and %18 failed [52]. Therefore managing a software project is a critical issue for software developing companies.

In order to manage the software project effectively, development activities must be clearly described and cost of development process must be accurately estimated [7], [8]. This estimation optimizes development process, reduces risks, determines economical feasibility of project, improves control over project resources and provides better resource reallocation, so minimize project failure [7], [8], [20].

Researchers have developed several models in order to achieve accurate cost estimation. Formal models such as The Constructive Cost Model (COCOMO), Putnam Estimation Model - Software Life Cycle Management (SLIM) and Function Point Analysis (FPA), which uses algorithmic techniques and some other approaches like expert intuition have been used for many years [52]. However it has not been possible to solve estimation problem totally [52], because there are many parameters like project complexity, size, team experience, technology used which have non-negligible impacts on estimation success [7].

This research aims to explore the relation between the line of code and two phases of database design, conceptual design and logical design, of a software and usability of this relation for cost estimation. The research assumption is that there is a relation between conceptual and logical design and LOC of software. By using this relation, an easier estimation model than the present models can be developed in the future works with the help of this research. Following sections will describe the methods and steps of research with the support of two projects.

This study is organized as follows: Chapter 1 briefly introduces the topic. Chapter 2 gives the information about the background of the subject. Chapter 3 gives the research question and the research methods used in this study. Research results are given in Chapter 4. Chapter 5 discusses the research topics and gives the conclusion of the study.

CHAPTER 2

BACKGROUND INFORMATION

2.1. Introduction

Software development is an expensive process and compared to hardware expenses, it is the major cost for information system budgets [1]. Investigation reports showed that majority of the projects end up with different budgets than estimates, 63% over-running them and 14% under-running them [4]. Therefore, in order to manage the software projects effectively and determine economic feasibility and control of project, it is important to have accurate, reliable cost estimates [3].

Accurate cost estimation is a challenging task in software management. Inaccurate estimations (over/under) may cause opportunity lost, non-productive projects, low quality software, less profit products, and even the break-down of the project in the mid-stream. On the contrary, with the knowledge of cost of software project early in development cycle, management can approve or reject project proposal or rearrange resources accordingly [2], [5].

In order to make accurate cost estimations in the literature some models and techniques exists, such as COCOMO, SLIM and FPA. Other than these formal models, some approaches depending on expert intuition or guess have also been used while determining the project cost. Studies claim that both formal and expert estimations are beneficial for some projects, where as, not useful for some others [52].

Although both approaches help engineers to optimize development process, improve control over resources and minimize project failure risk [7], it is still difficult to make accurate estimation [7]. The reason behind this is that cost estimation is affected by multiple parameters related to technologies, scheduling, manager - team member skills and experiences, mentality and culture, team cohesion, productivity, project size, complexity, reliability, quality and many more. These parameters are not easy to measure and manage and also have positive or negative impact on estimation accuracy [7].

Main objective of this research is purposing a new cost estimation approach for estimating LOC in the design phase of the software cycle by using LOC and conceptual and logical design phases of the software database design process. Before getting into details of the proposed approach, some software engineering concepts, in the scope of this study, will be described briefly.

2.2. The Classic Life Cycle

There are two main obstacles that large software projects have to stand up with. First, a team composed of many people develops these projects. They need adequate management process because of existence of multiple levels of personnel and large expenditures (computers, salaries, etc.). The second hurdle is overall system complexity. Some models have been developed in software engineering paradigm to manage software projects and to solve complexity problem of large systems. The bibliography [10], [52] presents four different models for the software process; classic life cycle (sequential) model, evolutionary model, incremental model and spiral model [9].

Classic life cycle model, which is sometimes called as “Waterfall Model”, [52] is explained in this work. Waterfall model defines a step-by-step (clearly identified sequence of phases [9]) process to transform user concepts into a developed code. These steps form a divide and conquer approach for dealing with the complexity of large systems [11].

Model also contains the mandatory testing steps in order to verify/validate the final product. Waterfall uses set of checkpoints, review and documents for all steps while managing the development process [11].

The current form of Waterfall Model goes back to the early 1970's. The model was presented by Royce of TRW [12] and by Boehm, also of TRW, in a classic article in 1976 [13]. Main feature of the model is that it uses verification steps for each step. Continuing to next step is only possible if current step is verified. Boehm's work on cost estimating [14] used the steps of the model as major categories for cost allocation. By the beginning of the 1980's Waterfall Life-Cycle Model was seen as fundamental standard practice in software engineering area [11].

Waterfall Model has sequential processing approach, consists of following parts: System engineering and analysis, requirements analysis, design, coding, testing, maintenance as shown in Figure 1 [52].

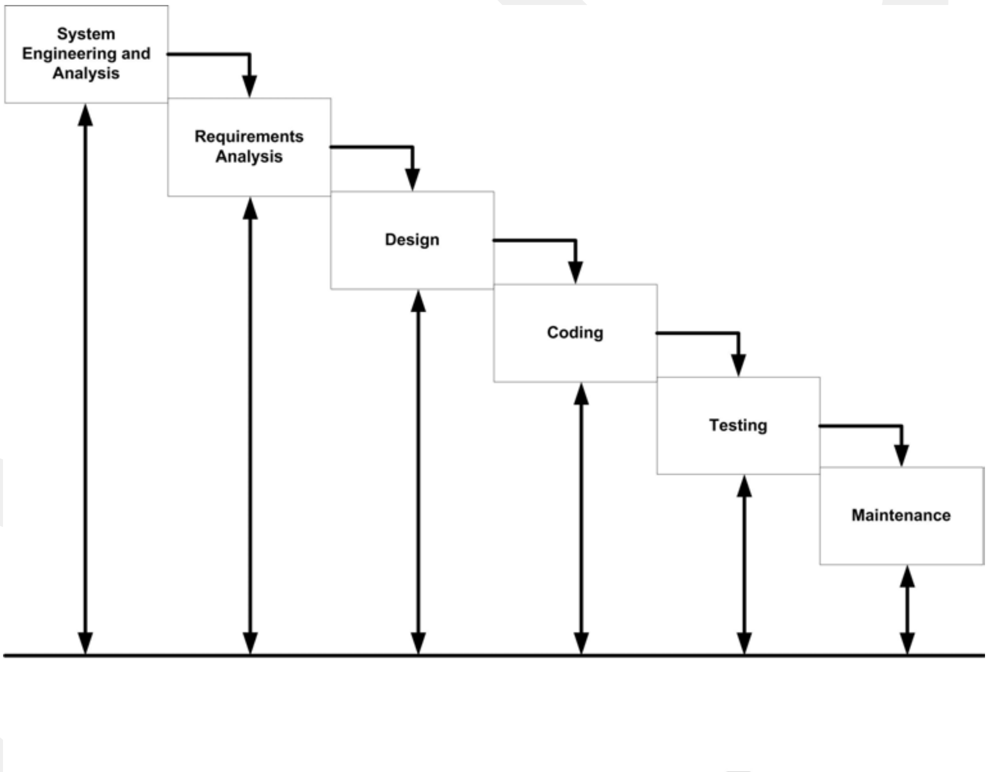

Figure 1 .The Classical Life Cycle – Waterfall Model [52]

Software development process begins by establishing requirements and allocating them to software. Requirements analysis focuses on software. Requirements analysis enables engineers to understand the information domain as well as the functions, interfaces and performance requirements [52]. Design phase is the step where software architecture, data structure, procedural detail and interface characterization is defined. Design activities represent requirements of software that can be verified before coding [52]. When design is finished, it is translated into machine readable form via coding. After coding developed, software is tested if it will produce desired results that are parallel to the required results [52]. Maintenance phase of Waterfall model deals with correcting errors encountered, enhancements and new functional requirements of customers [52].

2.3. Software Database Design

In the early 1970s organizations have moved to database systems from file systems. To accommodate such software development environment and manage successfully, two systems became the most important issues for management; information systems and database systems. These two systems have their own life cycles, which take place in the classic software life cycle phases. Information system includes all information resources about the collection, management, usage and dissemination of the information. Database system is a part of information system or in other words is a subsystem of information system [54].

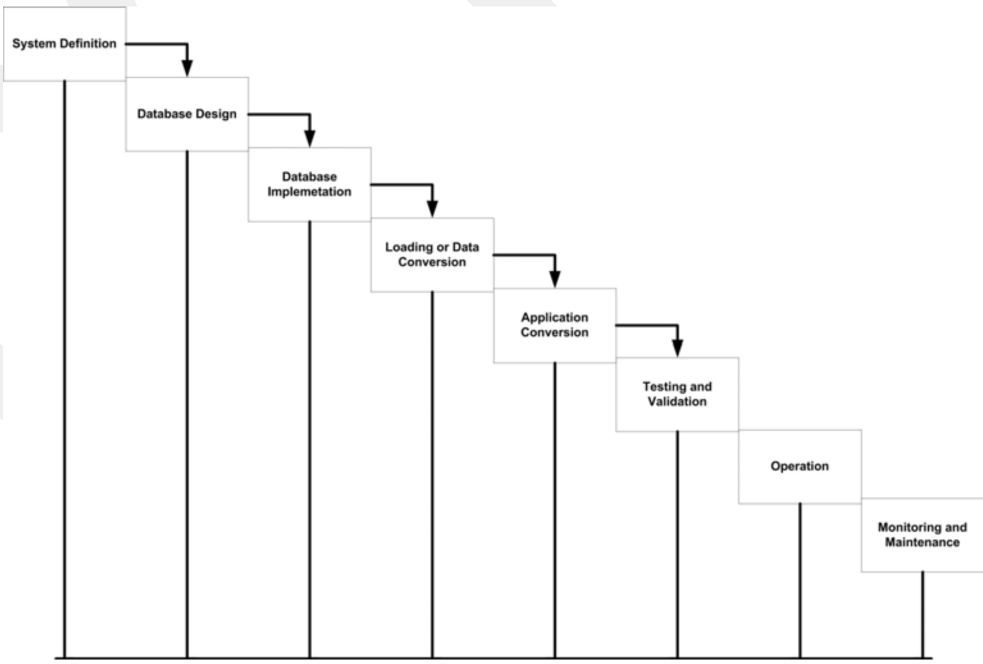

Figure 2 .Database System Life Cycle

Database system life cycle phases are given in Figure 2 above. If the phases are explained briefly [54];

1. System Definition: Scope, users, applications are defined.

2. Database Design: Conceptual, logical and physical design of the database system is prepared. This study focuses on conceptual and logical phases of database design.

3. Database Implementation: The conceptual, external and internal database definitions are specified.

4. Loading or Data Conversion: The data is loaded directly or converted by existing files.

5. Application Conversion: Previous system applications are converted to the new system.

6. Testing and Validation: Tests and approvals are done.

7. Operation: Database system and applications are used.

8. Monitoring and Maintenance: Modifications are done.

As mentioned before, this research focuses on conceptual design and logical design phases of database design, which is the second step of the database system life cycle. In the following paragraphs conceptual and logical design of database are explained in detail and the other phases are explained briefly in the following paragraphs [54].

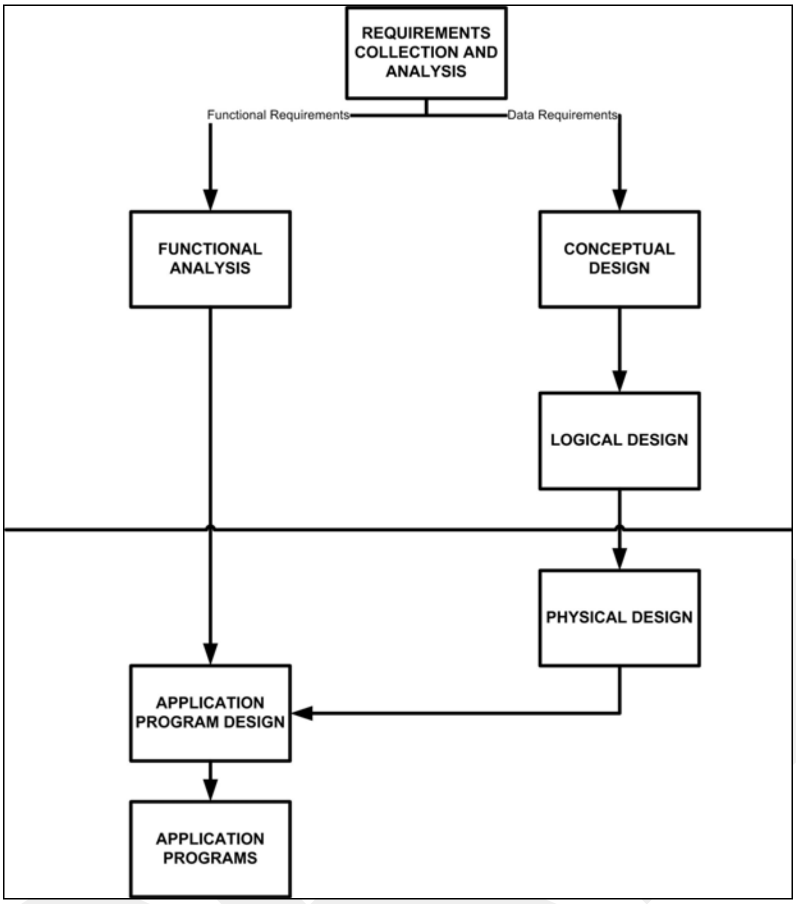

Figure 3 .Database Design Phases

Database design of database determines structures and constraints of the database to be developed. Phases of design are shown in Figure 3. Database design starts with requirements collection and analysis in which the designers interview with users to gather data requirements and document them. The expectations of users and design for database are determined in as much detail as possible. Requirement collection and analysis phase, which is crucial for the success of the information system, used for analyzing the existing users and applications and also the new users and applications and used for data requirements and functional requirements collections. An error made in this phase will cause unsatisfied users and as a result, the system may not be used. [54].

In the second phase two parallel activities, conceptual design and functional (transaction and application) design begins with the collected data and functional requirements. Conceptual design examines data requirements. As all the requirements are collected conceptual schema of database is created in the conceptual design. This conceptual schema design consists of entity types, relationships and constraints, which is expressed by a high-level data model [54]. Conceptual schema is built to describe the organization of data without considering physical organization of data and where and how the data is used. It can be understood by a non-technical user easily and can be used as a communication tool among users, designers and analysts. Data model of conceptual schema is described with Entity-Relationship (ER) Diagram [52].

ER Diagram was developed by Professor Chen in 1976 [51] and originally used in the database domain [50]. It specifies data as entities, relationships and attributes [52]. Entity is a “thing” with independent existence. It may be an object such as car, house, employee, which is an physical existence, or it may be an existence like “a company”, “a job”, “a course”, which is an conceptual existence [52]. Attributes are the properties of entities. For example “name, birthday, salary” attributes of “employee” entity [52]. Relationships are the references used whenever an entity refers to attribute of another entity [52], [50].

Entities, attributes and relationships directly influence software development effort and, cost and complexity of software increases with respect to increasing number of entities, relationships and attributes. ER Diagram, which shows the entities, attributes and their relationships, is created in the conceptual design phase of the database design [50].

Transaction and application design collects the characteristics of database applications and examines the functional requirements, which are collected and modeled by data flow diagrams, sequence diagrams and scenarios [54]. This phase identifies transactions’ input, output and functional behavior. Empirical estimation models, like FPA, are used in this phase or in the following steps of transaction and application design phase. Usage phases of the estimation models, COCOMO, SLIM and FPA, which are explained in the following parts of the chapter, are pointed out in Figure 4.

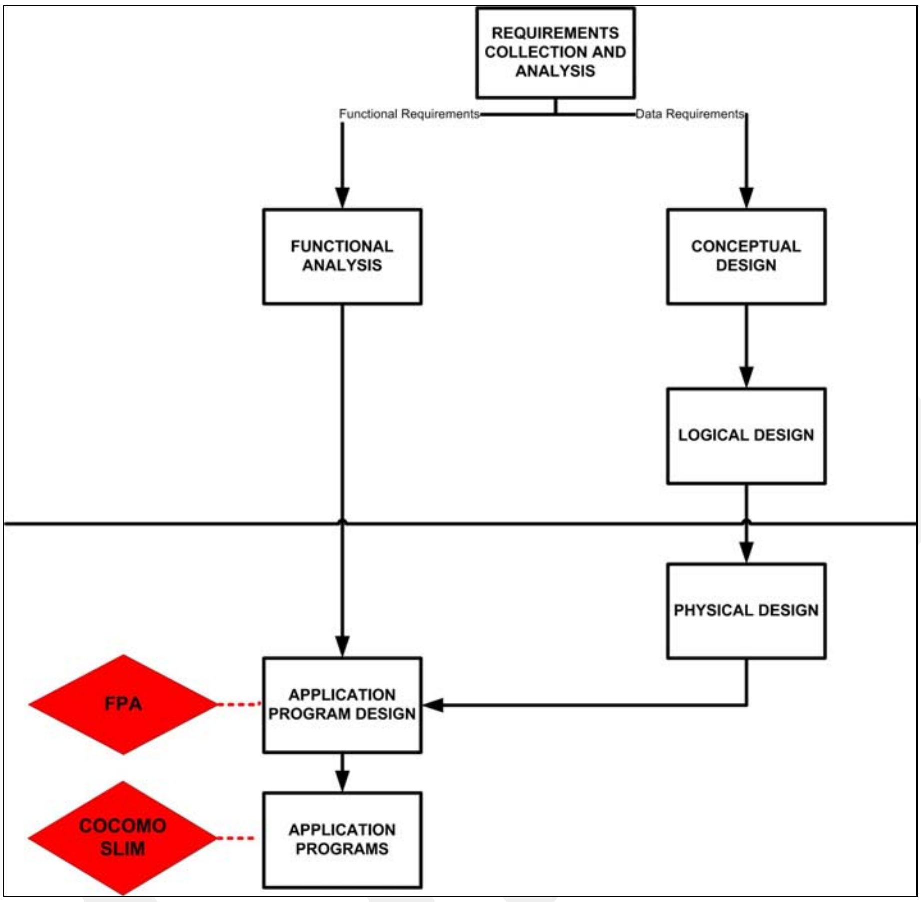

Figure 4 .Empirical Models Usage in the Database Design Phases

Collecting functional requirements, parallel to the conceptual design, makes the verification of the conceptual schema, and shows if the functional requirements are meet or not, early in the database design. Since the transaction and application design, the transaction and application implementation and application programs are the works of software engineering, they are out of database design and this study's scope [54].

In the third phase, logical design is created. After conceptual design finished, conceptual schema is transformed into an implementation model in logical design phase. Logical design focuses on relational database schema based on a conceptual schema design and can be called as relational database design. There are seven basic mapping steps to convert the basic ER Diagram to Relational Model. The mapping steps are [54];

1. Strong Entity Types Mapping: a relation, that includes all simple attributes, also only simple attributes of composite attributes, of each strong entity in the ER Schema is created. One of the key attributes of the entity is chosen as a primary key for the relation.

2. Weak Entity Types Mapping: a relation, that includes all simple attributes, also only simple attributes of composite attributes, of each weak entity in the ER Schema is created with its attributes.

3. Binary 1:1 Relationship Types Mapping: identification of the relations and entity types participating in binary 1:1 relationship type in the ER Schema.

4. Binary 1:N Relationship Types Mapping: identification of the relations that represents the participating entity type at the N-side of the relationship type. Each entity type instance on the N-side is related to at most one entity instance on the 1-side of the relationship type.

5. Binary M: N Relationship Types Mapping: creation of a new relation to represent for each binary M:N relationship type. Any simple attributes, also only simple attributes of composite attributes, of the M:N relationship are included as attributes of new relation.

6. Multi-valued Attributes Mapping: creation of a new relation which includes an attribute corresponding to multi-valued attribute and the primary key of the relation that represents the entity type or relationship type that has multi-valued attribute as an attribute.

7. N-ary Relationship Types Mapping: creation of a new relation to represent each n-ary relationship type where n is greater than 2. Simple attributes, foreign key attributes, the primary keys of the relations are determined.

The result of the logical design phase is the transformation of the conceptual schema from the high-level data model into the implementation data model. It specifies the conceptual and the external level schemas of the database systems [54].

After the logical design, final phase of database design is physical design during which storage structures, indexes, access paths and file organizations are specified for good performance. Response time, amount of storage space and number of transactions processed under the peak time condition of the system in a minute are the most important criteria for the physical database design options [54].

2.4. Software Metrics (LOC)

Management of software development process is important for development organizations in order to provide qualified products to global market. Management process should qualify and quantify the product to be developed [44]. Software size estimation is the process, which performs this quantification. Software size is the main product metric used for assessment, cost estimation, and improvement purposes [44].

However, estimating the software size is not that easy [44], [40]. It requires specific knowledge about scope, complexity and interactions of functionalities taking part in the software system [40]. Lines of Code (LOC) and Function Points are the main software size metrics identified in the literature [44], [40], [52]. These sizing metrics have been used by different type of cost estimation models. For example COCOMO and SLIM uses LOC where FPA of Albrecht uses function points [41]. Independent from the metric used, software size determination provides managerial information to support decision making during software lifecycle [52].

2.5. Software Cost Estimation

Software development is getting more and more sophisticated compared to the past [15]. Beside this, it is more expensive than expected cost and completed after planned time. There are many reasons for this, some of which are [15]:

- 35% of the participating organizations do not make an estimate of software development costs and time;
- 50% of the responding organizations record no data on an ongoing project;
- 57% do not use cost-accounting;
- 62% of the organizations that make an estimate, base their estimations on intuition and experiences. Only 16% use formalized estimation methods like cost estimation models.

Software cost estimation of a software project is an important concern for both managers and developers [16] since it is a crucial factor for software project success [17]. Overestimating a cost may contribute disapproval of project by managers, which might be significant to organization. On the contrary under estimating may convince managers to accept a project, which in fact exceeds the estimated cost and thus fail to produce expected profits. Underestimating may also cause overruns, which can damage software management's credibility and stifle future general management support [18], [6].

It is obvious that effective techniques for estimating software costs are needed in order to control the costs and make software more competitive [3] since software can be seen as industrial product [15].

Cost estimates are required in the lifecycle of software [19] to determine whether a project is feasible to accept or not. They also guide for allocation and reallocation of available resources [20]. Cost estimation techniques determine the effort needed to build up a software system [20] thus improving the quality of software product [21].

With the help of the techniques, the amount of effort required to develop a software system is predicted. In order to determine feasibility of software projects and to provide for appropriate allocation or reallocation of available resources, cost estimates are used throughout the software lifecycle [20], [22], [23].

Cost estimation is highly related with risk management. It identifies and eliminates the risks before they become real threats [24] by using the estimation results. The accurate estimations about cost of the project depend on the reliable information amount, about the product to be developed [20]. To achieve accurate cost estimates, the software development process should be clearly understood, and estimation process should be tightly linked to development process [21].

For estimating the size, cost, and schedule of software projects, many sophisticated models and methods are used [25]. Among them COCOMO, SLIM [26] and FPA [27] are the most well known ones [2]. Main assumption of these models is that some formulation can be built between project characteristics (input) and development effort (output) [28]. Accuracy of these models are still not hundred percent reliable. There are not so many models, which can make estimations more than 75 percent accuracy. Similar results are valid for software size estimation even there are some studies that have shown superior results [25].

Researches had started to develop some algorithmic models in early 50s. The first one was documented in 1956 [30]. Initial models were not much standardized and reliable [29]. They were mainly based only on single parameter like program size, therefore were not accurate and did not have enough information to make estimations [25].

After then some attempts (like fourteen factors which included design stability, programming language, concurrent hardware development, and differences between host and target computers) made to determine development effort including cost, size and schedule. However, these models were not more accurate than former ones [31].

The early 1980s witnessed a few attempts at software support cost estimating. By the late 1980s, most software development models had added support cost capabilities, but these capabilities varied widely in degree of sophistication, especially in their consideration of support-unique factors [25]. There were more advances in estimation modeling, especially software estimation. Function points have been continuing its importance. Albrecht's function points have also become popular for some applications.

Dr. Barry Boehm made major improvements to COCOMO during late 90s, and COCOMO II [32], revised one. COCOMO II is a set of three models that are used in different phases (application composition, early design, post architecture) [53] of the software development process. There were not many improvements for software maintenance cost estimation during 90s and most models did not change since 80s [25].

As mentioned above software cost estimation is a vital task through development cycle for a well managed and controlled software project. However, the process of estimation remains prone to human errors and biases [33], and does not give hundred percent correct results.

2.6. Empirical Estimation Models

Parametric models estimate the development duration and the effort as a function of number of variables, which represent the most important cost drivers [15]. Cost drivers, not the same for each model are the inputs of the model. Model gives an output of development time and effort. This output also changes between models. Algorithms and parameters stands in the center of it. Data are collected from database of completed projects as the values of parameters to be used by estimation model [15]. In general, steps of Software Cost Estimation (SCE) Models can be defined as:

1. Calibrate the model; a calibration process for model is performed before model is used for the first time, because there will be differences between the characteristics of the project and the data of the past project that the model is based on. Data on previous projects should be in an organized structure in order to make calibration possible. However, it is not easy to form this information precisely [15].

2. Estimate the software size in terms of LOC and function points [15].

3. Make a transformation from software size estimation to effort estimation. Mainly productivity measures are used for this translation. For example, a thousand of instructions can be used to identify an effort as;

$$effort = a \times (size)^b$$

Values of "a" and "b" gathered from regression analysis on previous projects. Effort is then expressed in the number of man months [15].

4. Adjust the estimated effort by taking in account the cost drivers. Adjust the previous effort formula as;

$$effort = a \times ((size)^b) \times correction\ factor$$

The correction factor is the total influence of all the cost drivers on development effort [15].

5. Split up the total effort over the phases and activities of a project. Splitting must be done by using empirical data. Thibodeau and Dodson made an analysis of effort division in a great number of software projects. Their conclusion was that in most of the projects %40 of total effort was for analysis & design, %20 for coding and %40 for testing [15].

6. Estimate development duration: Several researchers have implied that there is fairly a close relation between development time and effort, which can be formulated as;

$$duration = a \times (effort)^b$$

The values of “a” and “b” are empirically derived from previous projects. Value of “a” changes between 2-4 and value of “b” changes between 0.25-0.4 [15].

7. Finally execute risk analysis and sensibility analysis: Risk factors and sensitiveness of the cost drivers are much more important for management [15].

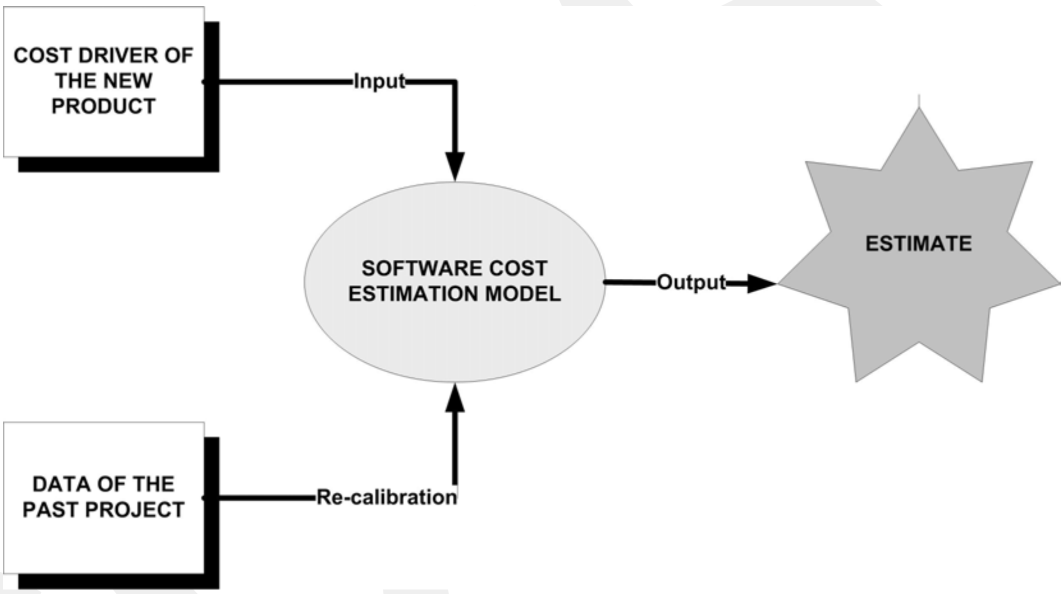

Figure 5 .Software Cost Estimation Process

Most important empirical estimation models, COCOMO, SLIM and FPA are explained in detail in the following parts of the chapter.

2.6.1. The Constructive Cost Model (COCOMO)

COCOMO is developed by Barry Boehm [24]. COCOMO as an empirical well-documented model, which is not tied to a specific software vendor and is based on project experience, is quite popular for software cost and effort estimation [23].

In COCOMO software development effort is calculated using the estimated delivered source instructions and an effort adjustment factor, applied to three distinct levels (basic, intermediate and advanced) each one for a different kind of project environment [7], [15].

The development effort is calculated and effort multipliers associated with cost driver ratings are modified by COCOMO model. Cost driver variables consist of attributes of product, platform, personnel and project [24].

The main focus in COCOMO is upon the estimation of the influence of 15 cost drivers like size, complexity, execution time, reliability, experience on the development effort [15], [24].

COCOMO uses Effort equation as given in the below, in order to calculate manpower (person-month) to develop a software.

$$EFFORT = A \times (SIZE)^B$$

In this equation "A" represents a proportinality constant and "B" is for economy. SIZE (Project's size) is LOC in COCOMO, whereas COCOMO II uses LOC, Function or Use Case points as software size input.

There are three operation modes , which is appropriate to different type of projects [34] :

- Organic : This mode is suitable for projects with small and experienced team who develops applications in familiar environment.
- Embedded: Embedded mode is more appropriate for large projects especially where severe time constraints exist and the project is not familiar.
- Semi-detached: Semi-detached mode is for projects somewhere in between embedded and organic modes[23].

Table 1 Modes of COCOMO

Mode	Effort (Cost)	Schedule
Organic	$Effort = 2.4(Size)^{1.05}$	$Time = 2.5(Effort)^{0.31}$
Semi-detached	$Effort = 3.0(Size)^{1.12}$	$Time = 2.5(Effort)^{0.31}$
Embedded	$Effort = 3.6(Size)^{1.20}$	$Time = 2.5(Effort)^{0.32}$

2.6.2. Putnam Estimation Model (SLIM)

SLIM, based on work of Norden, has been developed by Putnam in 1974 (Putnam, 1978) [15].

SLIM is a macro estimation model for software cost estimation. In order to determine the software cost estimate, it uses linear programming, statistical simulation, program evaluation and review techniques.

By using SLIM following tasks are performed to estimate software cost:

1. Calibration of the model

2. Building an information model of the software system.

3. Software sizing with LOC costing technique.

Puntnam's model uses the software equation below to get software size:

$$S = E \times (Effort)^{1/3} t_d^{4/3}$$

In this equation, "t_d" represents delivery time of software. "E" reflects the development capability and environmental factor. This capability is derived from historical data using software equation. Value of E (environmental factor/state of technology) can be between 610 and 57314.

Another important function included in this model is:

$$Effort = D_0 \times t_d^3$$

“D_0” is manpower parameter. It ranges from 8 (new software with too many interfaces) to 27 (rebuilt software). Output of former function (S) is LOC and latter one is person-year (manpower).

Software size is an important factor for SLIM model and must be identified in advance. Researches about SLIM shows that, estimates done by this model are too sensitive to technology (environmental factor E). SLIM is much more suitable for large projects and not recommended for small ones [23].

2.6.3. Function-Point Analysis (FPA)

FPA focuses on “functionality” or “utility” rather than LOC [2], [35]. FPA was developed by Albrecht of IBM, cooperating with Guide and Share user groups in 1979. Following years it has been refined several times [52], [15], [37].

International Function Point User Group (IFPUG), which was set up in 1984, clarifies the rules, set standards and promote their use and evolution [37], [38]. Table below shows the versions of FPA. The first three addresses the structure of FPA, while latter four clarifies rules and provides counting guidelines.

Table 2 Sequence of Official FPA Versions [37]

SEQUENCE OF OFFICIAL FPA VERSIONS	
1	Albrecht 79
2	Albrecht 83
3	Guide 84
4	IFPUG 86
5	IFPUG 88
6	IFPUG 90
7	IFPUG 94

FPA model quantifies the size and complexity of software system in terms of the functionality that the system provides to user [15], [40], [37], [38].

This model is designed to measure metrics of business type of applications. FPA is not suitable for scientific applications with complex algorithms, which cannot be handled by FPA. [40].

Functions delivered to user are independent from languages, methodologies and tools used to develop software [40]. For example, size of a general ledger application with 1,500 function points will remain that size whether written in COBOL, C++, or Smalltalk [38].

FPA model estimates the function points from system requirements and software design specifications [42], [40]. These specifications are the abstractions capturing fundamental entities, their attributes and relationships [43], [36], [39], which are used for identifying the functions of system.

Therefore, it is possible to estimate development effort before starting development [40]. Besides, it is possible to make re-estimations due to requirement changes, since function points are directly linked to requirements [40].

FPA represent the external view of the system [40], which makes it more meaningful for non-technical users than LOC.

Main goal of the function points is to determine size of software system not the effort for developing it. In order to discuss effort, some other project characteristics such as technologies, reuse, team experience, management capabilities, and development processes should be involved [38].

FPA assesses the functionality of the software by quantifying [2], [15]:

(1) User inputs

(2) User outputs

(3) User inquiries

(4) Files

(5) External interfaces

These parameters get values as "simple", "average" or "complex" and the Unadjusted Function Points (UFP) are computed with coefficients, given in the table below [2], [37], [52].

Table 3 FPA Coefficients

Measurement Parameter		Simple	Average	Complex
Number of user inputs	*	3	4	6
Number of user outputs	*	4	5	7
Number of user inquiries	*	3	4	6
Number of files	*	7	10	15
Number of external interfaces	*	5	7	10

This computation is referred as the functional size measurement process. It comprises both data function type measurement and transaction function type measurement [37].

Measurement process of FPA also includes 14 software characteristics sum of whose scores constitutes Technical Complexity Factors (TFC), which is shown in Figure 6 Factor Rates of FPA. TFC determines the influence of software characteristics on the overall complexity of the system [2], [52].

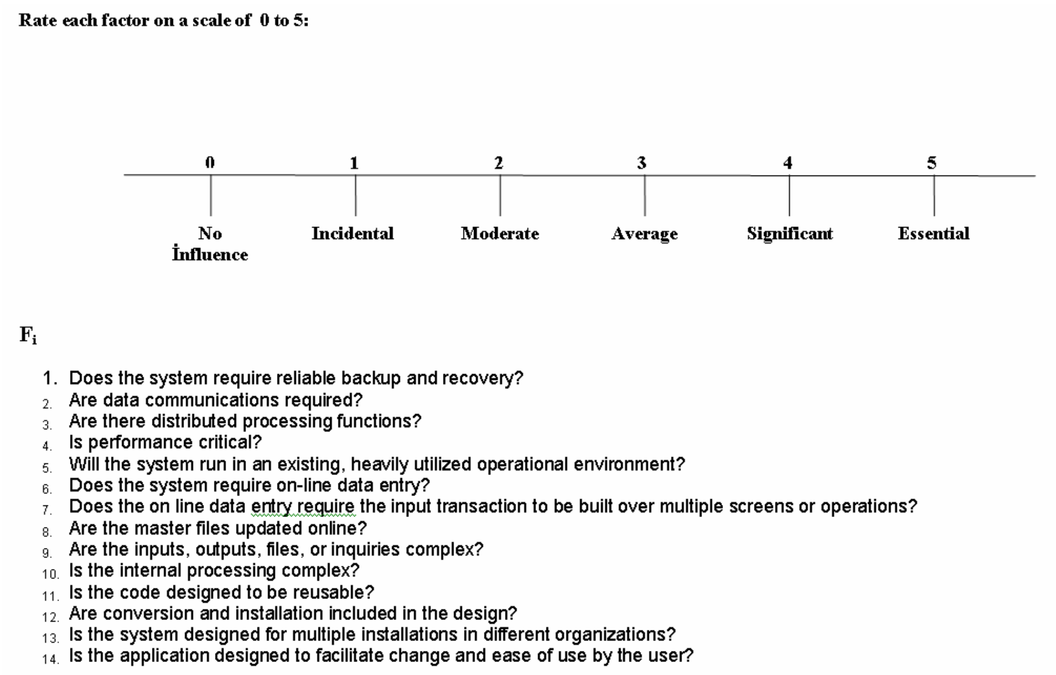

Figure 6 .Factor Rates of FPA [52]

After UPF and TFC are calculated Function Point (FP) of the system is designated as:

$$FP = UFP \times (0.65 + 0.01 \times TFC)$$

This formula gives size of software as the number of adjusted function points.

FPA assumes that if large number of function points included in system then system will be more complex. More complex system means more effort needed to develop the software [2].

2.7. Limits of The Current Solutions

Software cost estimation techniques are important concerns for managers and developers of a software project [16]. However, these models are not silver bullet and they have some defects, which makes the estimations only to some extend accurate. There are some challenging points for models during estimation process such as access to historical data, validity and uncertainty of data, limited time to develop estimates and immaturity of requirements [45], [5].

Like all empirical models, COCOMO model has some shortcomings. Although it is simple to apply [47] and offers a more adaptable tailored model [48], COCOMO has some weakness similar to LOC based techniques [2]. First, unlike function points [38], it is hard to estimate size of software at initial stage of project [2]. Measured number of lines of code is not accurate as function points [38]. Software size is dependent to programming language, because some languages may represent the same functionality with less number of lines of code than another one [49]. Other than these drawbacks for some languages, such as Authorware, definition of line is not clear thus making counting LOC difficult [2].

SLIM model has also some shortcomings. It is hard to estimate size of software at initial stage of project. This model requires historical data, experienced analyst and assumes equally distributed effort over the life of a software development project [52]. Historical data usage brings the validity and uncertainty drawbacks to the model [45], [5]. Researches about SLIM shows that, estimates done by this model are too sensitive to technology (environmental factor E). SLIM is not recommended for all projects, it is much more suitable for large projects and not for small ones. [23]. Since the model is not easy to use, simple to understand and requires for statistical knowledge, experienced user is required for the analysis. This is accepted as another limit of the model [52].

For FPA, if it is used within a specific organization then there will not be much problem but if it is used for cross-company development, there will be more risks with non-negligible problems [46]. Function points includes inputs, outputs, files, interfaces, and queries with values ranging as simple, average and complex, which means absolute scale counts are reduced to ordinal scale measures . Then it is not possible to use other transformations to make them as interval or ratio scale.

Moreover, you cannot make any arithmetic operation between values, because it is senseless, even if you make synonyms for example 3 as for “simple”. Measuring size on an ordinal scale can tell you that one system is bigger than another is, but not by how much [46]. It can be implied that complexity determination of function points is subjective [52].

Technology adjustment factor is another problem area of function points. It is based on assessment of 14 factors on a six-point ordinal scale. Raw function point is the sum of ordinal measures. There is not any evidence that those measures improve any predictive models involving function points. Some studies showed that predictions based on raw function points can be as accurate as the ones based on adjusted functions [46]. For effort estimation, function point does not deal with the impact of development environment on development effort [2].

CHAPTER 3

RESEARCH QUESTION AND RESEARCH METHOD

3.1. Introduction

Software project life cycle, a systematic development approach, which has specific documents, meetings, and deliverables associated with each step of the process, is described in Chapter 2 (The Classic Life Cycle). The complexities of the projects are handled, checkpoints and control mechanisms are determined for management with the life cycle's divide and conquer approach. In the life cycle of a project, the most important issue for all stakeholders is the cost of the project. Line of code is used as an input for most of the cost estimation models. However, line of code cannot be determined in the early phases of project life cycle.

From this point of view, in this study, the research question is defined as "is there a relation between actual LOC and database design of a software application?" For this aim, the relation between conceptual and logical database design and LOC is analyzed to be a basis to construct a statistical model for estimating LOC from database design.

For a new starting project, the model usage will be in the analysis phase of the software life cycle, where the database design is created. Since there was no chance to research relation between LOC and database design in a real time application, reverse engineering methodology used for gathering the data.

The proposed approach, DD&C (Database Design & Lines of Code), and the research method are discussed in this chapter. The details of research methods are given in the 3.3. (Research Methods and Tools for MOODLE and PROJECT X) part of the chapter.

3.2. Research Question and Proposed Approach

Objective of this research is to estimate LOC from the database design phases, conceptual design and logical design, of software. If the relation between LOC and database design can be proved, variables and appropriate coefficients can be determined and a new estimation model can be developed in the future works.

The database of a software project consists of several parameters such as number of fields, number of tables, field types, field sizes, foreign keys and primary keys. All of these parameters are usually defined in the database design of the software system. In this study, the aim is to analyze some of these parameters in order to find a relation between actual LOC and parameters in the database design of the software projects. The proposed approach is called as Database Design & Lines of Code (DD&C). DD&C approach usage phase in the database design, is shown in the Figure 7 below.

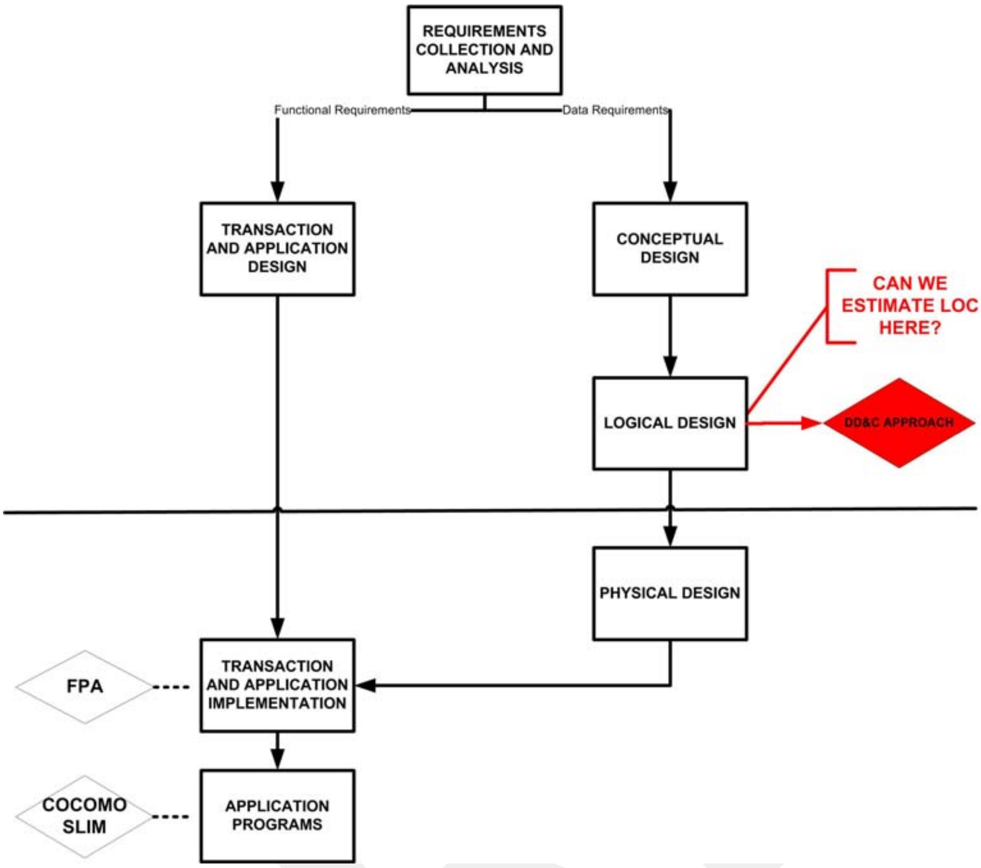

Figure 7 .DD&C Approach Usage in Software Database Design

DD&C, like FPA, can be used for all languages which is used in the coding phase of the project and it is not effected from the tools or methodologies used for implementation in the software. DD&C estimation approach, based on the database design, makes LOC estimation possible in the early phases of development. The database design makes the estimation process easier and eliminates the need for technical knowledge because it can be driven from the pseudo codes. As a result of these properties given, DD&C can make re-estimations for rapidly changing requirements.

3.3. Research Methods and Tools for MOODLE and PROJECT X

In this study, two software projects are analysed. These two projects are MOODLE and PROJECT X (because of the confidentiality constraints).

MOODLE;

- is developed with PHP,
- has a structured language and
- uses MySQL database.

PROJECT X (Name and detail information about this project will not be given because of confidential constraints and it will be called as PROJECT X);

- is developed with SAP/ABAP
- has a structured language and
- uses ORACLE database [55].

In determination of these projects, language structures are taken into consideration. Since the LOC is used as an indicator of the research, analysing a project which has an object oriented language should cause misinterpretation. For that reason, MOODLE and PROJECT X are analysed together in this research, which have structured languages.

In the data collection phase of the research, 4 basic steps are used for each project, which is shown in Figure 8 Research Phases.

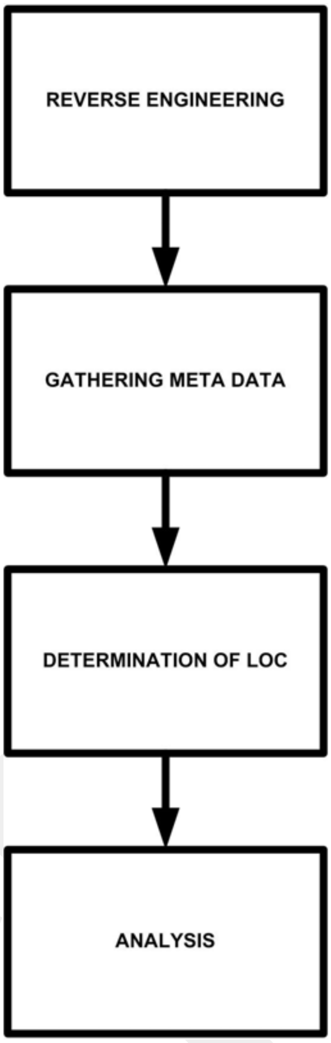

Figure 8 .Research Phases

The steps are applied to the projects with different methods because of the different specifications of these projects. The methods are summarized in the following figure.

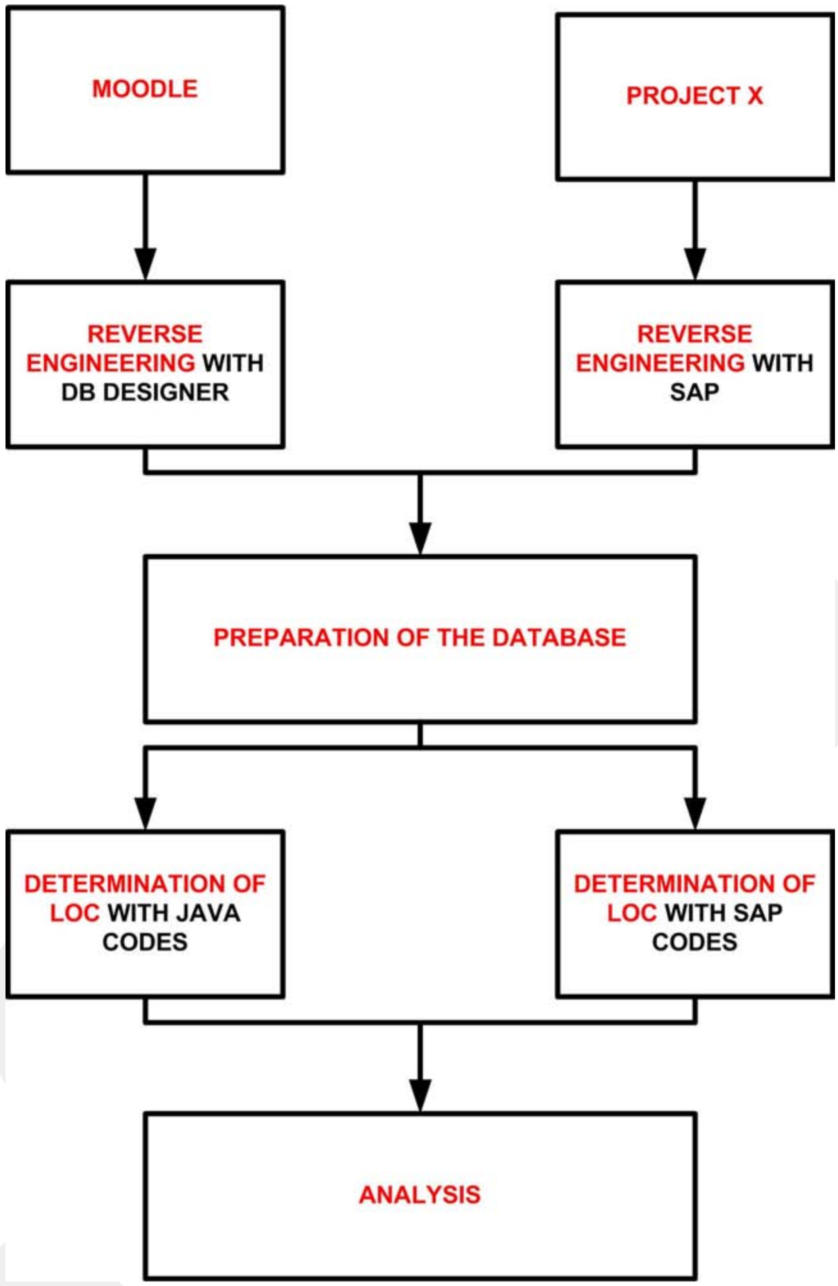

Figure 9 .Research Methodologies

Reverse Engineering is used for both projects, to turn to the design phase, whose all codes are written and all phases of the life cycle are done. This step can be defined as going backwards through the development cycle. Source code of the projects is reverse engineered back to the first phase of the waterfall model.

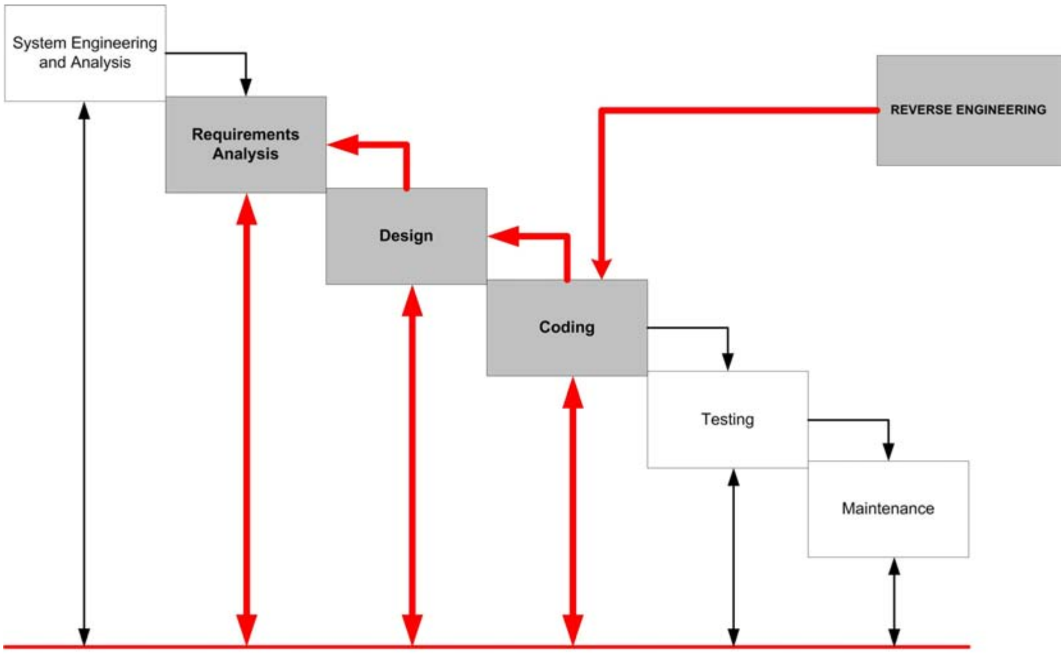

Figure 10 .Reverse Engineering

In the second step, after gathering the data and drawing the ER Diagram, database is created with the data required for analysis.

The third step is LOC determination for all modules of each project. This data later used in the analysis as shown in the Figure 9. For this aim two different programs have been developed, in order to count the LOC by handling the recursive structure of both projects.

In the last step, analysis is done, in order to answer the research question. The methods used for each project are explained separately in the following parts with headings, 3.3.1 PHP Analysis and 3.3.2. SAP/ABAP Analysis.

In summary, for reverse engineering DB Designer tool is used for MOODLE, SAP/ABAP Data Modeler tool is used for PROJECT X. A database is created for each software, which consists the data required for the analysis. The details of these steps are given in detail in the following sections.

3.3.1. DB Designer for MOODLE

Since there was no chance to apply the research phases concurrently with a new start project, reverse engineering, which can also be an alternative method for the future works, is done in order to gather the data required for the research. The output of the implementation phase is reverse engineered back to the analysis phase with a tool compatible with MySQL database.

In MOODLE, DB Designer tool is used, for reverse engineering. DB Designer [57];

- is a visual database design system,
- integrates database design, modelling, creation and maintenance,
- builds a clear and effective database structure,
- provides whole picture of the system representing all the tables, references, views, stored procedures within in the database.

For MOODLE, DB Designer tool is preferred because;

- DB Designer works well in MySQL database,
- MOODLE’s database size fits well to the DB Designer,
- DB Designer produces the detailed data of the database with tables, fields and relations which can be called as metadata and the ER Diagram, which represents all the tables, references, views, stored procedures within in the database. Below Figure 11 shows the format of metadata produced with DB Designer tool and Figure 12 shows an example of ER Diagram

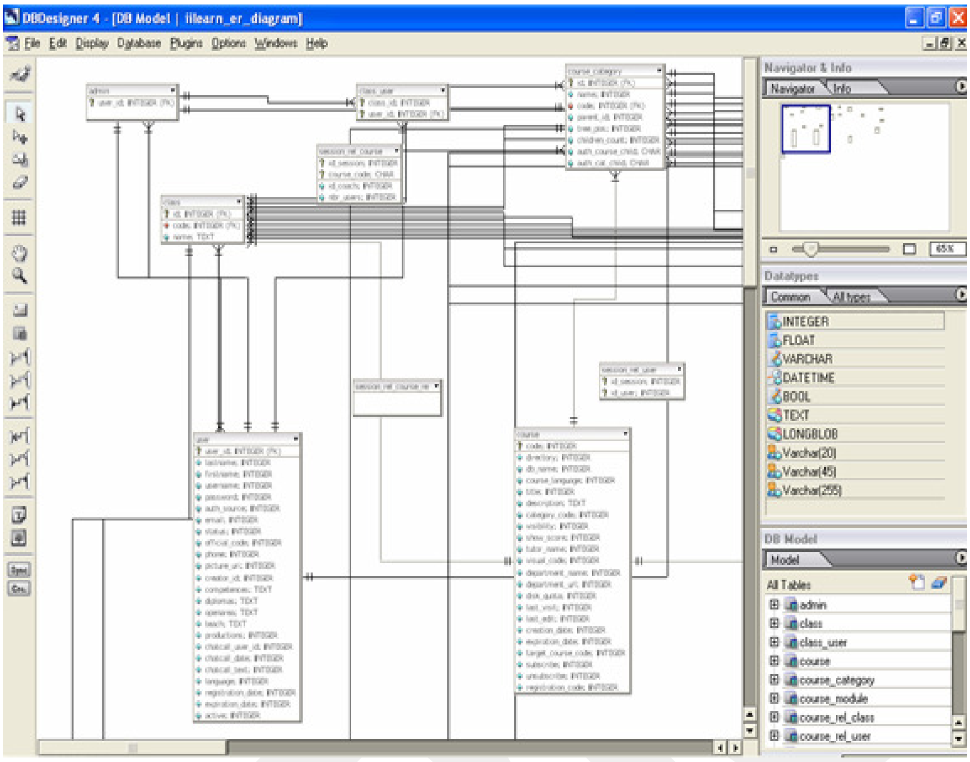

Figure 11 .DB Designer 4 – DB Model - ER Diagram Screen

ID	Tablename	Table Type	Table Prefix	ID2	ColName	idData type	DataDesc	Datatype Params	Width	Primary Key	NotNull	IsForeign Key	Default Value	ID3	Index Name	Index Kind
1000	adodb_logsql	0	0	1132	created	15	DATETIME		0	0	1	0				
1000	adodb_logsql	0	0	1133	sql0	20	VARCHAR	(250)	0	0	1	0				
1000	adodb_logsql	0	0	1134	sql1	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1135	params	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1136	tracer	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1137	timer	12	DECIMAL	(16,6)	0	0	1	0	0.000000			
1001	assignment	0	0	5961	id	5	INTEGER	(10)	-1	1	1	0				
1001	assignment	0	0	1139	course	5	INTEGER	(10)	0	0	1	1	0			

Figure 12 .Metadata Format Produced by DB Designer

As it is shown in Figure 12, the columns of metadata are; ID, Tablename, TableType, TablePrefix, ID', ColName, IdDatatype, DataDesc, DatatypeParams, Width, PrimaryKey, NotNull, IsForeignKey, DefaultValue, ID3, IndexName and IndexKind.

The ER Diagram and the metadata of MOODLE are the outputs, which will be used as inputs of the following steps.

3.3.2. Database Created for MOODLE

DB Designer gets all metadata of the database in a text format, produces an ER Diagram and makes it possible to prepare the data required for the analysis. DB Designer is used for gathering the detailed data of the database like table and field names, as described in the previous section and also shown in the Figure 11 and Figure 12.

By using the ER Diagram and metadata, five steps are applied in order to arrange the data for analysis. Summary of the steps are given in the following figure as a flow chart.

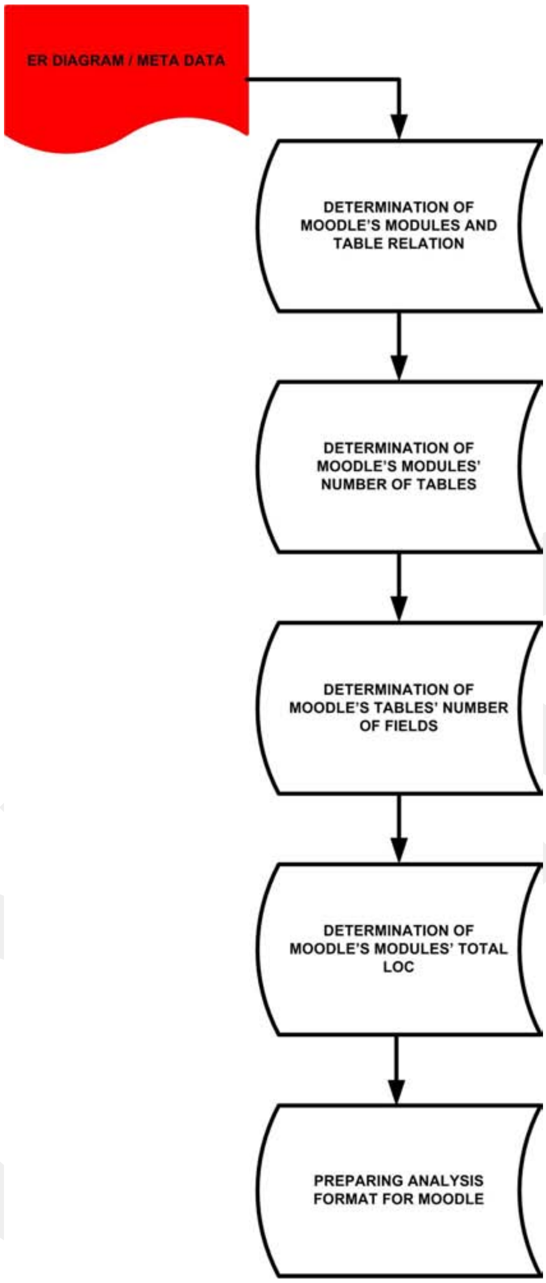

Figure 13 .Database Analysis Phases of MOODLE

The analysis steps shown Figure 13 of MOODLE are explained in detail in the following.

1. Determining Modules and Table Relation of MOODLE

Large software is usually built up from several modules. Each module actually consists of several program units to implement the functionality in the scope of the module. Accordingly, the first step is determining the modules of the database system.

While analyzing the metadata and ER Diagram, it is realized that all table names in the same module starts with module name as prefix. Naming standard of tables is;

Module Name _ Table name.

which can be seen on the ER Diagram and is given in the "Tablename" column of the metadata.

As a result, the relation between the modules and the tables is determined from the table names. The constituted format of the excel database, which keeps the module and the module's table relation, is given in the following Figure 14.

MODULE NAME	TABLE NAME
Module 1	Table 1
Module 1	Table 2
Module 1	Table 3
Module 2	Table 4
Module 2	Table 5
Module 2	Table 6
Module 2	Table 7
Module 3	Table 8
Module 3	Table 9
Module 4	Table 10

Figure 14 .Modules and Modules' Tables of MOODLE

2. Determining Number of Tables Used In Modules of MOODLE

In the second step, the occurrence of these tables is counted for all modules separately. For this aim the "VLOOKUP", "ISNA", "OFFSET", "COUNTIF" and "IF" functions of excel are used. By using functions of excel, the duplication risk of the same data in the excel database is eliminated. As a result, a flexible format, which is sensitive to the changes in the modules and the tables, is prepared. The format of excel is shown in the following Figure 15. The rows represent the table names, all the columns show the modules and the values, under the modules, “0” and “1” shows that if the table is used by the module, or not.

MODULE NAME / TABLE NAME	Module_01	Module_02	Module_03	Module_04	Module_05	Module_06	Module_07	Module_08	Module_09	Module_10
	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance
Table 1	0	1	0	0	0	0	0	0	0	0
Table 2	1	0	0	0	0	0	0	0	0	0
Table 3	1	0	0	0	0	0	0	0	0	0
Table 4	0	0	0	1	0	0	0	0	0	0
Table 5	0	0	0	0	0	1	0	0	0	0
Table 6	1	0	0	0	0	0	0	0	0	0
Table 7	1	0	0	0	0	0	0	0	0	0
Table 8	0	0	0	0	0	0	0	1	0	0
Table 9	0	0	0	0	0	0	0	0	1	0
Table 10	1	0	0	0	0	0	0	0	0	0
TOTAL	5	1	0	1	0	1	0	1	1	0

Figure 15 .Modules and Tables Used for Modules of MOODLE

3. Determining Number of Fields of Tables of MOODLE

Determining the number of fields of all tables is the third step of the study in the excel database. Using “ColName” column of the metadata for this aim should cause complexity and trash data. For this reason, the data types (“DataDesc” column of metadata) in the database are counted for all tables. The total of these counts provides the results (the number of fields in the tables) required for the study. For determining the occurrence of the fields in the tables, like in the previous step, the functions of excel is used and the duplication risk is eliminated. The format of this step is shown in the following Figure 16. In the format table names, field types and total fields of tables, whatever the type of it, are given.

FIELD TYPE / TABLE NAME	CHAR	DATE TIME	DECIMAL	DOUBLE	ENUM	FLOAT	INTEGER	LONGBLOB	LONG TEXT	MEDIUM TEXT	SMALL INT	TEXT	TINYINT	VARCHAR	TOTAL FIELDS
Table 1															
Table 2															
Table 3															
Table 4															
Table 5															
Table 6															
Table 7															
Table 8															
Table 9															
Table 10															

Figure 16 .Tables and Total Fields of Tables of MOODLE

4. Determining Total LOC of Each Module of MOODLE

In the fourth step, the total LOC for each module, which will be input of the fifth step and will be required at the end of the research for analysis, is added to excel in a format. Total LOC is determined with the help of a program, which is developed in Java. Java based program, which can be called as Line Counter for MOODLE, counts the LOC by handling the recursive structure of the source code and produces an excel output which represents LOC of the each module separately. The format consists of module names and total LOC, which is shown in the following Figure 17.

MODULE NAME	TOTAL LOC
Module 1	
Module 2	
Module 3	
Module 4	
Module 5	
Module 6	
Module 7	
Module 8	
Module 9	
Module 10	

Figure 17 .Modules and Modules' Total LOC of MOODLE

5. Preparing Format for Analysis of MOODLE

A format, which will be the input of the analysis, is used as the fifth step of the study. Data required for the analysis is prepared in the format, as given Figure 18. The format is made up of Module Name, Count of Total Table, Count of Total Field and Total LOC columns.

MODULE NAME	COUNT OF TOTAL TABLE	COUNT OF TOTAL FIELD	TOTAL LOC
Module 1			
Module 2			
Module 3			
Module 4			
Module 5			
Module 6			
Module 7			
Module 8			
Module 9			
Module 10			

Figure 18 .Analysis Data of MOODLE

3.3.3. SAP/ABAP Data Modeler for PROJECT X

In PROJECT X, the metadata and the ER Diagram of the project is provided from a standard tool called Data Modeler in SAP/ABAP, which directly gives the metadata and the ER Diagram of the modules. For PROJECT X, DB Designer is not preferred because;

- PROJECT X's codes are in confidential level because of that another database tool is not allowed for connection
- SAP/ABAP has its own dictionary separate from Oracle's data dictionary. Referential integrity and entity relationships are handled at SAP/ABAP level within its own dictionary and not at database (Oracle) level. Therefore, there is no relationship between tables in database level and if DB Designer was used it would not be possible to see the existing relationships.

For these reasons, the metadata and the ER Diagram of the PROJECT X is developed with SAP/ABAP's Data Modeler tool [55].

Data Modeler;

- is an ABAP/4 Development Workbench development tool,
- develop data models with the SAP/ABAP SERM (Structured Entity Relationship Model) method,
- allows to map the models which have been created in the Dictionary,
- have basic objects like data models,
- unlimited hierarchy levels of data models can be created and in the process parts of data models can be reused,
- can produce the ER Diagram, which represents all the entity types, the attributes of the entities, the relationships and specializations existing between the entity types within in the database, as shown in the following Figure 19.

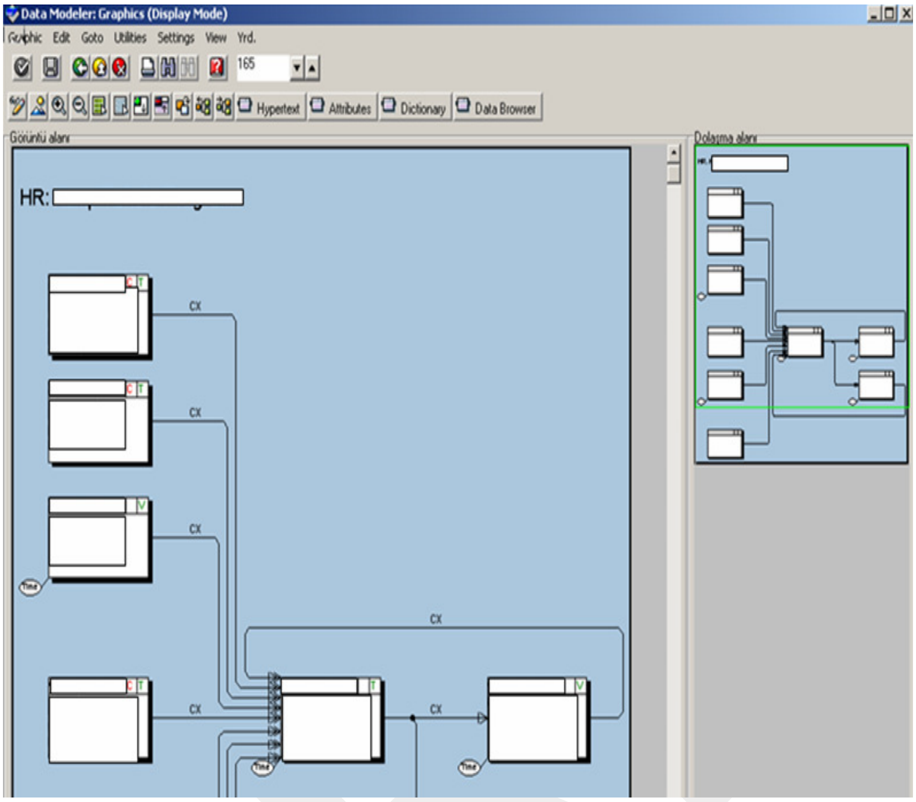

Figure 19 .SAP/ABAP Data Modeler Graphics Display Screen of PROJECT X

In this screen, entities, attributes and their relations are visualized. For details of the attributes, the button [Attributes]

 is used. The attributes of the entity can be seen as the screen given below.

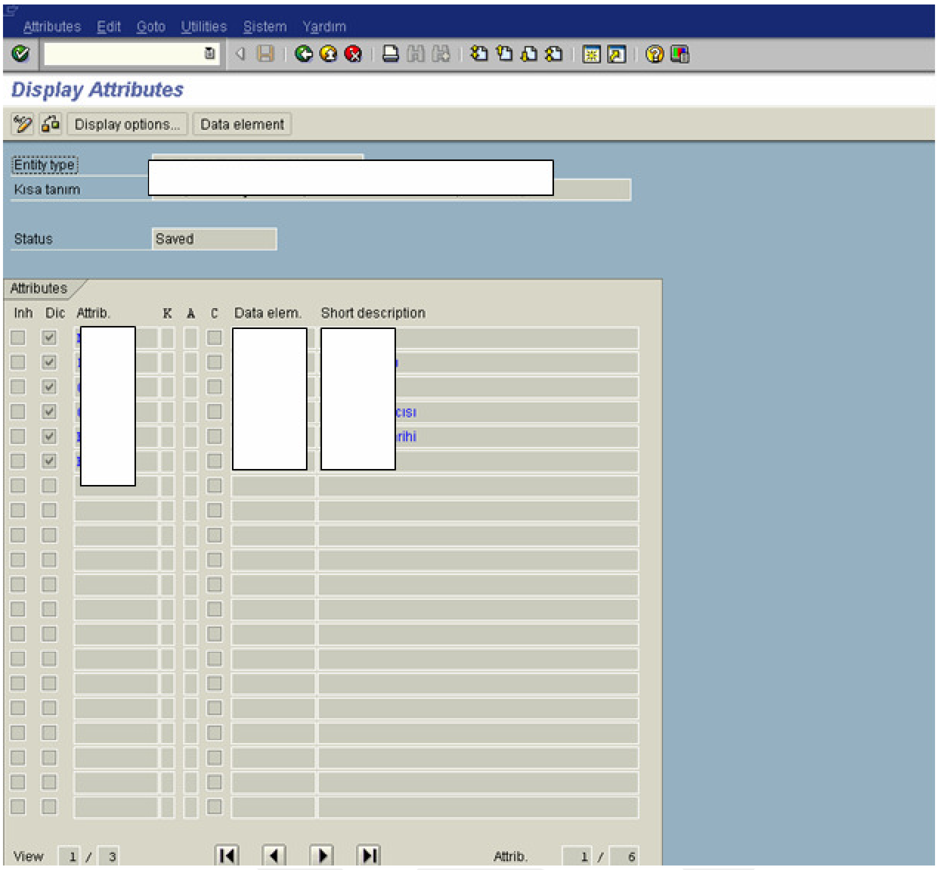

Figure 20 .SAP/ABAP Data Modeler Attributes Display Screen of PROJECT X

The details of these attributes are gathered with the [Data Element]

button. With the help of this button, the screen, which is shown in the figure below, gives the details of the attributes.

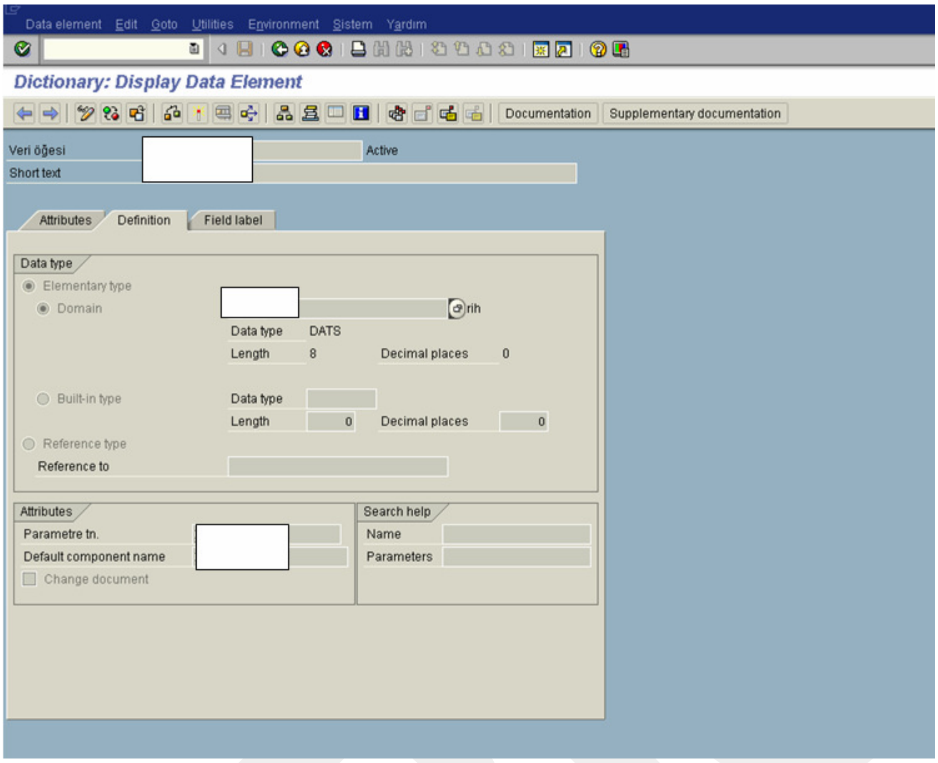

Figure 21 .SAP/ABAP Data Modeler Data Element Display Screen of PROJECT X

As an output of this step, the metadata and the ER Diagram of the PROJECT X, which is required for the following steps of this research, is produced.

3.3.4. Database Created for PROJECT X

Data Modeler is used for gathering the detailed data of the database, as described in the previous section. Data Modeler gets all data of the database, can be called as metadata, in a ER Diagram format and makes it possible prepare the data required for the analysis, which is done in this research.

By using the metadata and ER Diagram obtained from the Data Modeler, five steps are applied in order to arrange the data for analysis. Summary of the steps are given in the following figure.

The analysis steps shown Figure 22 of MOODLE are explained in detail in the following.

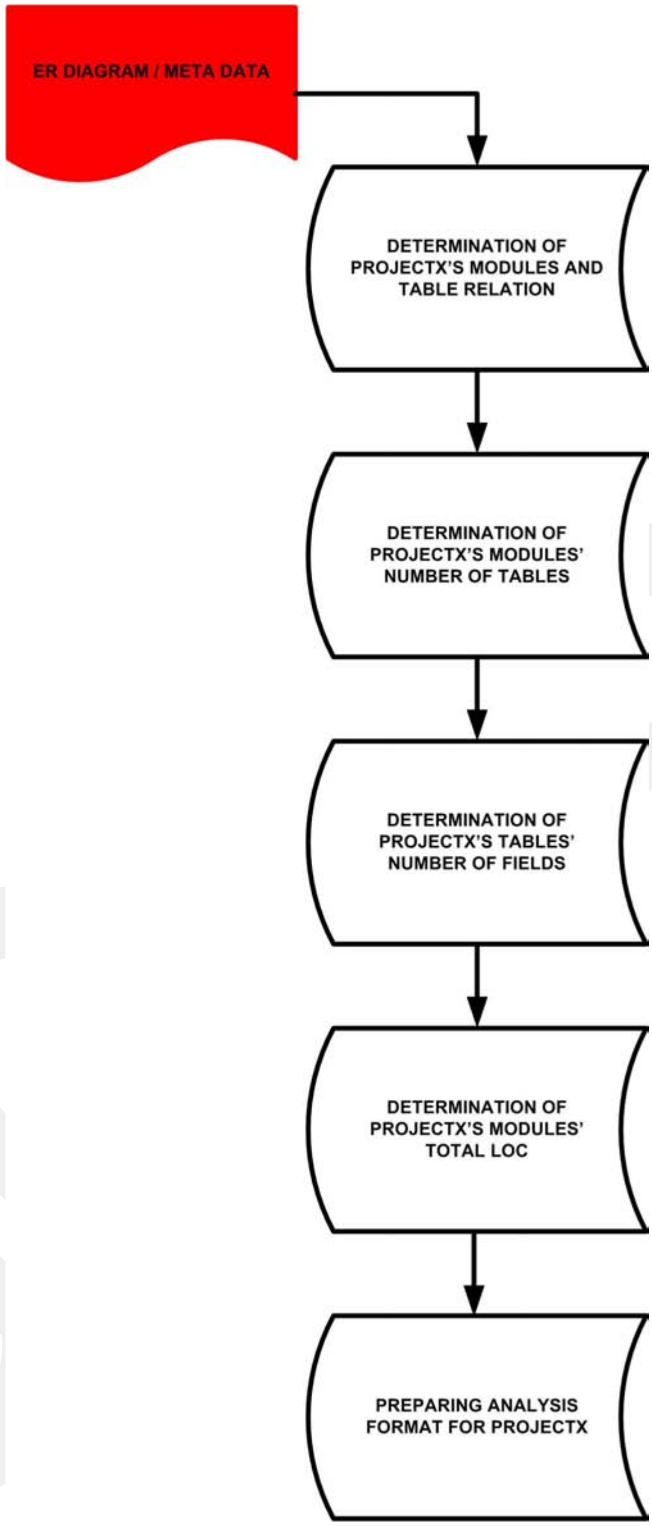

Figure 22 .Database Analysis Phases of PROJECT X

The analysis steps shown Figure 22 of MOODLE are explained in detail in the following.

1. Determining Modules and Tables Relation for PROJECT X

As mentioned in MOODLE analysis steps, large software usually build up several modules, which consist of several program units to implement the functionality in the scope of the module. Accordingly, the first step in the analysis is determining the modules of the database system.

The relation between the modules and the tables is determined from the ER Diagram. The constituted format of the excel database, which keeps the module and the module's table relation, is given in the following Figure 23.

MODULE NAME	TABLE NAME
Module 1	Table 1
Module 1	Table 2
Module 1	Table 3
Module 2	Table 4
Module 2	Table 5
Module 2	Table 6
Module 2	Table 7
Module 3	Table 8
Module 3	Table 9
Module 4	Table 10

Figure 23 .Modules and Modules' Tables of PROJECT X

2. Determining Number of Tables Used In Modules for PROJECT X

In the second step, by using ER Diagram the occurrence of these tables are counted for all modules separately. The format of excel, made up of Module Name and Count of Total Table columns, is shown in the following Figure 24.

MODULE NAME	COUNT OF TOTAL TABLE
Module 1	
Module 2	
Module 3	
Module 4	
Module 5	
Module 6	
Module 7	
Module 8	
Module 9	
Module 10	

Figure 24 .Modules and Count of Tables Used for Modules of PROJECT X

3. Determining Number of Fields of Tables for PROJECT X

Determining the number of fields of all tables is the third step of the study in the excel database. The attributes of the entities are counted from the ER Diagram. The total of these counts will provide the results (the number of fields in the tables) required for the study. The format of database, consists Table Name and Count of Total Fields, is shown in the following Figure 25.

TABLE NAME	COUNT OF TOTAL FIELDS
Table 1	
Table 2	
Table 3	
Table 4	
Table 5	
Table 6	
Table 7	
Table 8	
Table 9	
Table 10	

Figure 25 .Tables and Total Fields of Tables of PROJECT X

4. Determining Total LOC of Each Module for PROJECT X

In the fourth step, the total LOC for each module, which will be input of the fifth step and will be required at the end of the research for analysis, is computed. LOC of the modules have been determined with the help of SAP/ABAP codes, which can be called as Line Counter for PROJECT X. It counts the LOC by handling the recursive structure of the source code and determines LOC of all modules separately. The format for storing data, Module Name and Total LOC, is shown in the following Figure 26.

MODULE NAME	TOTAL LOC
Module 1	
Module 2	
Module 3	
Module 4	
Module 5	
Module 6	
Module 7	
Module 8	
Module 9	
Module 10	

Figure 26 .Modules and Modules' Total LOC of PROJECT X

5. Preparing Format for Analysis for PROJECT X

A format, which will be the input of the analysis, is used as the fifth step of the study. The data of the analysis is prepared in the format with Module Name, Count of Total Table, Count of Total Field and Total LOC columns, as given the next figure.

MODULE NAME	COUNT OF TOTAL TABLE	COUNT OF TOTAL FIELD	TOTAL LOC
Module 1			
Module 2			
Module 3			
Module 4			
Module 5			
Module 6			
Module 7			
Module 8			
Module 9			
Module 10			

Figure 27 .Analysis Format of PROJECT X

CHAPTER 4

RESEARCH RESULTS

4.1. Introduction

As mentioned in the previous chapter, two software projects, MOODLE and PROJECT X, are analysed. To collect data, required for the DD&C Analysis, 4 basic steps are used for each project,

Reverse engineering,

Gathering metadata,

3. Determination of LOC and

Analysis.

In some steps, different methods are used since the features of two projects are different. However, the methods are different; the data collected are the same data for the analysis. The methods, summarized in Figure 8 in Chapter 3, are summarized again in a table format for a clear understanding in Table 4.

Table 4 Research Phases

	MOODLE	**PROJECT X**
Reverse Engineering	DB Designer is used	SAP/ABAP Data Modeler Tool is used
Gathering metadata	Collected data stored in an excel database	Collected data stored in an excel database
Determination of LOC	A program, developed in Java is used	Custom developed program in ABAP is used
Analysis	Excel is used	Excel is used

As shown in Figure 10, Reverse Engineering is used for both projects, to turn to the design phase of the projects. This step can be defined as going backwards through the development cycle.

In the second step, after gathering the metadata and drawing the ER Diagram, excel database is created with data required for analysis.

The third step is LOC determination for all modules of each project. This data will be used in the analysis as shown in Figure 8. For this aim, two different programs have been developed, in order to count the LOC by handling the recursive structure of both projects.

The results of the research are given in the following parts of the chapter.

4.2. Research Results for Project 1: MOODLE

MOODLE [56];

- is a course management system (CMS),
- is an open Source software package,
- provides effective web-based learning communities,
- compatible with Windows, Mac OS X, Linux, FreeBSD, Unix, NetWare and all systems that supports PHP,
- supports more than 70 languages.

MOODLE is divided into modules in order to divide the database into meaningful fragments. Modules are determined from the directory of the database files.

MOODLE is decomposed into 20 modules. The names of the modules are given in the table given below.

Table 5 MOODLE's Modules

Module 1	Admin
Module 2	Assignment
Module 3	Backup
Module 4	Chat
Module 5	Choice
Module 6	Config
Module 7	Course
Module 8	Enrol
Module 9	Forum
Module 10	Glossary
Module 11	Journal
Module 12	Label
Module 13	Lesson
Module 14	Quiz
Module 15	Resource
Module 16	Scorm
Module 17	Survey
Module 18	User
Module 19	Wiki
Module 20	Workshop

4.2.1. DB Designer for MOODLE

The output of the implementation phase for MOODLE is reverse engineered back to the analysis phase by using DB Designer. DB Designer produced the detailed data of the database with tables, fields and relations which can be called as metadata and the ER Diagram. In Figure 28, a part of MOODLE's ER Diagram is shown and the whole ER Diagram of MOODLE is given in Appendix A.

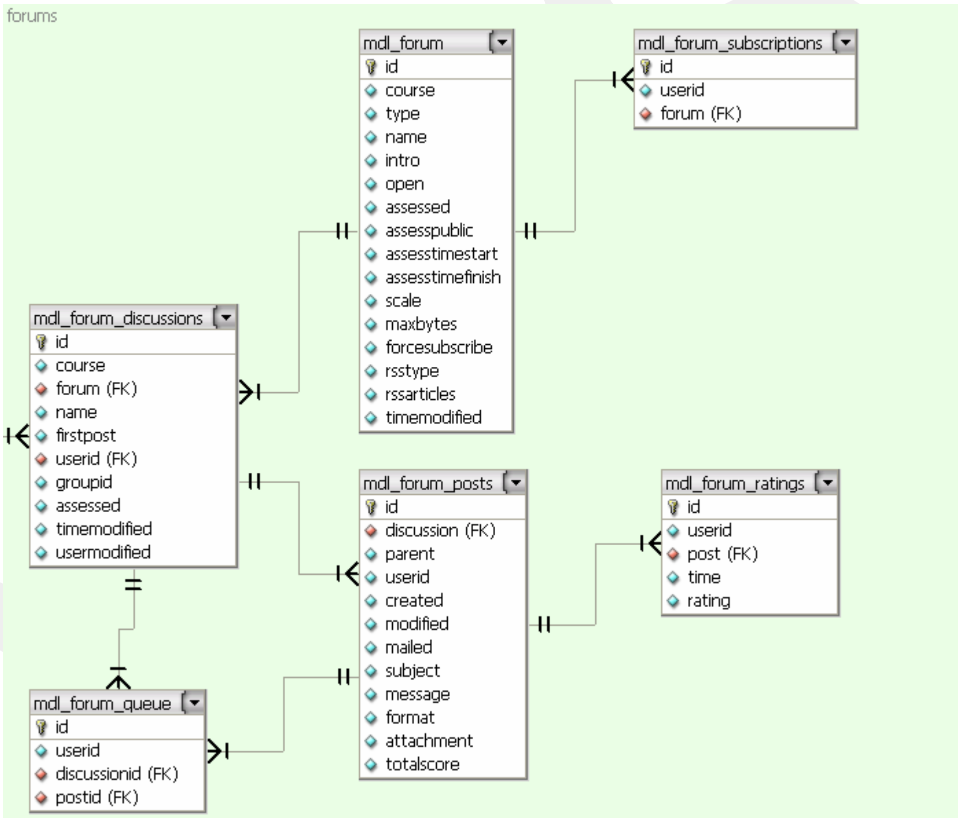

Figure 28 .Example ER Diagram for a Module of MOODLE

First 30 rows of metadata is illustrated in Figure 29. The whole data is given in Appendix B.

ID	Tablename	Table Type	Table Prefix	ID2	ColName	idData type	DataDesc	Datatype Params	Width	Primary Key	Not Null	IsForeign Key	Default Value	ID3	Index Name	Index Kind
1000	adodb_logsql	0	0	1132	created	15	DATETIME		0	0	1	0	0000-00-00 00:00:0 0			
1000	adodb_logsql	0	0	1133	sql0	20	VARCHAR	(250)	0	0	1	0				
1000	adodb_logsql	0	0	1134	sql1	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1135	params	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1136	tracer	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1137	timer	12	DECIMAL	(16,6)	0	0	1	0	0.00000 0			
1001	assignment	0	0	5961	id	5	INTEGER	(10)	-1	1	1	0				
1001	assignment	0	0	1139	course	5	INTEGER	(10)	0	0	1	1	0			
1001	assignment	0	0	1140	name	20	VARCHAR	(255)	0	0	1	0				
1001	assignment	0	0	1141	description	28	TEXT		0	0	1	0				
1001	assignment	0	0	1142	format	1	TINYINT	(4)	0	0	1	0	0			
1001	assignment	0	0	1143	assignmentty	20	VARCHAR	(50)	0	0	1	0				
1001	assignment	0	0	1144	resubmit	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1145	preventlate	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1146	emailteachers	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1147	var1	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1148	var2	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1149	var3	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1150	var4	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1151	var5	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1152	maxbytes	5	INTEGER	(10)	0	0	1	0	100000			
1001	assignment	0	0	1153	timedue	5	INTEGER	(10)	0	0	1	0	0			
1001	assignment	0	0	1154	timeavailable	5	INTEGER	(10)	0	0	1	0	0			
1001	assignment	0	0	1155	grade	5	INTEGER	(10)	0	0	1	1	0			
1001	assignment	0	0	1156	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	13938	id	5	INTEGER	(10)	-1	1	1	0				
1002	assignment_submissions	0	0	13936	assignment	5	INTEGER	(10)	-1	0	1	1	0			
1002	assignment_submissions	0	0	1161	userid	5	INTEGER	(10)	0	0	1	1	0			

Figure 29 .Metadata of MOODLE

The ER Diagram and the metadata of MOODLE are the outputs of DB Designer, which will be used as inputs of the following steps.

4.2.2. Database Created for MOODLE

By using the ER Diagram and metadata, obtained from the DB Designer, five steps are applied in order to arrange the data for analysis. Summary of the steps are given in Figure 30 .

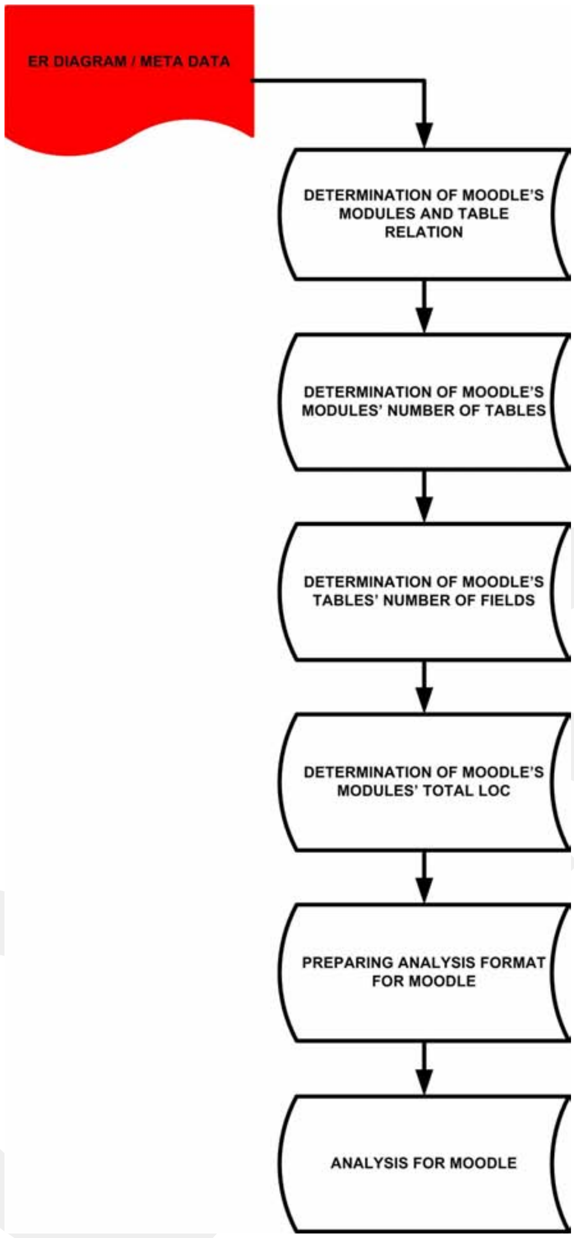

Figure 30 .Database Analysis Phases of MOODLE

Data collected by using the steps above are given in following sections of the chapter.

1. Modules and Tables Relation

The relation between the modules and the tables is determined from the table names. The constituted format and first 30 entries of the excel database, which keeps the module and the module's table relation, is illustrated in Figure 31. The whole data is given in Appendix C.

MODULE NAME	TABLE NAME
admin	mdl_adodb_logsql
assignment	mdl_assignment
assignment	mdl_assignment_submissions
backup	mdl_backup_config
backup	mdl_backup_courses
backup	mdl_backup_files
backup	mdl_backup_ids
backup	mdl_backup_log
chat	mdl_chat
chat	mdl_chat_messages
chat	mdl_chat_users
choice	mdl_choice
choice	mdl_choice_answers
choice	mdl_choice_options
config	mdl_config
config	mdl_config_plugins
course	mdl_course
course	mdl_course_categories
course	mdl_course_display
course	mdl_course_meta
course	mdl_course_modules
course	mdl_course_sections
enrol	mdl_enrol_authorize
enrol	mdl_enrol_paypal
forum	mdl_forum
forum	mdl_forum_discussions
forum	mdl_forum_posts
forum	mdl_forum_queue

Figure 31 .Modules and Modules' Tables Data of MOODLE

2. Number of Tables Used In Modules

The occurrence of these tables is counted for all modules separately. As mentioned before, for this aim the "VLOOKUP", "ISNA", "OFFSET", "COUNTIF" and "IF" functions of excel are used. The data collected for 10 modules and 30 tables in the excel database is illustrated in Figure 32 and the whole data is given in Appendix D.

MODULE NAME	assignment	chat	choice	forum	glossary	journal	label	lesson	quiz	resource
	Module_01	Module_02	Module_03	Module_04	Module_05	Module_06	Module_07	Module_08	Module_09	Module_10
TABLE NAME	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance
mdl_adodb_logsql	0	0	0	0	0	0	0	0	0	0
mdl_assignment	1	0	0	0	0	0	0	0	0	0
mdl_assignment_submissions	1	0	0	0	0	0	0	0	0	0
mdl_backup_config	0	0	0	0	0	0	0	0	0	0
mdl_backup_courses	0	0	0	0	0	0	0	0	0	0
mdl_backup_files	0	0	0	0	0	0	0	0	0	0
mdl_backup_ids	0	0	0	0	0	0	0	0	0	0
mdl_backup_log	0	0	0	0	0	0	0	0	0	0
mdl_block	0	0	0	0	0	0	0	0	0	0
mdl_block_instance	0	0	0	0	0	0	0	0	0	0
mdl_block_rss_client	0	0	0	0	0	0	0	0	0	0
mdl_chat	0	1	0	0	0	0	0	0	0	0
mdl_chat_messages	0	1	0	0	0	0	0	0	0	0
mdl_chat_users	0	1	0	0	0	0	0	0	0	0
mdl_choice	0	0	1	0	0	0	0	0	0	0
mdl_choice_answers	0	0	1	0	0	0	0	0	0	0
mdl_choice_options	0	0	1	0	0	0	0	0	0	0
mdl_config	0	0	0	0	0	0	0	0	0	0
mdl_config_plugins	0	0	0	0	0	0	0	0	0	0
mdl_course	0	0	0	0	0	0	0	0	0	0
mdl_course_categories	0	0	0	0	0	0	0	0	0	0
mdl_course_display	0	0	0	0	0	0	0	0	0	0
mdl_course_meta	0	0	0	0	0	0	0	0	0	0
mdl_course_modules	0	0	0	0	0	0	0	0	0	0
mdl_course_sections	0	0	0	0	0	0	0	0	0	0
mdl_enrol_authorize	0	0	0	0	0	0	0	0	0	0
mdl_enrol_paypal	0	0	0	0	0	0	0	0	0	0

Figure 32 .Modules and Tables Used for Modules Data of MOODLE

3. Number of Fields of Tables

The total data types of all tables are counted separately with the functions of excel. By calculating the sum of all types for each table, the field number of tables is determined. The first 30 tables' data is given as an example in the following figure. The rest of the data collected is illustrated in Appendix E.

FIELD TYPE / TABLE NAME	CHAR	DATE TIME	DECIMAL	DOUBLE	ENUM	FLOAT	INTEGER	LONG BLOB	LONG TEXT	MEDIUM TEXT	SMALL INT	TEXT	TINY INT	VARC HAR	TOTAL FIELDS
mdl_adodb_logsql	0	1	1	0	0	0	0	0	0	0	0	3	0	1	6
mdl_assignment	0	0	0	0	0	0	12	0	0	0	0	1	4	2	19
mdl_assignment_submissions	0	0	0	0	0	0	9	0	0	0	0	3	2	0	14
mdl_backup_config	0	0	0	0	0	0	1	0	0	0	0	0	0	2	3
mdl_backup_courses	1	0	0	0	0	0	5	0	0	0	0	0	0	0	6
mdl_backup_files	0	0	0	0	0	0	3	0	0	0	0	0	0	2	5
mdl_backup_ids	0	0	0	0	0	0	3	0	0	1	0	0	0	1	5
mdl_backup_log	0	0	0	0	0	0	4	0	0	0	0	0	0	1	5
mdl_chat	0	0	0	0	0	0	7	0	0	0	0	1	0	1	9
mdl_chat_messages	0	0	0	0	0	0	6	0	0	0	0	1	0	0	7
mdl_chat_users	0	0	0	0	0	0	8	0	0	0	0	0	0	4	12
mdl_choice	0	0	0	0	0	0	5	0	0	0	0	1	7	1	14
mdl_choice_answers	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5
mdl_choice_options	0	0	0	0	0	0	4	0	0	0	0	1	0	0	5
mdl_config	0	0	0	0	0	0	1	0	0	0	0	1	0	1	3
mdl_config_plugins	0	0	0	0	0	0	1	0	0	0	0	1	0	2	4
mdl_course	0	0	0	0	0	0	15	0	1	0	4	1	0	12	33
mdl_course_categories	0	0	0	0	0	0	5	0	0	0	0	1	1	1	8
mdl_course_display	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
mdl_course_meta	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_course_modules	0	0	0	0	0	0	7	0	0	0	0	0	3	0	10
mdl_course_sections	0	0	0	0	0	0	3	0	0	0	0	2	1	0	6
mdl_enrol_authorize	1	0	0	0	0	0	4	0	0	0	0	0	0	4	9
mdl_enrol_paypal	0	0	0	0	0	0	4	0	0	0	0	0	0	16	20
mdl_forum	0	0	0	0	1	0	9	0	0	0	0	1	5	1	17
mdl_forum_discussions	0	0	0	0	0	0	8	0	0	0	0	0	1	1	10

Figure 33 .Tables and Total Fields of Tables Data of MOODLE

4. Total LOC of Each Module

The LOC of the modules, determined with Java codes as mentioned before, are added to the excel database and the data is illustrated in the following figure.

MODULE NAME	TOTAL LOC
assignment	57211
chat	70997
choice	40540
forum	157667
glossary	249940
journal	54759
label	26473
lesson	43937
quiz	224341
resource	50476
scorm	115469
survey	88892
wiki	67567
workshop	6610
admin	286097
backup	67144
config	13148
course	454130
enrol	1427
user	68805

Figure 34 .Modules and Modules' Total LOC Data of MOODLE

5. Data for Analysis

The data required for the analysis is given in Figure 35.

MODULE NAME	COUNT OF TOTAL TABLE	COUNT OF TOTAL FIELD	TOTAL LOC
assignment	6	27	57211
chat	7	21	70997
choice	3	21	40540
forum	6	55	157667
glossary	15	51	249940
journal	4	15	54759
label	2	3	26473
lesson	26	127	43937
quiz	40	127	224341
resource	10	7	50476
scorm	22	19	115469
survey	15	28	88892
wiki	10	26	67567
workshop	12	74	6610
admin	4	0	286097
backup	8	16	67144
config	5	2	13148
course	18	46	454130
enrol	21	8	1427
user	31	39	68805

Figure 35 .Analysis Data of MOODLE

4.3. Research Results for Project 2: PROJECT X

PROJECT X, is an integrated business application software project. Because of the confidentiality constraints, the details of the project can not be given in this research. PROJECT X is developed in SAP/ABAP language. A brief information about SAP/ABAP is given.

SAP/ABAP [55];

- is real-time business applications, with several currency and several language capabilities built in,
- is compatible with multiple platforms and operating systems, like UNIX or Microsoft Windows,
- a 3-tiered model which is a client/server based application. The first layer is the presentation layer, which interfaces with the user. The second layer, which is called application layer, houses all the business-specific logic, and the last layer, which is the database layer, keeps all the information about the system,

- uses language called ABAP (Advanced Business Application Programming), which is a fourth generation language (4GL) and interacts with the database system with SQL statements for operations like query, update, delete.

- have application modules. Some examples for modules are; Human Resources (HR), Financial Accounting (FI) and Environmental Health and Safety (EH&S).

This research is done in HR module of PROJECT X. Briefly; HR supports the planning and control of personnel activities. The modules for the analysis are the sub modules of HR and their names are not given because of the confidentiality constraints of PROJECT X.

4.3.1. SAP/ABAP Data Modeler for PROJECT X

In PROJECT X, the metadata and the ER Diagram of the project is provided from a standard tool called Data Modeler in SAP/ABAP. Data Modeler produced the ER Diagram and represented all the entity types, the attributes of the entities, the relationships and specializations existing between the entity types within in the database. The ER Diagram produced is not given because of confidentiality constraints.

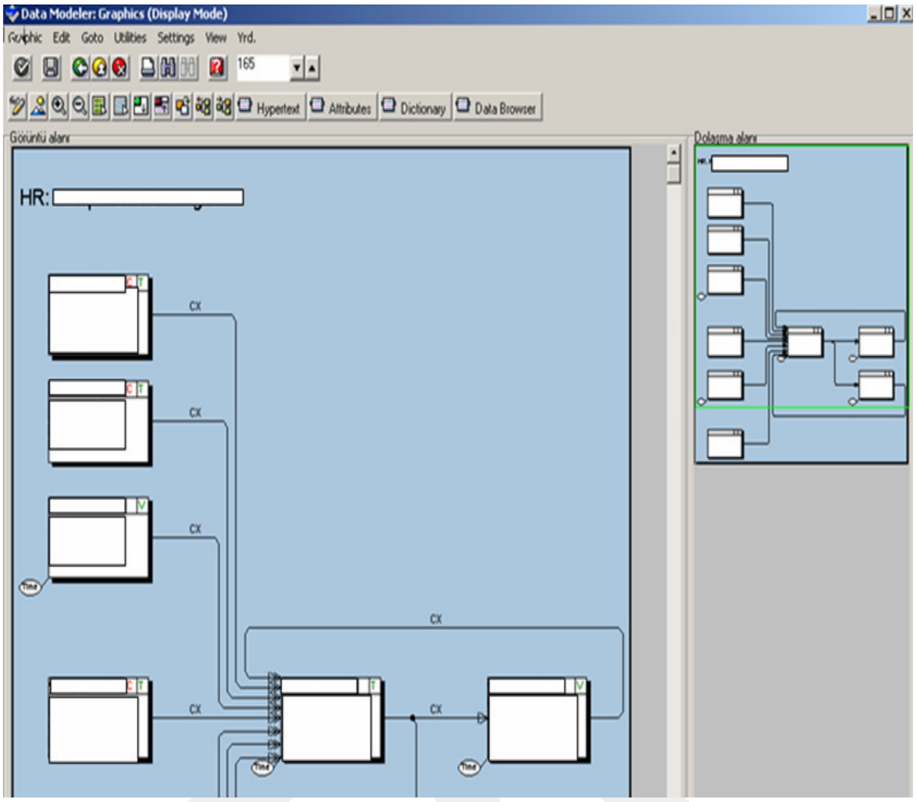

Figure 36 .SAP/ABAP Data Modeler Graphics Display Screen of PROJECT X

4.3.2. Database Created for PROJECT X

By using the metadata and ER Diagram obtained from the Data Modeler, five steps (section 4.2.2.2.1) are applied in order to arrange the data for analysis. Summary of the steps are given in Figure 37 .

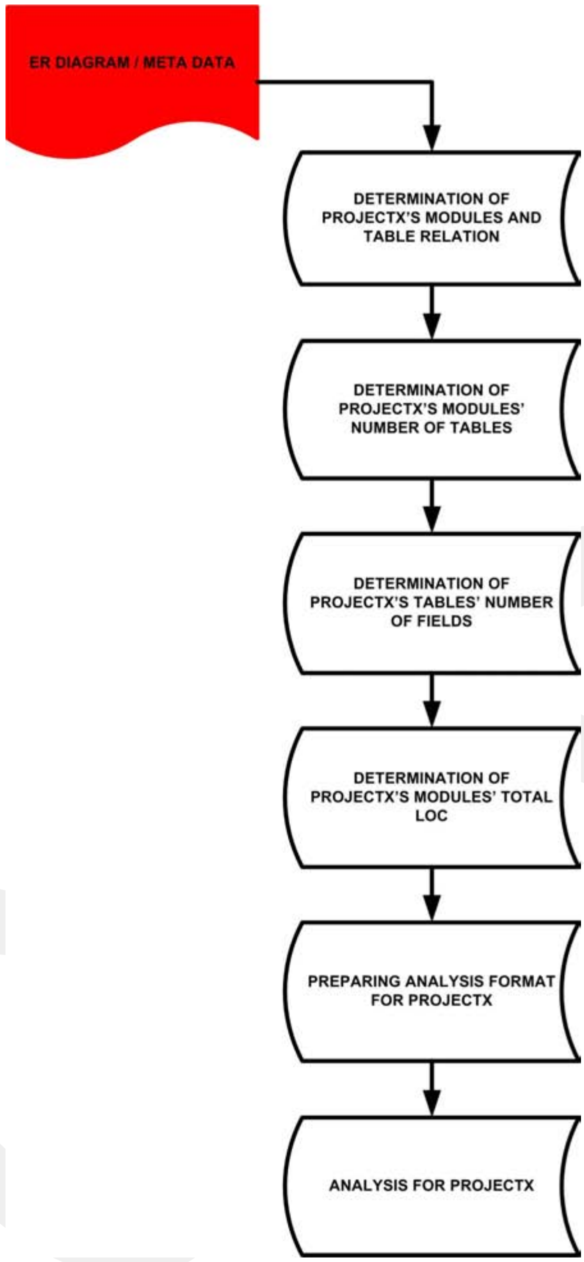

Figure 37 .Database Analysis Phases of PROJECT X

These data collected by using the steps above are given in following section of the chapter.

1. Modules and Tables Relation

The relation between the modules and the tables is determined from the ER Diagram. The data, which keeps the module and the module's table relation, is collected but cannot be given because of the confidentiality constraints.

2. Number of Tables Used In Modules

In the second step, by using ER Diagram the occurrence of these tables are counted for all modules separately but the data collected cannot be given because of the confidentiality constraints.

3. Number of Fields of Tables

Determining the number of fields of all tables is the third step of the study in the excel database. The attributes of the entities are counted from the ER Diagram. The total of these counts provided the results (the number of fields in the tables) required for the study but the data collected cannot be given because of the confidentiality constraints.

4. Total LOC of Each Module

In the fourth step, the total LOC for each module, which will be input of the fifth step and will be required at the end of the research for analysis, is collected. As mentioned before, the LOC of the modules have been determined with the help of SAP/ABAP codes. The module names are not given because of the confidentiality constraints.

MODULE NAME	TOTAL LOC
Module 1	4929
Module 2	1288
Module 3	6804
Module 4	2287
Module 5	2466
Module 6	3015
Module 7	1905
Module 8	1165
Module 9	1178
Module 10	1404
Module 11	2552
Module 12	3174
Module 13	3982
Module 14	4442
Module 15	740
Module 16	1815
Module 17	1637
Module 18	4063
Module 19	1681
Module 20	6075
Module 21	3205
Module 22	3229
Module 23	3169
Module 24	2286
Module 25	2008
Module 26	971
Module 27	1769
Module 28	6175
Module 29	593
Module 30	2872
Module 31	811
Module 32	3204
Module 33	2236
Module 34	2016

Figure 38 .Modules and Modules' Total LOC Data of PROJECT X

5. Format for Analysis

A format, which will be the input of the analysis, is used as the fifth step of the study. The data of the analysis is given in the next figure.

MODULE NAME	COUNT OF TOTAL TABLE	COUNT OF TOTAL FIELD	TOTAL LOC
Module 1	41	977	4929
Module 2	15	309	1288
Module 3	39	838	6804
Module 4	18	518	2287
Module 5	24	558	2466
Module 6	22	459	3015
Module 7	21	554	1905
Module 8	33	486	1165
Module 9	34	612	1178
Module 10	32	600	1404
Module 11	31	640	2552
Module 12	38	904	3174
Module 13	43	2005	3982
Module 14	23	458	4442
Module 15	16	376	740
Module 16	17	506	1815
Module 17	9	245	1637
Module 18	29	899	4063
Module 19	19	635	1681
Module 20	36	907	6075
Module 21	38	1014	3205
Module 22	23	636	3229
Module 23	29	815	3169
Module 24	38	653	2286
Module 25	23	479	2008
Module 26	10	177	971
Module 27	17	305	1769
Module 28	33	742	6175
Module 29	10	230	593
Module 30	23	641	2872
Module 31	12	358	811
Module 32	24	617	3204
Module 33	21	354	2236
Module 34	19	243	2016

Figure 39 .Analysis Data of PROJECT X

4.4. Research Results Analysis for MOODLE and PROJECT X

In this study, our research question is “Is there a relationship between LOC and conceptual and logical database design?” Accordingly, we analyzed the LOC and total number of tables and fields in the related module databases. We found that, LOC number and the number of tables and fields in the related module databases follow the similar paths (they generate similar signals) however, the sizes of the numbers are different.

4.4.1. Analysis Results for MOODLE

The change in the number of tables and fields are analysed according to increasing LOC. To keep the graphic lines more readable, number of tables is multiplied with 10000 and number of fields with 2000. In this part of the chapter only the graphics and regression analysis results of MOODLE are given. The evaluations of these analyses are done in the next part of the chapter for both projects, MOODLE and PROJECT X.

In Figure 43 and Figure 44 graphical paths are drawn for number of tables, number of fields and LOC.

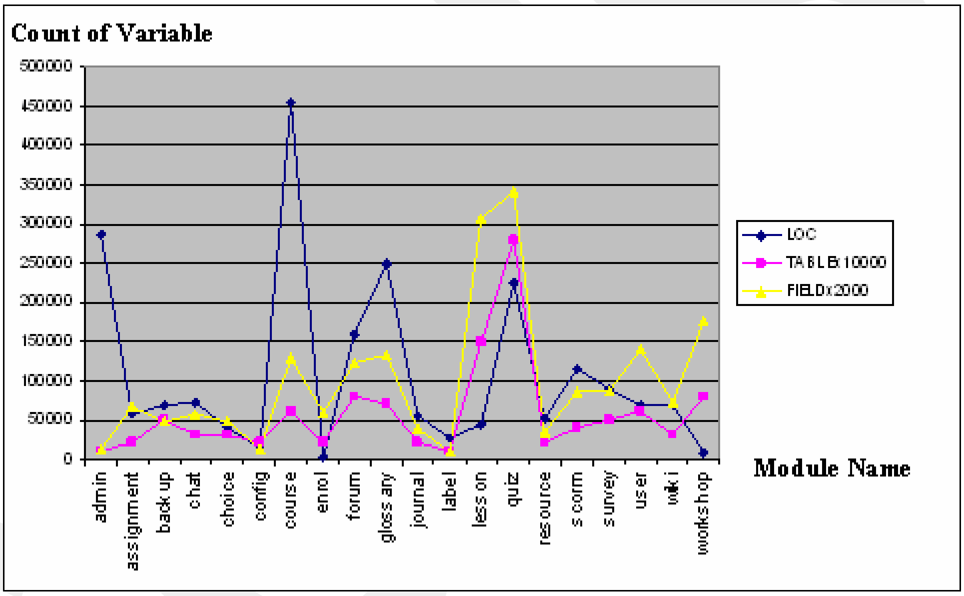

Figure 40 .LOC, Number of Tables and Fields (Unordered)

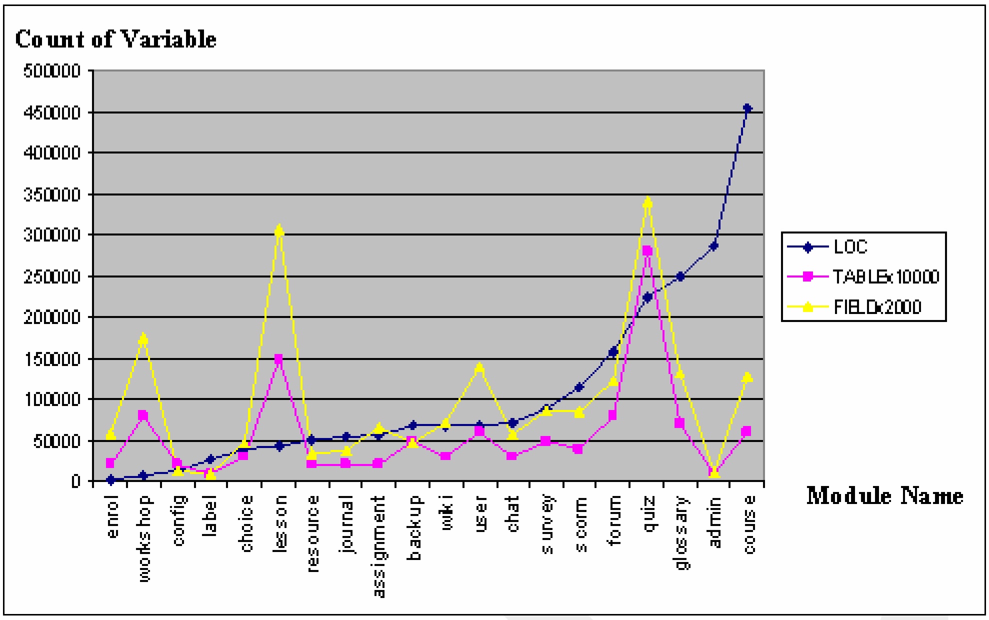

Figure 41 .Changes in the Number of Tables and Fields by LOC (Ordered by LOC)

In Figure 45, the change in the LOC according to increasing number of tables is analysed.

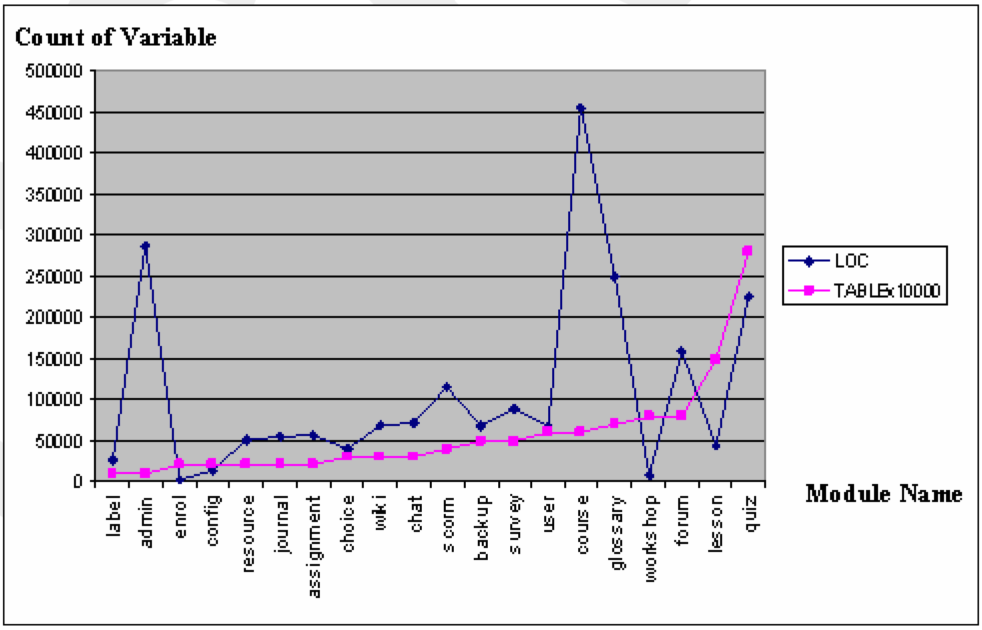

Figure 42 .Changes in LOC by Number of Tables

The change in the LOC according to increasing number of fields is analysed in below, Figure 46.

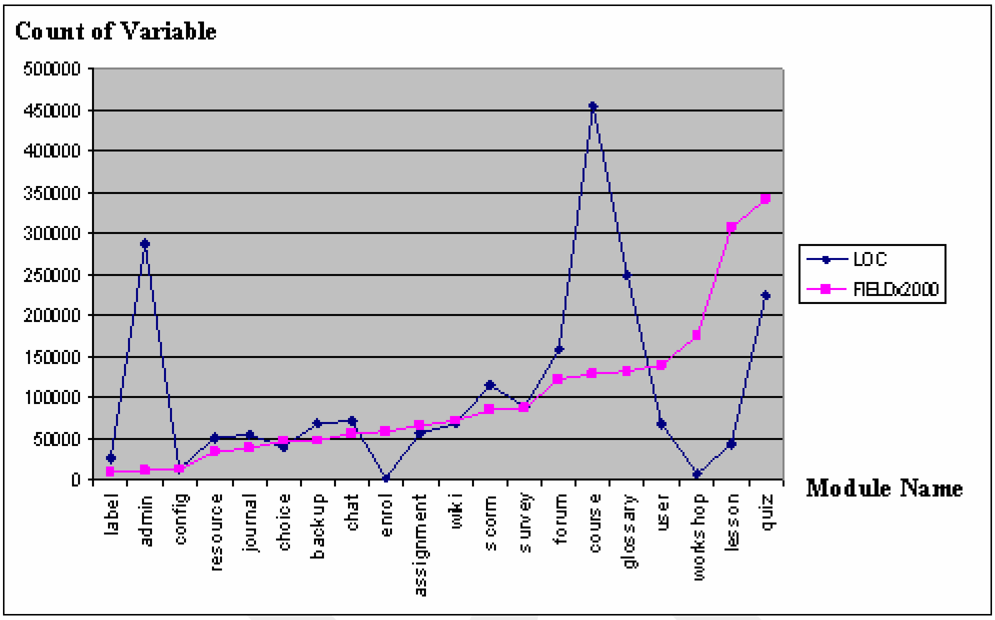

Figure 43 .Changes in LOC by Number of Fields

In the following Figure 47, regression results applied to the LOC and number of tables and field are given.

Regression Statistics	
Multiple R	0,263512937
R Square	0,069439068
Adjusted R Square	-0,040038688
Standard Error	116736,4789
Observations	20

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	17287061215	8643530608	0,634275585	0,54241405
Residual	17	2,31666E+11	13627405512		
Total	19	2,48953E+11			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	85456,06915	40142,12835	2,128837525	0,048186735	763,582204	170148,5561	763,582204	170148,5561
X Variable 1	0,764788053	1,195830046	0,639545774	0,530992623	-1,758192784	3,28776889	-1,758192784	3,28776889
X Variable 2	-0,21666762	0,824809018	-0,262688229	0,79594787	-1,95686252	1,523527279	-1,95686252	1,523527279

Figure 44 .Regression Analysis for MOODLE

4.4.2. Analysis Results for PROJECT X

The change in the number of tables and fields according to increasing LOC are analysed. To keep the graphic lines more readable, number of tables is multiplied with 100 and number of fields with 5.

In this part of the chapter only the graphics and regression analysis results of PROJECT X are given. The evaluations of these analyses are done in the next part of the chapter for both projects, MOODLE and PROJECT X.

In Figure 48 and Figure 49 graphical paths are drawn for number of tables, number of fields and LOC.

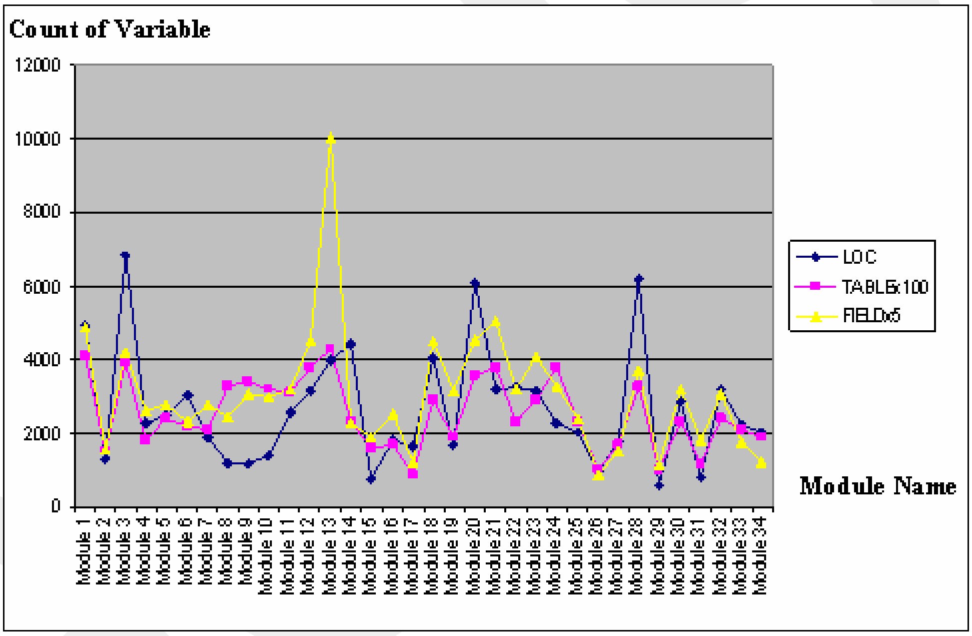

Figure 45 .LOC, Number of Tables and Fields

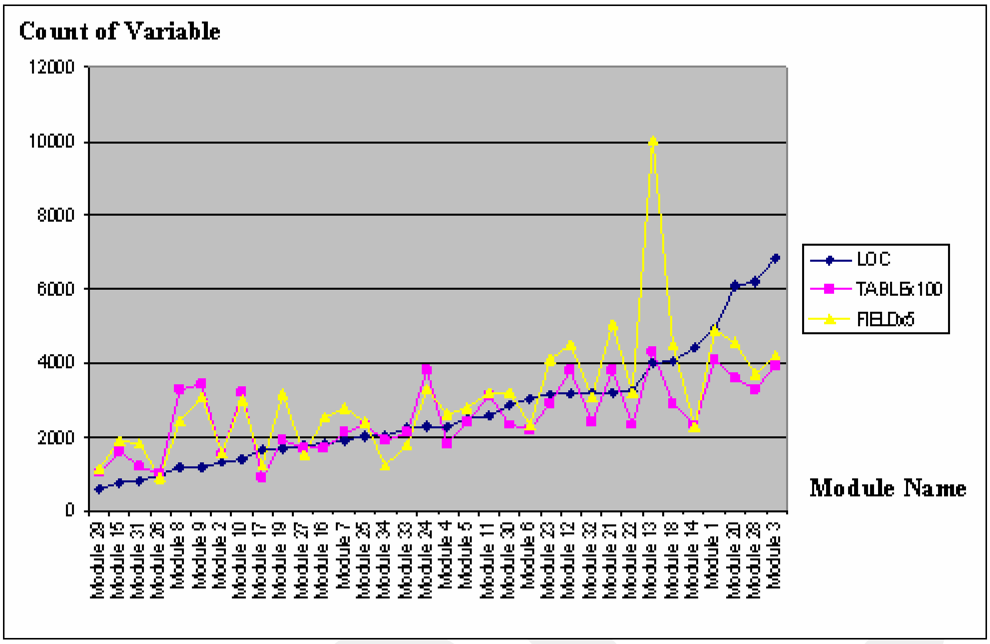

Figure 46 .Changes in Number of Tables and Fields by LOC

In Figure 50, the change in the LOC according to increasing number of tables is analysed.

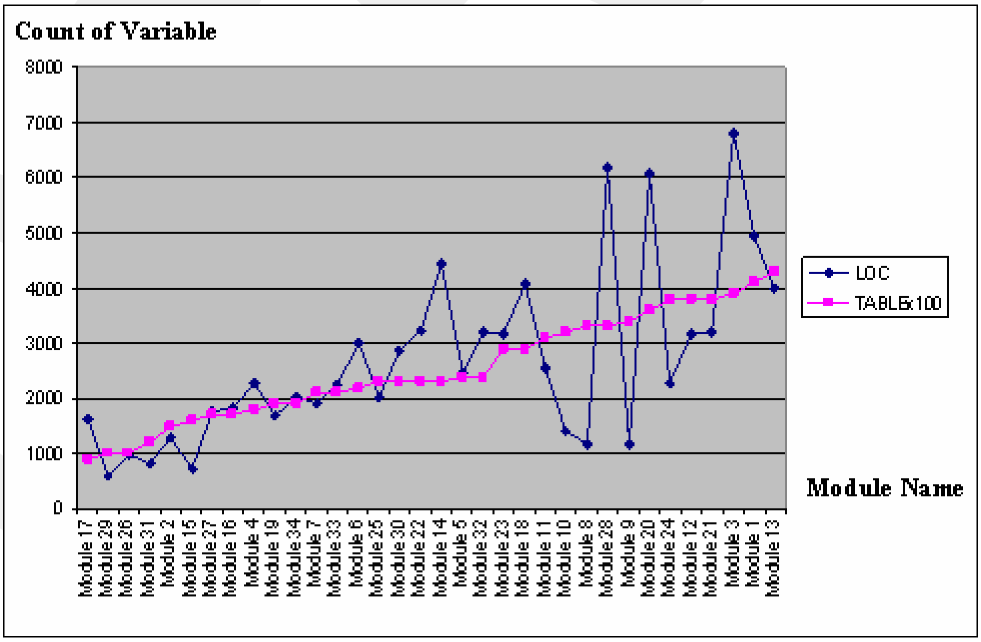

Figure 47 .Changes in LOC by Number of Tables

The change in the LOC according to increasing number of fields is analysed in below, Figure 51.

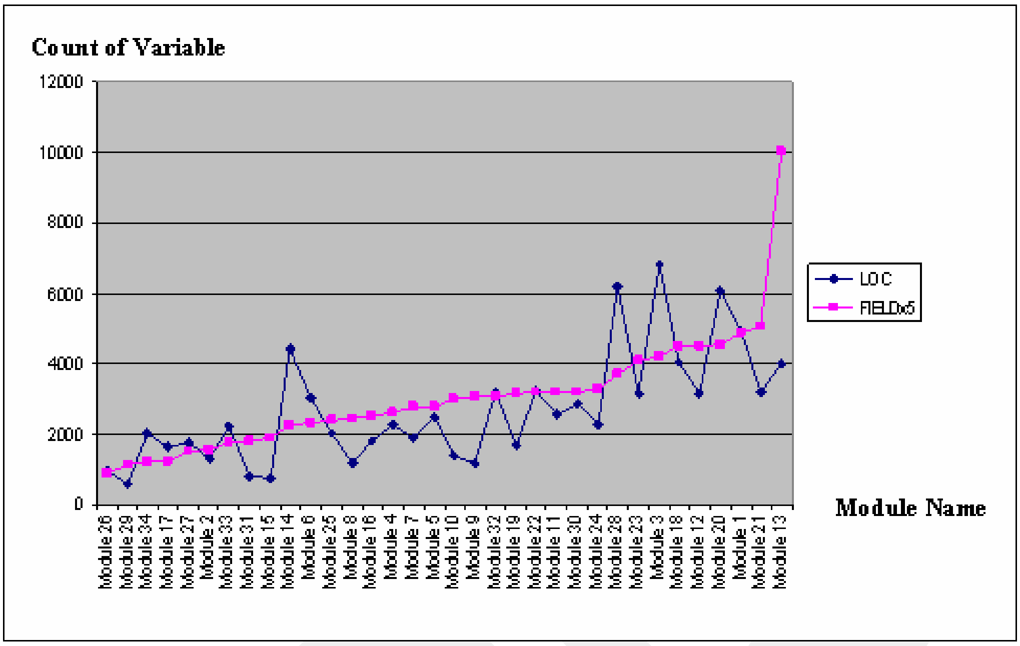

Figure 48 .Changes in LOC by Number of Fields

In the following Figure 52, the regression results applied to the LOC and number of tables and field are given.

Regression Statistics								
Multiple R	0,642918604							
R Square	0,413344331							
Adjusted R Square	0,375495578							
Standard Error	1248,587488							
Observations	34							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	34050881,94	17025440,97	10,92094983	0,000257004			
Residual	31	48328092,18	1558970,716					
Total	33	82378974,12						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	139,8846707	612,2422018	0,228479302	0,820774154	-1108,791527	1388,560869	-1108,791527	1388,560869
X Variable 1	0,786447986	0,362521795	2,169381251	0,03783986	0,047079912	1,525816059	0,047079912	1,525816059
X Variable 2	0,180774886	0,209862743	0,861395801	0,395634255	-0,247242999	0,608792771	-0,247242999	0,608792771

Figure 49 .Regression Analysis for PROJECT X

4.4.3. Evaluations on Analysis of MOODLE and PROJECT X

From the graphical interpretation, both curves follow the same inclinations and same path except some data points. It is clearly seen from the graphical analysis that, the number of tables and fields in the modules is generally increasing by the increase in LOC. This is a promising result regarding an estimate for LOC. The graphical analysis results of this study show that there is a strong relationship between actual LOC and number of tables and fields in the database. Depending on this strong relation, it can be accepted that DD&C approach is proven.

However, according to regression results on the data, it is hard to specify that there is an exact linear functional relation between these three variables. The reason for poor regression results seems to be some data points that saturate the graphical path. The data points, which saturate the regression results, require special attention on characteristics of the module.

CHAPTER 5

CONCLUSION AND DISCUSSION

Software development is an expensive process and compared to hardware expenses, it is the major cost for information system budgets [1]. In order to manage the software projects effectively and determine economic feasibility and control of project, it is important to have accurate, reliable cost estimates [3]. Inaccurate estimations (over/under) may cause opportunity lost, non-productive projects, low quality software, less profit products, and even the break-down of the project in the mid-stream. As a result, accurate cost estimation is a challenging task in software management. On the contrary, with the knowledge of cost of software project early in development cycle, management can approve or reject project proposal or rearrange resources accordingly [2], [5].

Cost estimation is affected by multiple parameters related to technologies, scheduling, manager - team member skills and experiences, mentality and culture, team cohesion, productivity, project size, complexity, reliability, quality and many more. These parameters are not easy to measure and manage and also have positive or negative impact on estimation accuracy [7].

In order to make accurate cost estimations in the literature some models and techniques exists, such as COCOMO, SLIM and FPA. Other than these formal models, some approaches depending on expert intuition or guess have also been used while determining the project cost. Although estimation models help engineers to optimize development process, improve control over resources and minimize project failure risk [7], it is still difficult to make accurate estimation and have some limits [7]. These limits are summarized in the following paragraphs.

* Some models use absolute scale counts, like FPA. As a result, transformations, to make them as interval or ratio scale, will not be possible. Any arithmetic operation between values can not be made [46]. Since determining one of the absolute scale of a model is dependent to the analyst, absolute scale counts will cause subjectivity and inconsistent results, which can change analyst from analyst [52].

* LOC based techniques, like COCOMO, cannot be used in the early phases of a software project [2]. Software size is dependent to programming language, because some languages may represent the same functionality with less number of lines of code than another one [49]. Other than these drawbacks for some languages, such as Authorware, definition of line is not clear thus making counting LOC difficult [2].

* Historical data, validity and uncertainty of data, limited time to develop estimates and immaturity of requirements are some challenging points for models, like COCOMO and SLIM, during estimation process [45], [5].

* Historical data based models, like COCOMO and SLIM, cannot estimate size of software at initial stage of project.

* Experienced analyst required models, like SLIM, causes to increase the cost of the project with the experienced workforce need and for these models, there cannot be simplicity advantage for the model usage.

In order to handle these disadvantages of the models, the relation between the LOC, database design and cost estimation is researched in this study.

This proven relation, DD&C approach, can be used to develop a new model, which uses parameters collected from the conceptual and logical database design like number of tables and fields.

DD&C approach can provide advantages like simplicity, independent results from the analyst and early estimation in the software life cycle. Besides these advantages, it will not require additional calculations because the data collections, used by DD&C, are already produced at the main steps of a database design phase.

By using the DD&C approach proposed in this study, a new model can be developed in the future works. By including other complexity elements in the database such as foreign keys, field types and field sizes, it would be possible to make better estimations based on a functional dependency of LOC and database complexity elements. This model can bring the simplicity, user-friendliness and consistent results. Also the cost estimation can be made at early stages of software design by carrying the cost estimation process to the database design phase of software.

REFERENCES

[1] Mukhopadhyay T., Vicinanza S.S. and Prietula M.J., "*Examining the feasibility of a case-based reasoning model for software effort estimation*", MIS Quarterly, 155-170, 1992.

[2] Gao Z. and Lo B. "*An Integrated Software Cost Model Based on COCOMO and Function Point Approaches*" Southern Cross University, 1995.

[3] Venkatachalam A.R., *Proceedings of 1993 International Joint Conference on Neural Networks: Software Cost Estimation Using Artificial Neural Networks*, Department of Decision Sciences, The Whittemore School of Business and Economics, University of New Hampshire.

[4] Lederer A.L. and Prasad J., "*Systems development and cost estimating: Challenges and guidelines*", Information Systems Management, 37-4 I, Fall, 1993.

[5] Strike K., El Emam K. and Madhavji N. "*Software cost estimation with incomplete data*", IEEE Transactions on Software Engineering, Vol. 27, No. 10, 2001.

[6] King J.L. and Schrems E.L., "*Cost-Benefit Analysis in Information System Development and Operation*", Computing Surveys, Mar. 1978.

[7] Andreou A.S., Papatheocharous E. and Skouroumounis C. "*19th IEEE International Conference on Tools with Artificial Intelligence: Evolving Conditional Value Sets of Cost Factors for Estimating Software Development Effort*", Department of Computer Science, University of Cyprus, 2007.

[8] Lederer A.L. and Prasad J., "*Nine Management Guidelines for Better Cost Estimating*", Communications of the ACM, Vol. 35, No. 2, p.51-59, 1992.

[9] Fernando J.B.L and Renato de Oliveira M., "*Managing Conflicts in IT Projects in Brazilian Companies*", Production Engineering Department, Polytechnic School, University of Sao Paulo.

[10] Sommerville I., *Software Engineering*, Addison-Wesley, 5 ed., 1995.

[11] Bowen R.B., "*Software Project Management Under Incomplete and Ambiguous Specifications*", IEEE Transactions on Engineering Management, Vol. 37, No. I, 1990.

[12] Royce W.W., "*Managing the development of large software systems: Concepts and techniques*", WESCON Tech. Papers, Aug. A.l 1-9, p.25-28, 1970.

[13] Boehm B.W., "*Software engineering*", IEEE Trans. Comput., Vol. C-25, No. 12, pp. 1226-1241, 1976.

[14] Boehm B.W., *Software Engineering Economics*. Englewood Cliffs, NJ: Prentice-Hall, 1981.

[15] Heemstra F.J., "*Software Cost Estimation Models*", Department of Industrial Engineering, University of Technology, 1990.

[16] Lederer A.L. and Prasad J., "*A Causal Model for Software Cost Estimating Error*", IEEE Transactions on Software Engineering, Vol. 24, No. 2, p.137, 1998.

[17] Heidrich J. et. al., "*Lessons Learned and Results from Applying Data-Driven*
Cost Estimation to Industrial Data Sets", Sixth International Conference on the Quality of Information and Communications Technology, 2007.

[18] Emery J.C., *"Cost/Benefit Analysis of Information Systems"*, Chicago: The Society for Information Management, p. 16-46, 1971.

[19] Li Y. F., Xie M. and Goh T. N. "*A Study of Genetic Algorithm for Project Selection for Analogy Based Software Cost Estimation*", Department of Industrial and Systems Engineering, National University of Singapore, Singapore, 2007.

[20] Musilek P., Pedrycz W. and Sun N., "*On the Sensitivity of COCOMO II Software Cost Estimation Model*", Dept. of Electrical and Computer Engineering, University of Alberta, Giancarlo Succi Faculty of Computer Science, Free University of Bozen, 2002.

[21] Yu W.D., "*A Modeling Approach to Software Cost Estimation*", IEEE Journal on Selected Areas in Communication, Vol. 8. No 2, 1990.

[22] Auer M., Biffl S., "*Increasing the Accuracy and Reliability of Analogy-Based Cost Estimation with Extensive Project Feature DimensionWeighting*", Proceedings of the 2004 International Symposium on Empirical Software Engineering (ISESE'04), Institute of Software Technology and Interactive Systems, Vienna University of Technology, 2004.

[23] Nasir M., "*A Survey of Software Estimation Techniques and Project Planning Practices*", Proceedings of the Seventh ACIS International Conference on Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing (SNPD'06), NUST Institute of Information Technology, National University of Sciences and Technology, 2006.

[24] Madachy R.J., "*Heuristic Risk Assessment Using Cost Factors*", Litton Data Systems and University of Southern California, 1997.

[25] Ferens D.V., "*The Conundrum of Software Estimation Models"* , Engineenng Analyst Air Force Research Laboratory (AFWIFSD), 1998.

[26] Boehm B.W., *Software Engineering Economics*. Englewood Cliffs, NJ: Prentice-Hall, 1981.

[27] Albrecht A.J. and Gaffney J., "*Software function, sourcelines of code, and development effort prediction: A software science validation*", IEEE Transactions on Software Engineering, Vo1.9, No.6, p.639-648, Nov. 1983.

[28] Pendharkar P.C., Subramanian G.H. and Rodger J.A., "*A Probabilistic Model for Predicting Software Development Effort*", IEEE Transactions on Software Engineering, Vol. 31, No. 7, p.615-624, 2005.

[29] Rowlands B.H., "*Estimating instructional systems development effort and costs*", Proceedings of the Seventh Annual Conference of the Australian Society for Computers in Learning in Tertiary Education, Bond University, 1989.

[30] Behrens C.A., "*Measuring the productivity of computer systems development activities with function point*s", IEEE Transactions on Software Engineering, Vo1.9, No.6, p.648-652, Nov. 1983.

[31] Boehm B.W., *Software Engineering Economics*. Englewood Cliffs, NJ: Prentice-Hall, 1981.

[32] *COCOMO 2.0 Model Definition Manual*, University of Southern California 1997.

[33] Valerdi R., "*Cognitive Limits of Software Cost Estimation*", Massachusetts Institute of Technology.

[34] Sommerville I., *Software Engineering*, Addison-Wesley, 7 ed., 2004.

[35] Kemerer C.F. and Porter B.S., "*Improving the Reliability of Function Point Measurement: An Empirical Study*", IEEE Transactions on Software Engineering, Vol 18. No 11, p.1011, Nov. 1992.

[36] DeMarco T., "*Controlling Software Projects: Management, Measurement and Estimation*", New York, N.Y.: Yourdon Press, 1982.

[37] Abran A. And Robillard P.N., "Function Points Analysis: An Empirical Study of Its Measurement Processes", IEEE Transactions on Software Engineering, Vol. 22, No. 12, p.895, Dec. 1996.

[38] Furey S., "*Why We Should Use Function Points*", American Management Systems, 1997.

[39] Guttag J.V. and Horning J.J., "*The Algebraic Specification of Abstract Data Types*", Acta Informatica 10, p.27-52, 1978.

[40] Matson J.E., Barrett B.E. and Mellichamp J.M., "*Software Development Cost Estimation Using Function Points*", IEEE Transactions on Software Engineering, Vol. 20, No. 4, April 1994.

[41] Fenton N. et. al., "*Making Resource Decisions for Software Projects*", Department of Computer Science, Queen Mary, University of London, 2004.

[42] Jones C., *"Software Sizing"*, IEE Review, p.165-167, July 1999.

[43] Booch G., "*Object Oriented Analysis and Design with Applications*" , Redwood City, Calif.: Benjamin/Cummings, 1991.

[44] Hastings T.E. and Sajeev A.S.M, "*A Vector-Based Approach to Software Size Measurement and Effort Estimation*", IEEE Transactions on Software Engineering, Vol. 27, No. 4, April 2001.

[45] Salas A., "*Cost Estimation: More Than an Analytical Tool*", 2004 IEEE Aerospace Conference Proceedings.

[46] Kitchenham B., "*The Problem with Function Points*", Keele University.

[47] Marwane R. and Mili A., "*Building tailor-made software cost model: Intermediate TUCOMO*", Information and Software Technology, Vol.33, No.3, p.232-238, Apr. 1991.

[48] Kitchenham B.A. and Taylor N.R., "*Software project development cost estimation*", The Journal of Systems and Software, Vo1.5, No.4, p.267-278, 1985.

[49] Matson J.E. and Mellichamp J.M., "*An object-oriented tool for function point analysis*", Expert Systems,Vol.l0, No.l, p.3-14, Feb. 1993.

[50] Zhao Y., Kuan Tan H.B. and Zhang W., *"Software Cost Estimation through Conceptual Requirement"*, Proceedings of the Third International Conference On Quality Software (QSIC'03), 2003.

[51] Chen P. P., "*The Entity-Relationship model – towards a Unified View of Data*", ACM Trans, Database Syst, 1(1), p. 9-36, Mar. 1976.

[52] Pressman R.S., *Software Engineering*, McGraw-Hill, Inc., New York, 3 ed., 1992.

[53] Huges B., *Software Project Management,* McGraw-Hill, Inc., Berkshire, 3 ed., 2002.

[54] Elmasri R., Navathe S.B., *Fundamentals of Database Systems,* Addison-Wesley, Boston 4 ed., 2004.

[55] 22.07.2008, *SAP Help Portal,* http://help.sap.com.

[56] 25.07.2008, *Open Source Software Package MOODLE,* http://moodle.org.

[57] 24.07.2008, *Fabulous Force Database Tools,* *http://www.fabforce.net/dbdesigner4*.

APPENDICES

APPENDIX A - MOODLE ER DIAGRAM

APPENDIX B - MOODLE METADATA

APPENDIX C - MOODLE MODULE AND TABLE RELATION

MODULE NAME	TABLE NAME
admin	mdl_adodb_logsql
assignment	mdl_assignment
assignment	mdl_assignment_submissions
backup	mdl_backup_config
backup	mdl_backup_courses
backup	mdl_backup_files
backup	mdl_backup_ids
backup	mdl_backup_log
chat	mdl_chat
chat	mdl_chat_messages
chat	mdl_chat_users
choice	mdl_choice
choice	mdl_choice_answers
choice	mdl_choice_options
config	mdl_config
config	mdl_config_plugins
course	mdl_course
course	mdl_course_categories
course	mdl_course_display
course	mdl_course_meta
course	mdl_course_modules
course	mdl_course_sections
enrol	mdl_enrol_authorize
enrol	mdl_enrol_paypal
forum	mdl_forum
forum	mdl_forum_discussions
forum	mdl_forum_posts
forum	mdl_forum_queue
forum	mdl_forum_ratings
forum	mdl_forum_read
forum	mdl_forum_subscriptions
forum	mdl_forum_track_prefs
glossary	mdl_glossary
glossary	mdl_glossary_alias
glossary	mdl_glossary_categories
glossary	mdl_glossary_comments
glossary	mdl_glossary_entries
glossary	mdl_glossary_entries_categories
glossary	mdl_glossary_formats
journal	mdl_journal

journal	mdl_journal_entries
label	mdl_label
lesson	mdl_lesson
lesson	mdl_lesson_answers
lesson	mdl_lesson_attempts
lesson	mdl_lesson_branch
lesson	mdl_lesson_default
lesson	mdl_lesson_grades
lesson	mdl_lesson_high_scores
lesson	mdl_lesson_pages
lesson	mdl_lesson_timer
lesson	mdl_log
lesson	mdl_log_display
lesson	mdl_message
lesson	mdl_message_contacts
lesson	mdl_message_read
lesson	mdl_modules
quiz	mdl_quiz
quiz	mdl_quiz_answers
quiz	mdl_quiz_attemptonlast_datasets
quiz	mdl_quiz_attempts
quiz	mdl_quiz_calculated
quiz	mdl_quiz_categories
quiz	mdl_quiz_dataset_definitions
quiz	mdl_quiz_dataset_items
quiz	mdl_quiz_grades
quiz	mdl_quiz_match
quiz	mdl_quiz_match_sub
quiz	mdl_quiz_multianswers
quiz	mdl_quiz_multichoice
quiz	mdl_quiz_newest_states
quiz	mdl_quiz_numerical
quiz	mdl_quiz_numerical_units
quiz	mdl_quiz_question_datasets
quiz	mdl_quiz_question_instances
quiz	mdl_quiz_question_versions
quiz	mdl_quiz_questions
quiz	mdl_quiz_randomsamatch
quiz	mdl_quiz_rqp
quiz	mdl_quiz_rqp_servers
quiz	mdl_quiz_rqp_states
quiz	mdl_quiz_rqp_types
quiz	mdl_quiz_shortanswer
quiz	mdl_quiz_states
quiz	mdl_quiz_truefalse

resource	mdl_resource
resource	mdl_scale
scorm	mdl_scorm
scorm	mdl_scorm_scoes
scorm	mdl_scorm_scoes_track
scorm	mdl_sessions
survey	mdl_survey
survey	mdl_survey_analysis
survey	mdl_survey_answers
survey	mdl_survey_questions
survey	mdl_timezone
user	mdl_user
user	mdl_user_admins
user	mdl_user_coursecreators
user	mdl_user_preferences
user	mdl_user_students
user	mdl_user_teachers
wiki	mdl_wiki
wiki	mdl_wiki_entries
wiki	mdl_wiki_pages
workshop	mdl_workshop
workshop	mdl_workshop_assessments
workshop	mdl_workshop_comments
workshop	mdl_workshop_elements
workshop	mdl_workshop_grades
workshop	mdl_workshop_rubrics
workshop	mdl_workshop_stockcomments
workshop	mdl_workshop_submissions

APPENDIX D - NUMBER OF TABLES USED IN MOODLE MODULES

MODULE NAME / TABLE NAME	assignment	chat	choice	forum	glossary	journal	label	lesson	quiz	resource	scorm	survey	wiki	workshop	admin	backup	config	course	enrol	user
	Module_01	Module_02	Module_03	Module_04	Module_05	Module_06	Module_07	Module_08	Module_09	Module_10	Module_11	Module_12	Module_13	Module_14	Module_15	Module_16	Module_17	Module_18	Module_19	Module_20
	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance	occurance
mdl_adodb_logsql	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
mdl_assignment	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_assignment_submissions	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_backup_config	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
mdl_backup_courses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
mdl_backup_files	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
mdl_backup_ids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
mdl_backup_log	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
mdl_block	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_block_instance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_block_rss_client	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_chat	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_chat_messages	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_chat_users	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_choice	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_choice_answers	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_choice_options	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_config	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
mdl_config_plugins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
mdl_course	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_course_categories	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_course_display	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_course_meta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_course_modules	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_course_sections	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
mdl_enrol_authorize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
mdl_enrol_paypal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
mdl_forum	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_discussions	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

mdl_forum_posts	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_queue	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_ratings	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_read	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_subscriptions	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_forum_track_prefs	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_alias	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_categories	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_comments	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_entries	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_entries_categories	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_glossary_formats	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_journal	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_journal_entries	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_label	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_answers	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_attempts	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_branch	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_default	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_grades	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_high_scores	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_pages	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_lesson_timer	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_log	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_log_display	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_message	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_message_contacts	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_message_read	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_modules	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_answers	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_attemptonlast_datasets	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_attempts	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_calculated	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_categories	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_dataset_definitions	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_dataset_items	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_grades	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_match	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_match_sub	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_multianswers	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_multichoice	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_newest_states	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_numerical	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

mdl_quiz_numerical_units	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_question_datasets	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_question_instances	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_question_versions	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_questions	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_randomsamatch	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_rqp	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_rqp_servers	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_rqp_states	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_rqp_types	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_shortanswer	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_states	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_quiz_truefalse	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
mdl_resource	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
mdl_scale	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
mdl_scorm	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
mdl_scorm_scoes	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
mdl_scorm_scoes_track	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
mdl_sessions	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
mdl_survey	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
mdl_survey_analysis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
mdl_survey_answers	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
mdl_survey_questions	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
mdl_timezone	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
mdl_user	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_user_admins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_user_coursecreators	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_user_preferences	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_user_students	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_user_teachers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
mdl_wiki	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
mdl_wiki_entries	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
mdl_wiki_pages	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
mdl_workshop	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_assessments	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_comments	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_elements	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_grades	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_rubrics	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_stockcomments	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
mdl_workshop_submissions	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TOTAL	2	3	3	8	7	2	1	15	28	2	4	5	3	8	1	5	2	6	2	6

APPENDIX E - NUMBER OF FIELDS OF TABLE OF MOODLE

FIELD TYPE / TABLE NAME	CHAR	DATETIME	DECIMAL	DOUBLE	ENUM	FLOAT	INTEGER	LONGBLOB	LONGTEXT	MEDIUMTEXT	SMALLINT	TEXT	TINYINT	VARCHAR	TOTAL FIELDS
mdl_adodb_logsql	0	1	1	0	0	0	0	0	0	0	0	3	0	1	6
mdl_assignment	0	0	0	0	0	0	12	0	0	0	0	1	4	2	19
mdl_assignment_submissions	0	0	0	0	0	0	9	0	0	0	0	3	2	0	14
mdl_backup_config	0	0	0	0	0	0	1	0	0	0	0	0	0	2	3
mdl_backup_courses	1	0	0	0	0	0	5	0	0	0	0	0	0	0	6
mdl_backup_files	0	0	0	0	0	0	3	0	0	0	0	0	0	2	5
mdl_backup_ids	0	0	0	0	0	0	3	0	0	1	0	0	0	1	5
mdl_backup_log	0	0	0	0	0	0	4	0	0	0	0	0	0	1	5
mdl_chat	0	0	0	0	0	0	7	0	0	0	0	1	0	1	9
mdl_chat_messages	0	0	0	0	0	0	6	0	0	0	0	1	0	0	7
mdl_chat_users	0	0	0	0	0	0	8	0	0	0	0	0	0	4	12
mdl_choice	0	0	0	0	0	0	5	0	0	0	0	1	7	1	14
mdl_choice_answers	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5
mdl_choice_options	0	0	0	0	0	0	4	0	0	0	0	1	0	0	5
mdl_config	0	0	0	0	0	0	1	0	0	0	0	1	0	1	3
mdl_config_plugins	0	0	0	0	0	0	1	0	0	0	0	1	0	2	4
mdl_course	0	0	0	0	0	0	15	0	1	0	4	1	0	12	33
mdl_course_categories	0	0	0	0	0	0	5	0	0	0	0	1	1	1	8
mdl_course_display	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
mdl_course_meta	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_course_modules	0	0	0	0	0	0	7	0	0	0	0	0	3	0	10
mdl_course_sections	0	0	0	0	0	0	3	0	0	0	0	2	1	0	6
mdl_enrol_authorize	1	0	0	0	0	0	4	0	0	0	0	0	0	4	9
mdl_enrol_paypal	0	0	0	0	0	0	4	0	0	0	0	0	0	16	20
mdl_forum	0	0	0	0	1	0	9	0	0	0	0	1	5	1	17
mdl_forum_discussions	0	0	0	0	0	0	8	0	0	0	0	0	1	1	10
mdl_forum_posts	0	0	0	0	0	0	6	0	0	0	0	1	3	2	12
mdl_forum_queue	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
mdl_forum_ratings	0	0	0	0	0	0	4	0	0	0	0	0	1	0	5
mdl_forum_read	0	0	0	0	0	0	7	0	0	0	0	0	0	0	7
mdl_forum_subscriptions	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_forum_track_prefs	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_glossary	0	0	0	0	0	0	8	0	0	0	0	1	15	2	26
mdl_glossary_alias	0	0	0	0	0	0	2	0	0	0	0	0	0	1	3
mdl_glossary_categories	0	0	0	0	0	0	2	0	0	0	0	0	1	1	4
mdl_glossary_comments	0	0	0	0	0	0	4	0	0	0	0	1	1	0	6
mdl_glossary_entries	0	0	0	0	0	0	6	0	0	0	0	1	6	2	15
mdl_glossary_entries_categories	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3

mdl_glossary_formats	0	0	0	0	0	0	1	0	0	0	0	0	2	6	9
mdl_journal	0	0	0	0	0	0	4	0	0	0	1	1	1	1	8
mdl_journal_entries	0	0	0	0	0	0	8	0	0	0	0	2	1	0	11
mdl_label	0	0	0	0	0	0	3	0	0	0	0	1	0	1	5
mdl_lesson	0	0	0	0	0	0	15	0	0	0	0	0	13	3	31
mdl_lesson_answers	0	0	0	0	0	0	7	0	0	0	0	2	2	0	11
mdl_lesson_attempts	0	0	0	0	0	0	8	0	0	0	0	1	0	0	9
mdl_lesson_branch	0	0	0	0	0	0	6	0	0	0	0	0	1	0	7
mdl_lesson_default	0	0	0	0	0	0	19	0	0	0	0	0	6	2	27
mdl_lesson_grades	0	0	0	0	0	1	5	0	0	0	0	0	0	0	6
mdl_lesson_high_scores	0	0	0	0	0	0	4	0	0	0	0	0	0	1	5
mdl_lesson_pages	0	0	0	0	0	0	6	0	0	0	0	1	4	1	12
mdl_lesson_timer	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5
mdl_log	0	0	0	0	0	0	5	0	0	0	0	0	0	5	10
mdl_log_display	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
mdl_message	0	0	0	0	0	0	5	0	0	0	0	1	0	1	7
mdl_message_contacts	0	0	0	0	0	0	3	0	0	0	0	0	1	0	4
mdl_message_read	0	0	0	0	0	0	6	0	0	0	0	1	1	1	9
mdl_modules	0	0	0	0	0	0	4	0	0	0	0	0	1	2	7
mdl_quiz	0	0	0	0	0	0	14	0	0	0	1	2	5	3	25
mdl_quiz_answers	0	0	0	0	0	0	2	0	0	0	0	2	0	1	5
mdl_quiz_attemptonlast_datasets	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
mdl_quiz_attempts	0	0	0	0	0	0	6	0	0	0	1	1	1	1	10
mdl_quiz_calculated	0	0	0	0	0	0	6	0	0	0	0	0	0	1	7
mdl_quiz_categories	0	0	0	0	0	0	4	0	0	0	0	1	1	2	8
mdl_quiz_dataset_definitions	0	0	0	0	0	0	4	0	0	0	0	0	0	2	6
mdl_quiz_dataset_items	0	0	0	0	0	0	3	0	0	0	0	0	0	1	4
mdl_quiz_grades	0	0	0	1	0	0	4	0	0	0	0	0	0	0	5
mdl_quiz_match	0	0	0	0	0	0	2	0	0	0	0	0	0	1	3
mdl_quiz_match_sub	0	0	0	0	0	0	2	0	0	0	0	1	0	1	4
mdl_quiz_multianswers	0	0	0	0	0	0	2	0	0	0	0	0	0	1	3
mdl_quiz_multichoice	0	0	0	0	0	0	2	0	0	0	0	0	2	1	5
mdl_quiz_newest_states	0	0	0	0	0	0	5	0	0	0	0	0	0	1	6
mdl_quiz_numerical	0	0	0	0	0	0	3	0	0	0	0	0	0	1	4
mdl_quiz_numerical_units	0	0	1	0	0	0	2	0	0	0	0	0	0	1	4
mdl_quiz_question_datasets	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_quiz_question_instances	0	0	0	0	0	0	3	0	0	0	1	0	0	0	4
mdl_quiz_question_versions	0	0	0	0	0	0	6	0	0	0	0	0	0	0	6
mdl_quiz_questions	0	0	0	0	0	1	7	0	0	0	1	1	1	3	14
mdl_quiz_randomsamatch	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
mdl_quiz_rqp	0	0	0	0	0	0	4	1	0	0	0	0	1	1	7
mdl_quiz_rqp_servers	0	0	0	0	0	0	2	0	0	0	0	0	2	1	5
mdl_quiz_rqp_states	0	0	0	0	0	0	2	0	0	0	0	3	0	0	5
mdl_quiz_rqp_types	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
mdl_quiz_shortanswer	0	0	0	0	0	0	2	0	0	0	0	0	1	1	4

mdl_quiz_states	0	0	0	0	0	0	7	0	0	0	0	1	0	3	11
mdl_quiz_truefalse	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
mdl_resource	0	0	0	0	0	0	3	0	0	0	0	3	0	4	10
mdl_scale	0	0	0	0	0	0	4	0	0	0	0	2	0	1	7
mdl_scorm	0	0	0	0	0	1	6	0	0	0	0	1	3	3	14
mdl_scorm_scoes	0	0	0	0	0	0	2	0	0	0	0	0	2	13	17
mdl_scorm_scoes_track	0	0	0	0	0	0	5	0	1	0	0	0	0	1	7
mdl_sessions	0	0	0	0	0	0	1	0	0	0	0	1	0	2	4
mdl_survey	0	0	0	0	0	0	5	0	0	0	1	1	0	2	9
mdl_survey_analysis	0	0	0	0	0	0	3	0	0	0	0	1	0	0	4
mdl_survey_answers	0	0	0	0	0	0	5	0	0	0	0	2	0	0	7
mdl_survey_questions	0	0	0	0	0	0	1	0	0	0	0	1	1	4	7
mdl_timezone	0	0	0	0	0	0	4	0	0	0	0	0	8	4	16
mdl_user	1	0	0	0	0	0	6	0	0	0	0	1	11	24	43
mdl_user_admins	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
mdl_user_coursecreators	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
mdl_user_preferences	0	0	0	0	0	0	2	0	0	0	0	0	0	2	4
mdl_user_students	0	0	0	0	0	0	7	0	0	0	0	0	0	1	8
mdl_user_teachers	0	0	0	0	0	0	9	0	0	0	0	0	0	2	11
mdl_wiki	0	0	0	0	1	0	3	0	0	0	0	1	8	3	16
mdl_wiki_entries	0	0	0	0	0	0	6	0	0	0	0	0	0	1	7
mdl_wiki_pages	0	0	0	0	0	0	8	0	0	3	0	0	0	2	13
mdl_workshop	0	0	0	0	0	0	9	0	0	0	0	1	20	2	32
mdl_workshop_assessments	0	0	0	0	0	1	8	0	0	0	0	2	3	0	14
mdl_workshop_comments	0	0	0	0	0	0	5	0	0	0	0	1	1	0	7
mdl_workshop_elements	0	0	0	0	0	1	3	0	0	0	0	1	4	0	9
mdl_workshop_grades	0	0	0	0	0	0	4	0	0	0	0	1	1	0	6
mdl_workshop_rubrics	0	0	0	0	0	0	3	0	0	0	0	1	1	0	5
mdl_workshop_stockcomments	0	0	0	0	0	0	3	0	0	0	0	1	0	0	4
mdl_workshop_submissions	0	0	0	0	0	0	8	0	0	0	0	1	1	1	11

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1000	adodb_logsql	0	0	1132	created	15	DATETIME		0	0	1	0	0000-00-00 00:00:00			
1000	adodb_logsql	0	0	1133	sql0	20	VARCHAR	(250)	0	0	1	0				
1000	adodb_logsql	0	0	1134	sql1	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1135	params	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1136	tracer	28	TEXT		0	0	1	0				
1000	adodb_logsql	0	0	1137	timer	12	DECIMAL	(16,6)	0	0	1	0	0.000000			
1001	assignment	0	0	5961	id	5	INTEGER	(10)	-1	1	1	0				
1001	assignment	0	0	1139	course	5	INTEGER	(10)	0	0	1	1	0			
1001	assignment	0	0	1140	name	20	VARCHAR	(255)	0	0	1	0				
1001	assignment	0	0	1141	description	28	TEXT		0	0	1	0				
1001	assignment	0	0	1142	format	1	TINYINT	(4)	0	0	1	0	0			
1001	assignment	0	0	1143	assignmenttype	20	VARCHAR	(50)	0	0	1	0				
1001	assignment	0	0	1144	resubmit	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1145	preventlate	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1146	emailteachers	1	TINYINT	(2)	0	0	1	0	0			
1001	assignment	0	0	1147	var1	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1148	var2	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1149	var3	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1150	var4	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1151	var5	5	INTEGER	(10)	0	0	0	0	0			
1001	assignment	0	0	1152	maxbytes	5	INTEGER	(10)	0	0	1	0	100000			
1001	assignment	0	0	1153	timedue	5	INTEGER	(10)	0	0	1	0	0			
1001	assignment	0	0	1154	timeavailable	5	INTEGER	(10)	0	0	1	0	0			
1001	assignment	0	0	1155	grade	5	INTEGER	(10)	0	0	1	1	0			
1001	assignment	0	0	1156	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	13938	id	5	INTEGER	(10)	-1	1	1	0				
1002	assignment_submissions	0	0	13936	assignment	5	INTEGER	(10)	-1	0	1	1	0			
1002	assignment_submissions	0	0	1161	userid	5	INTEGER	(10)	0	0	1	1	0			
1002	assignment_submissions	0	0	1162	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	1163	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	1164	numfiles	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	1165	data1	28	TEXT		0	0	1	0				
1002	assignment_submissions	0	0	1166	data2	28	TEXT		0	0	1	0				
1002	assignment_submissions	0	0	1167	grade	5	INTEGER	(10)	0	0	1	1	0			
1002	assignment_submissions	0	0	1168	comment	28	TEXT		0	0	1	0				
1002	assignment_submissions	0	0	1169	format	1	TINYINT	(4)	0	0	1	0	0			
1002	assignment_submissions	0	0	1170	teacher	5	INTEGER	(10)	0	0	1	1	0			
1002	assignment_submissions	0	0	1171	timemarked	5	INTEGER	(10)	0	0	1	0	0			
1002	assignment_submissions	0	0	1172	mailed	1	TINYINT	(1)	0	0	1	0	0			
1003	backup_config	0	0	5981	id	5	INTEGER	(10)	-1	1	1	0				
1003	backup_config	0	0	1179	name	20	VARCHAR	(255)	0	0	1	0				
1003	backup_config	0	0	1180	value	20	VARCHAR	(255)	0	0	1	0				
1004	backup_courses	0	0	1183	id	5	INTEGER	(10)	0	1	1	0				
1004	backup_courses	0	0	1184	courseid	5	INTEGER	(10)	0	0	1	1	0			
1004	backup_courses	0	0	1185	laststarttime	5	INTEGER	(10)	0	0	1	0	0			
1004	backup_courses	0	0	1186	lastendtime	5	INTEGER	(10)	0	0	1	0	0			
1004	backup_courses	0	0	1187	laststatus	19	CHAR	(1)	0	0	1	0	0			
1004	backup_courses	0	0	1188	nextstarttime	5	INTEGER	(10)	0	0	1	0	0			
1005	backup_files	0	0	1191	backup_code	5	INTEGER	(10)	0	1	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1005	backup_files	0	0	1192	file_type	20	VARCHAR	(10)	0	1	1	0				
1005	backup_files	0	0	1193	path	20	VARCHAR	(255)	0	1	1	0				
1005	backup_files	0	0	1194	old_id	5	INTEGER	(10)	0	0	0	0	NULL			
1005	backup_files	0	0	1195	new_id	5	INTEGER	(10)	0	0	0	0	NULL			
1006	backup_ids	0	0	1197	backup_code	5	INTEGER	(12)	0	1	1	0	0			
1006	backup_ids	0	0	1198	table_name	20	VARCHAR	(30)	0	1	1	0				
1006	backup_ids	0	0	1199	old_id	5	INTEGER	(10)	0	1	1	0	0			
1006	backup_ids	0	0	1200	new_id	5	INTEGER	(10)	0	0	0	0	NULL			
1006	backup_ids	0	0	1201	info	29	MEDIUMTEXT		0	0	0	0	NULL			
1007	backup_log	0	0	5976	id	5	INTEGER	(10)	-1	1	1	0				
1007	backup_log	0	0	1204	courseid	5	INTEGER	(10)	0	0	1	1	0			
1007	backup_log	0	0	1205	time	5	INTEGER	(10)	0	0	1	0	0			
1007	backup_log	0	0	1206	laststarttime	5	INTEGER	(10)	0	0	1	0	0			
1007	backup_log	0	0	1207	info	20	VARCHAR	(255)	0	0	1	0				
1011	cache_filters	0	0	1234	id	5	INTEGER	(10)	0	1	1	0				
1011	cache_filters	0	0	1235	filter	20	VARCHAR	(32)	0	0	1	0				
1011	cache_filters	0	0	1236	version	5	INTEGER	(10)	0	0	1	0	0			
1011	cache_filters	0	0	1237	md5key	20	VARCHAR	(32)	0	0	1	0				
1011	cache_filters	0	0	1238	rawtext	28	TEXT		0	0	1	0				
1011	cache_filters	0	0	1239	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1012	cache_text	0	0	1242	id	5	INTEGER	(10)	0	1	1	0				
1012	cache_text	0	0	1243	md5key	20	VARCHAR	(32)	0	0	1	0				
1012	cache_text	0	0	1244	formattedtext	30	LONGTEXT		0	0	1	0				
1012	cache_text	0	0	1245	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1013	chat	0	0	5997	id	5	INTEGER	(10)	-1	1	1	0				
1013	chat	0	0	1249	course	5	INTEGER	(10)	0	0	1	1	0			
1013	chat	0	0	1250	name	20	VARCHAR	(255)	0	0	1	0				
1013	chat	0	0	1251	intro	28	TEXT		0	0	1	0				
1013	chat	0	0	1252	keepdays	5	INTEGER	(11)	0	0	1	0	0			
1013	chat	0	0	1253	studentlogs	5	INTEGER	(4)	0	0	1	0	0			
1013	chat	0	0	1254	chattime	5	INTEGER	(10)	0	0	1	0	0			
1013	chat	0	0	1255	schedule	5	INTEGER	(4)	0	0	1	0	0			
1013	chat	0	0	1256	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1014	chat_messages	0	0	13553	id	5	INTEGER	(10)	-1	1	1	0				
1014	chat_messages	0	0	6006	chatid	5	INTEGER	(10)	-1	0	1	1	0			
1014	chat_messages	0	0	1261	userid	5	INTEGER	(10)	0	0	1	1	0			
1014	chat_messages	0	0	13551	groupid	5	INTEGER	(10)	0	0	1	1	0			
1014	chat_messages	0	0	1263	system	5	INTEGER	(1)	0	0	1	0	0			
1014	chat_messages	0	0	1264	message	28	TEXT		0	0	1	0				
1014	chat_messages	0	0	1265	timestamp	5	INTEGER	(10)	0	0	1	0	0			
1015	chat_users	0	0	13548	id	5	INTEGER	(10)	-1	1	1	0				
1015	chat_users	0	0	6016	chatid	5	INTEGER	(10)	-1	0	1	1	0			
1015	chat_users	0	0	1273	userid	5	INTEGER	(10)	0	0	1	1	0			
1015	chat_users	0	0	13546	groupid	5	INTEGER	(10)	0	0	1	1	0			
1015	chat_users	0	0	1275	version	20	VARCHAR	(16)	0	0	1	0				
1015	chat_users	0	0	1276	ip	20	VARCHAR	(15)	0	0	1	0				
1015	chat_users	0	0	1277	firstping	5	INTEGER	(10)	0	0	1	0	0			
1015	chat_users	0	0	1278	lastping	5	INTEGER	(10)	0	0	1	0	0			
1015	chat_users	0	0	1279	lastmessageping	5	INTEGER	(10)	0	0	1	0	0			
1015	chat_users	0	0	1280	sid	20	VARCHAR	(32)	0	0	1	0				

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1015	chat_users	0	0	1281	course	5	INTEGER	(10)	0	0	1	1				
1015	chat_users	0	0	1282	lang	20	VARCHAR	(10)	0	0	1	0	0			
1016	choice	0	0	1288	id	5	INTEGER	(10)	0	1	1	0				
1016	choice	0	0	1289	course	5	INTEGER	(10)	0	0	1	1	0			
1016	choice	0	0	1290	name	20	VARCHAR	(255)	0	0	1	0				
1016	choice	0	0	1291	text	28	TEXT		0	0	1	0				
1016	choice	0	0	1292	format	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1293	publish	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1294	release	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1295	display	1	TINYINT	(4)	0	0	1	0	0			
1016	choice	0	0	1296	allowupdate	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1297	showunanswered	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1298	limitanswers	1	TINYINT	(2)	0	0	1	0	0			
1016	choice	0	0	1299	timeopen	5	INTEGER	(10)	0	0	1	0	0			
1016	choice	0	0	1300	timeclose	5	INTEGER	(10)	0	0	1	0	0			
1016	choice	0	0	1301	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1017	choice_answers	0	0	4354	id	5	INTEGER	(10)	-1	1	1	0				
1017	choice_answers	0	0	1306	choiceid	5	INTEGER	(10)	0	0	1	1	0			
1017	choice_answers	0	0	1307	userid	5	INTEGER	(10)	0	0	1	1	0			
1017	choice_answers	0	0	1308	optionid	5	INTEGER	(10)	0	0	1	1	0			
1017	choice_answers	0	0	1309	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1018	choice_options	0	0	4357	id	5	INTEGER	(10)	-1	1	1	0				
1018	choice_options	0	0	1315	choiceid	5	INTEGER	(10)	0	0	1	1	0			
1018	choice_options	0	0	1316	text	28	TEXT		0	0	0	0	NULL			
1018	choice_options	0	0	1317	maxanswers	5	INTEGER	(10)	0	0	0	0	0			
1018	choice_options	0	0	1318	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1019	config	0	0	1322	id	5	INTEGER	(10)	0	1	1	0				
1019	config	0	0	1323	name	20	VARCHAR	(255)	0	0	1	0				
1019	config	0	0	1324	value	28	TEXT		0	0	1	0				
1020	config_plugins	0	0	1327	id	5	INTEGER	(10)	0	1	1	0				
1020	config_plugins	0	0	1328	plugin	20	VARCHAR	(100)	0	0	1	0	core			
1020	config_plugins	0	0	1329	name	20	VARCHAR	(100)	0	0	1	0				
1020	config_plugins	0	0	1330	value	28	TEXT		0	0	1	0				
1021	course	0	0	1333	id	5	INTEGER	(10)	0	1	1	0				
1021	course	0	0	1334	category	5	INTEGER	(10)	0	0	1	1	0			
1021	course	0	0	1335	sortorder	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1336	password	20	VARCHAR	(50)	0	0	1	0				
1021	course	0	0	1337	fullname	20	VARCHAR	(254)	0	0	1	0				
1021	course	0	0	1338	shortname	20	VARCHAR	(15)	0	0	1	0				
1021	course	0	0	1339	idnumber	20	VARCHAR	(100)	0	0	1	0				
1021	course	0	0	1340	summary	28	TEXT		0	0	1	0				
1021	course	0	0	1341	format	20	VARCHAR	(10)	0	0	1	0	topics			
1021	course	0	0	1342	showgrades	2	SMALLINT	(2)	0	0	1	0	1			
1021	course	0	0	1343	modinfo	30	LONGTEXT		0	0	1	0				
1021	course	0	0	1344	newsitems	2	SMALLINT	(5)	0	0	1	0	1			
1021	course	0	0	1345	teacher	20	VARCHAR	(100)	0	0	1	0	Teacher			
1021	course	0	0	1346	teachers	20	VARCHAR	(100)	0	0	1	0	Teachers			
1021	course	0	0	1347	student	20	VARCHAR	(100)	0	0	1	0	Student			
1021	course	0	0	1348	students	20	VARCHAR	(100)	0	0	1	0	Students			
1021	course	0	0	1349	guest	2	SMALLINT	(2)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1021	course	0	0	1350	startdate	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1351	enrolperiod	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1352	numsections	2	SMALLINT	(5)	0	0	1	0	1			
1021	course	0	0	1353	marker	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1354	maxbytes	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1355	showreports	5	INTEGER	(4)	0	0	1	0	0			
1021	course	0	0	1356	visible	5	INTEGER	(1)	0	0	1	0	1			
1021	course	0	0	1357	hiddensections	5	INTEGER	(2)	0	0	1	0	0			
1021	course	0	0	1358	groupmode	5	INTEGER	(4)	0	0	1	0	0			
1021	course	0	0	1359	groupmodeforce	5	INTEGER	(4)	0	0	1	0	0			
1021	course	0	0	1360	lang	20	VARCHAR	(10)	0	0	1	0				
1021	course	0	0	1361	theme	20	VARCHAR	(50)	0	0	1	0				
1021	course	0	0	1362	cost	20	VARCHAR	(10)	0	0	1	0				
1021	course	0	0	1363	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1364	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1021	course	0	0	1365	metacourse	5	INTEGER	(1)	0	0	1	0	0			
1022	course_categories	0	0	1370	id	5	INTEGER	(10)	0	1	1	0				
1022	course_categories	0	0	1371	name	20	VARCHAR	(255)	0	0	1	0				
1022	course_categories	0	0	1372	description	28	TEXT		0	0	1	0				
1022	course_categories	0	0	1373	parent	5	INTEGER	(10)	0	0	1	1	0			
1022	course_categories	0	0	1374	sortorder	5	INTEGER	(10)	0	0	1	0	0			
1022	course_categories	0	0	1375	coursecount	5	INTEGER	(10)	0	0	1	0	0			
1022	course_categories	0	0	1376	visible	1	TINYINT	(1)	0	0	1	0	1			
1022	course_categories	0	0	1377	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1023	course_display	0	0	4366	id	5	INTEGER	(10)	-1	1	1	0				
1023	course_display	0	0	1381	course	5	INTEGER	(10)	0	0	1	1	0			
1023	course_display	0	0	1382	userid	5	INTEGER	(10)	0	0	1	1	0			
1023	course_display	0	0	1383	display	5	INTEGER	(10)	0	0	1	0	0			
1024	course_meta	0	0	5359	id	5	INTEGER	(10)	-1	1	1	0				
1024	course_meta	0	0	1388	parent_course	5	INTEGER	(10)	0	0	1	1	0			
1024	course_meta	0	0	1389	child_course	5	INTEGER	(10)	0	0	1	1	0			
1025	course_modules	0	0	4370	id	5	INTEGER	(10)	-1	1	1	0				
1025	course_modules	0	0	1394	course	5	INTEGER	(10)	0	0	1	1	0			
1025	course_modules	0	0	1395	module	5	INTEGER	(10)	0	0	1	1	0			
1025	course_modules	0	0	1396	instance	5	INTEGER	(10)	0	0	1	0	0			
1025	course_modules	0	0	1397	section	5	INTEGER	(10)	0	0	1	1	0			
1025	course_modules	0	0	1398	added	5	INTEGER	(10)	0	0	1	0	0			
1025	course_modules	0	0	1399	score	1	TINYINT	(4)	0	0	1	0	0			
1025	course_modules	0	0	1400	indent	5	INTEGER	(5)	0	0	1	0	0			
1025	course_modules	0	0	1401	visible	1	TINYINT	(1)	0	0	1	0	1			
1025	course_modules	0	0	1402	groupmode	1	TINYINT	(4)	0	0	1	0	0			
1026	course_sections	0	0	3998	id	5	INTEGER	(10)	-1	1	1	0				
1026	course_sections	0	0	1410	course	5	INTEGER	(10)	0	0	1	1	0			
1026	course_sections	0	0	1411	section	5	INTEGER	(10)	0	0	1	0	0			
1026	course_sections	0	0	1412	summary	28	TEXT		0	0	1	0				
1026	course_sections	0	0	1413	sequence	28	TEXT		0	0	1	0				
1026	course_sections	0	0	1414	visible	1	TINYINT	(1)	0	0	1	0	1			
1027	enrol_authorize	0	0	1417	id	5	INTEGER	(10)	0	1	1	0				
1027	enrol_authorize	0	0	1418	cclastfour	5	INTEGER	(11)	0	0	0	0	0			
1027	enrol_authorize	0	0	1419	ccexp	20	VARCHAR	(6)	0	0	0	0				

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1027	enrol_authorize	0	0	1420	cvv	20	VARCHAR	(4)	0	0	0	0				
1027	enrol_authorize	0	0	1421	ccname	20	VARCHAR	(255)	0	0	0	0				
1027	enrol_authorize	0	0	1422	courseid	5	INTEGER	(10)	0	0	1	1	0			
1027	enrol_authorize	0	0	1423	userid	5	INTEGER	(10)	0	0	1	1	0			
1027	enrol_authorize	0	0	1424	avscode	19	CHAR	(1)	0	0	0	0	P			
1027	enrol_authorize	0	0	1425	transid	20	VARCHAR	(255)	0	0	0	0				
1028	enrol_paypal	0	0	1427	id	5	INTEGER	(10)	0	1	1	0				
1028	enrol_paypal	0	0	1428	business	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1429	receiver_email	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1430	receiver_id	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1431	item_name	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1432	courseid	5	INTEGER	(10)	0	0	1	1	0			
1028	enrol_paypal	0	0	1433	userid	5	INTEGER	(10)	0	0	1	1	0			
1028	enrol_paypal	0	0	1434	memo	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1435	tax	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1436	option_name1	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1437	option_selection1_x	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1438	option_name2	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1439	option_selection2_x	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1440	payment_status	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1441	pending_reason	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1442	reason_code	20	VARCHAR	(30)	0	0	1	0				
1028	enrol_paypal	0	0	1443	txn_id	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1444	parent_txn_id	20	VARCHAR	(255)	0	0	1	0				
1028	enrol_paypal	0	0	1445	payment_type	20	VARCHAR	(30)	0	0	1	0				
1028	enrol_paypal	0	0	1446	timeupdated	5	INTEGER	(10)	0	0	1	0	0			
1029	event	0	0	1448	id	5	INTEGER	(10)	0	1	1	0				
1029	event	0	0	1449	name	20	VARCHAR	(255)	0	0	1	0				
1029	event	0	0	1450	description	28	TEXT		0	0	1	0				
1029	event	0	0	1451	format	5	INTEGER	(4)	0	0	1	0	0			
1029	event	0	0	1452	courseid	5	INTEGER	(10)	0	0	1	1	0			
1029	event	0	0	6259	groupid	5	INTEGER	(10)	-1	0	1	1	0			
1029	event	0	0	6260	userid	5	INTEGER	(10)	0	0	1	1	0			
1029	event	0	0	14331	repeatid	5	INTEGER	(10)	-1	0	1	0	0			
1029	event	0	0	1456	modulename	20	VARCHAR	(20)	0	0	1	0				
1029	event	0	0	1457	instance	5	INTEGER	(10)	0	0	1	0	0			
1029	event	0	0	1458	eventtype	20	VARCHAR	(20)	0	0	1	0				
1029	event	0	0	1459	timestart	5	INTEGER	(10)	0	0	1	0	0			
1029	event	0	0	1460	timeduration	5	INTEGER	(10)	0	0	1	0	0			
1029	event	0	0	1461	visible	1	TINYINT	(4)	0	0	1	0	1			
1029	event	0	0	1462	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1030	forum	0	0	1469	id	5	INTEGER	(10)	0	1	1	0				
1030	forum	0	0	1470	course	5	INTEGER	(10)	0	0	1	1	0			
1030	forum	0	0	1471	type	31	ENUM		0	0	1	0	general			
1030	forum	0	0	1472	name	20	VARCHAR	(255)	0	0	1	0				
1030	forum	0	0	1473	intro	28	TEXT		0	0	1	0				
1030	forum	0	0	1474	open	1	TINYINT	(2)	0	0	1	0	2			
1030	forum	0	0	1475	assessed	5	INTEGER	(10)	0	0	1	0	0			
1030	forum	0	0	1476	assesspublic	5	INTEGER	(4)	0	0	1	0	0			
1030	forum	0	0	1477	assesstimestart	5	INTEGER	(10)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1030	forum	0	0	1478	assesstimefinish	5	INTEGER	(10)	0	0	1	0	0			
1030	forum	0	0	15830	scale	5	INTEGER	(10)	-1	0	1	0	0			
1030	forum	0	0	1480	maxbytes	5	INTEGER	(10)	0	0	1	0	0			
1030	forum	0	0	1481	forcesubscribe	1	TINYINT	(1)	0	0	1	0	0			
1030	forum	0	0	1482	trackingtype	1	TINYINT	(2)	0	0	1	0	1			
1030	forum	0	0	1483	rsstype	1	TINYINT	(2)	0	0	1	0	0			
1030	forum	0	0	1484	rssarticles	1	TINYINT	(2)	0	0	1	0	0			
1030	forum	0	0	1485	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1031	forum_discussions	0	0	4730	id	5	INTEGER	(10)	-1	1	1	0				
1031	forum_discussions	0	0	1490	course	5	INTEGER	(10)	0	0	1	1	0			
1031	forum_discussions	0	0	1491	forum	5	INTEGER	(10)	0	0	1	1	0			
1031	forum_discussions	0	0	1492	name	20	VARCHAR	(255)	0	0	1	0				
1031	forum_discussions	0	0	1493	firstpost	5	INTEGER	(10)	0	0	1	1	0			
1031	forum_discussions	0	0	1494	userid	5	INTEGER	(10)	0	0	1	1	0			
1031	forum_discussions	0	0	1495	groupid	5	INTEGER	(10)	0	0	1	1	-1			
1031	forum_discussions	0	0	1496	assessed	1	TINYINT	(1)	0	0	1	0	1			
1031	forum_discussions	0	0	1497	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1031	forum_discussions	0	0	1498	usermodified	5	INTEGER	(10)	0	0	1	1	0			
1032	forum_posts	0	0	4736	id	5	INTEGER	(10)	-1	1	1	0				
1032	forum_posts	0	0	1503	discussion	5	INTEGER	(10)	0	0	1	1	0			
1032	forum_posts	0	0	12783	parent	5	INTEGER	(10)	-1	0	1	1	0			
1032	forum_posts	0	0	1505	userid	5	INTEGER	(10)	0	0	1	1	0			
1032	forum_posts	0	0	1506	created	5	INTEGER	(10)	0	0	1	0	0			
1032	forum_posts	0	0	1507	modified	5	INTEGER	(10)	0	0	1	0	0			
1032	forum_posts	0	0	1508	mailed	1	TINYINT	(2)	0	0	1	0	0			
1032	forum_posts	0	0	1509	subject	20	VARCHAR	(255)	0	0	1	0				
1032	forum_posts	0	0	1510	message	28	TEXT		0	0	1	0				
1032	forum_posts	0	0	1511	format	1	TINYINT	(2)	0	0	1	0	0			
1032	forum_posts	0	0	1512	attachment	20	VARCHAR	(100)	0	0	1	0				
1032	forum_posts	0	0	1513	totalscore	1	TINYINT	(4)	0	0	1	0	0			
1033	forum_queue	0	0	12737	id	5	INTEGER	(10)	-1	1	1	0				
1033	forum_queue	0	0	1521	userid	5	INTEGER	(10)	0	0	1	1	0			
1033	forum_queue	0	0	12732	discussionid	5	INTEGER	(10)	-1	0	1	1	0			
1033	forum_queue	0	0	12733	postid	5	INTEGER	(10)	-1	0	1	1	0			
1034	forum_ratings	0	0	12728	id	5	INTEGER	(10)	-1	1	1	0				
1034	forum_ratings	0	0	1528	userid	5	INTEGER	(10)	0	0	1	1	0			
1034	forum_ratings	0	0	12723	post	5	INTEGER	(10)	-1	0	1	1	0			
1034	forum_ratings	0	0	1530	time	5	INTEGER	(10)	0	0	1	0	0			
1034	forum_ratings	0	0	1531	rating	1	TINYINT	(4)	0	0	1	0	0			
1035	forum_read	0	0	12749	id	5	INTEGER	(10)	-1	1	1	0				
1035	forum_read	0	0	1536	userid	5	INTEGER	(10)	0	0	1	1	0			
1035	forum_read	0	0	1537	forumid	5	INTEGER	(10)	0	0	1	1	0			
1035	forum_read	0	0	12742	discussionid	5	INTEGER	(10)	-1	0	1	1	0			
1035	forum_read	0	0	12743	postid	5	INTEGER	(10)	-1	0	1	1	0			
1035	forum_read	0	0	1540	firstread	5	INTEGER	(10)	0	0	1	0	0			
1035	forum_read	0	0	1541	lastread	5	INTEGER	(10)	0	0	1	0	0			
1036	forum_subscriptions	0	0	4722	id	5	INTEGER	(10)	-1	1	1	0				
1036	forum_subscriptions	0	0	1547	userid	5	INTEGER	(10)	0	0	1	1	0			
1036	forum_subscriptions	0	0	1548	forum	5	INTEGER	(10)	0	0	1	1	0			
1037	forum_track_prefs	0	0	4703	id	5	INTEGER	(10)	-1	1	1	0				

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1037	forum_track_prefs	0	0	1554	userid	5	INTEGER	(10)	0	0	1	1	0			
1037	forum_track_prefs	0	0	1555	forumid	5	INTEGER	(10)	0	0	1	1	0			
1038	glossary	0	0	1558	id	5	INTEGER	(10)	0	1	1	0				
1038	glossary	0	0	1559	course	5	INTEGER	(10)	0	0	1	1	0			
1038	glossary	0	0	1560	name	20	VARCHAR	(255)	0	0	1	0				
1038	glossary	0	0	1561	intro	28	TEXT		0	0	1	0				
1038	glossary	0	0	1562	studentcanpost	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1563	allowduplicatedentries	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1564	displayformat	20	VARCHAR	(50)	0	0	1	0	dictionary			
1038	glossary	0	0	1565	mainglossary	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1566	showspecial	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1567	showalphabet	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1568	showall	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1569	allowcomments	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1570	allowprintview	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1571	usedynalink	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1572	defaultapproval	1	TINYINT	(2)	0	0	1	0	1			
1038	glossary	0	0	1573	globalglossary	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1574	entbypage	1	TINYINT	(3)	0	0	1	0	10			
1038	glossary	0	0	1575	editalways	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1576	rsstype	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1577	rssarticles	1	TINYINT	(2)	0	0	1	0	0			
1038	glossary	0	0	1578	assessed	5	INTEGER	(10)	0	0	1	0	0			
1038	glossary	0	0	1579	assesstimestart	5	INTEGER	(10)	0	0	1	0	0			
1038	glossary	0	0	1580	assesstimefinish	5	INTEGER	(10)	0	0	1	0	0			
1038	glossary	0	0	16208	scale	5	INTEGER	(10)	-1	0	1	0	0			
1038	glossary	0	0	1582	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1038	glossary	0	0	1583	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1039	glossary_alias	0	0	4762	id	5	INTEGER	(10)	-1	1	1	0				
1039	glossary_alias	0	0	1587	entryid	5	INTEGER	(10)	0	0	1	1	0			
1039	glossary_alias	0	0	1588	alias	20	VARCHAR	(255)	0	0	1	0				
1040	glossary_categories	0	0	1591	id	5	INTEGER	(10)	0	1	1	0				
1040	glossary_categories	0	0	1592	glossaryid	5	INTEGER	(10)	0	0	1	1	0			
1040	glossary_categories	0	0	1593	name	20	VARCHAR	(255)	0	0	1	0				
1040	glossary_categories	0	0	1594	usedynalink	1	TINYINT	(2)	0	0	1	0	1			
1041	glossary_comments	0	0	4958	id	5	INTEGER	(10)	-1	1	1	0				
1041	glossary_comments	0	0	1598	entryid	5	INTEGER	(10)	0	0	1	1	0			
1041	glossary_comments	0	0	1599	userid	5	INTEGER	(10)	0	0	1	1	0			
1041	glossary_comments	0	0	1600	comment	28	TEXT		0	0	1	0				
1041	glossary_comments	0	0	1601	format	1	TINYINT	(2)	0	0	1	0	0			
1041	glossary_comments	0	0	1602	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1042	glossary_entries	0	0	4752	id	5	INTEGER	(10)	-1	1	1	0				
1042	glossary_entries	0	0	1607	glossaryid	5	INTEGER	(10)	0	0	1	1	0			
1042	glossary_entries	0	0	1608	userid	5	INTEGER	(10)	0	0	1	1	0			
1042	glossary_entries	0	0	1609	concept	20	VARCHAR	(255)	0	0	1	0				
1042	glossary_entries	0	0	1610	definition	28	TEXT		0	0	1	0				
1042	glossary_entries	0	0	1611	format	1	TINYINT	(2)	0	0	1	0	0			
1042	glossary_entries	0	0	1612	attachment	20	VARCHAR	(100)	0	0	1	0				
1042	glossary_entries	0	0	1613	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1042	glossary_entries	0	0	1614	timemodified	5	INTEGER	(10)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1042	glossary_entries	0	0	1615	teacherentry	1	TINYINT	(2)	0	0	1	0	0			
1042	glossary_entries	0	0	1616	sourceglossaryid	5	INTEGER	(10)	0	0	1	1	0			
1042	glossary_entries	0	0	1617	usedynalink	1	TINYINT	(2)	0	0	1	0	1			
1042	glossary_entries	0	0	1618	casesensitive	1	TINYINT	(2)	0	0	1	0	0			
1042	glossary_entries	0	0	1619	fullmatch	1	TINYINT	(2)	0	0	1	0	1			
1042	glossary_entries	0	0	1620	approved	1	TINYINT	(2)	0	0	1	0	1			
1043	glossary_entries_categories	0	0	4758	id	5	INTEGER	(10)	-1	1	1	0				
1043	glossary_entries_categories	0	0	1626	categoryid	5	INTEGER	(10)	0	0	1	1	0			
1043	glossary_entries_categories	0	0	1627	entryid	5	INTEGER	(10)	0	0	1	1	0			
1044	glossary_formats	0	0	1631	id	5	INTEGER	(10)	0	1	1	0				
1044	glossary_formats	0	0	1632	name	20	VARCHAR	(50)	0	0	1	0				
1044	glossary_formats	0	0	1633	popupformatname	20	VARCHAR	(50)	0	0	1	0				
1044	glossary_formats	0	0	1634	visible	1	TINYINT	(2)	0	0	1	0	1			
1044	glossary_formats	0	0	1635	showgroup	1	TINYINT	(2)	0	0	1	0	1			
1044	glossary_formats	0	0	1636	defaultmode	20	VARCHAR	(50)	0	0	1	0				
1044	glossary_formats	0	0	1637	defaulthook	20	VARCHAR	(50)	0	0	1	0				
1044	glossary_formats	0	0	1638	sortkey	20	VARCHAR	(50)	0	0	1	0				
1044	glossary_formats	0	0	1639	sortorder	20	VARCHAR	(50)	0	0	1	0				
1045	glossary_ratings	0	0	4962	id	5	INTEGER	(10)	-1	1	1	0				
1045	glossary_ratings	0	0	1642	userid	5	INTEGER	(10)	0	0	1	1	0			
1045	glossary_ratings	0	0	1643	entryid	5	INTEGER	(10)	0	0	1	1	0			
1045	glossary_ratings	0	0	1644	time	5	INTEGER	(10)	0	0	1	0	0			
1045	glossary_ratings	0	0	1645	rating	1	TINYINT	(4)	0	0	1	0	0			
1046	grade_category	0	0	1649	id	5	INTEGER	(10)	0	1	1	0				
1046	grade_category	0	0	1650	name	20	VARCHAR	(64)	0	0	0	0	NULL			
1046	grade_category	0	0	1651	courseid	5	INTEGER	(10)	0	0	1	1	0			
1046	grade_category	0	0	1652	drop_x_lowest	5	INTEGER	(10)	0	0	1	0	0			
1046	grade_category	0	0	1653	bonus_points	5	INTEGER	(10)	0	0	1	0	0			
1046	grade_category	0	0	1654	hidden	5	INTEGER	(10)	0	0	1	0	0			
1046	grade_category	0	0	1655	weight	12	DECIMAL	(4,2)	0	0	0	0	0.00			
1047	grade_exceptions	0	0	16972	id	5	INTEGER	(10)	-1	1	1	0				
1047	grade_exceptions	0	0	1659	courseid	5	INTEGER	(10)	0	0	1	1	0			
1047	grade_exceptions	0	0	16970	grade_itemid	5	INTEGER	(10)	-1	0	1	1	0			
1047	grade_exceptions	0	0	1661	userid	5	INTEGER	(10)	0	0	1	1	0			
1048	grade_item	0	0	6180	id	5	INTEGER	(10)	-1	1	1	0				
1048	grade_item	0	0	1665	courseid	5	INTEGER	(10)	0	0	0	1	NULL			
1048	grade_item	0	0	1666	category	5	INTEGER	(10)	0	0	0	1	NULL			
1048	grade_item	0	0	1667	modid	5	INTEGER	(10)	0	0	0	1	NULL			
1048	grade_item	0	0	1668	cminstance	5	INTEGER	(10)	0	0	0	0	NULL			
1048	grade_item	0	0	1669	scale_grade	7	FLOAT	(11,10)	0	0	0	0	1.0000000000			
1048	grade_item	0	0	1670	extra_credit	5	INTEGER	(10)	0	0	1	0	0			
1048	grade_item	0	0	1671	sort_order	5	INTEGER	(10)	0	0	1	0	0			
1049	grade_letter	0	0	6093	id	5	INTEGER	(10)	-1	1	1	0				
1049	grade_letter	0	0	1675	courseid	5	INTEGER	(10)	0	0	1	1	0			
1049	grade_letter	0	0	1676	letter	20	VARCHAR	(8)	0	0	1	0	NA			
1049	grade_letter	0	0	1677	grade_high	12	DECIMAL	(4,2)	0	0	1	0	100.00			
1049	grade_letter	0	0	1678	grade_low	12	DECIMAL	(4,2)	0	0	1	0	0.00			
1050	grade_preferences	0	0	1681	id	5	INTEGER	(10)	0	1	1	0				
1050	grade_preferences	0	0	1682	courseid	5	INTEGER	(10)	0	0	0	1	NULL			
1050	grade_preferences	0	0	1683	preference	5	INTEGER	(10)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1050	grade_preferences	0	0	1684	value	5	INTEGER	(10)	0	0	1	0	0			
1051	groups	0	0	1687	id	5	INTEGER	(10)	0	1	1	0				
1051	groups	0	0	1688	courseid	5	INTEGER	(10)	0	0	1	1	0			
1051	groups	0	0	1689	name	20	VARCHAR	(254)	0	0	1	0				
1051	groups	0	0	1690	description	28	TEXT		0	0	1	0				
1051	groups	0	0	1691	password	20	VARCHAR	(50)	0	0	1	0				
1051	groups	0	0	1692	lang	20	VARCHAR	(10)	0	0	1	0	en			
1051	groups	0	0	1693	theme	20	VARCHAR	(50)	0	0	1	0				
1051	groups	0	0	1694	picture	5	INTEGER	(10)	0	0	1	0	0			
1051	groups	0	0	1695	hidepicture	5	INTEGER	(2)	0	0	1	0	0			
1051	groups	0	0	1696	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1051	groups	0	0	1697	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1052	groups_members	0	0	13951	id	5	INTEGER	(10)	-1	1	1	0				
1052	groups_members	0	0	13949	groupid	5	INTEGER	(10)	0	0	1	1	0			
1052	groups_members	0	0	1703	userid	5	INTEGER	(10)	0	0	1	1	0			
1052	groups_members	0	0	1704	timeadded	5	INTEGER	(10)	0	0	1	0	0			
1053	hotpot	0	0	1709	id	5	INTEGER	(10)	0	1	1	0				
1053	hotpot	0	0	1710	course	5	INTEGER	(10)	0	0	1	1	0			
1053	hotpot	0	0	1711	name	20	VARCHAR	(255)	0	0	1	0				
1053	hotpot	0	0	1712	reference	20	VARCHAR	(255)	0	0	1	0				
1053	hotpot	0	0	1713	summary	28	TEXT		0	0	1	0				
1053	hotpot	0	0	1714	timeopen	5	INTEGER	(10)	0	0	1	0	0			
1053	hotpot	0	0	1715	timeclose	5	INTEGER	(10)	0	0	1	0	0			
1053	hotpot	0	0	1716	attempts	2	SMALLINT	(6)	0	0	1	0	0			
1053	hotpot	0	0	1717	grademethod	1	TINYINT	(4)	0	0	1	0	1			
1053	hotpot	0	0	1718	review	1	TINYINT	(4)	0	0	1	0	0			
1053	hotpot	0	0	1719	grade	5	INTEGER	(10)	0	0	1	1	0			
1053	hotpot	0	0	1720	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1053	hotpot	0	0	1721	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1053	hotpot	0	0	1722	location	5	INTEGER	(4)	0	0	1	0	0			
1053	hotpot	0	0	1723	navigation	5	INTEGER	(4)	0	0	1	0	1			
1053	hotpot	0	0	1724	outputformat	5	INTEGER	(4)	0	0	1	0	1			
1053	hotpot	0	0	1725	shownextquiz	5	INTEGER	(4)	0	0	1	0	0			
1053	hotpot	0	0	1726	forceplugins	5	INTEGER	(4)	0	0	1	0	0			
1053	hotpot	0	0	1727	password	20	VARCHAR	(255)	0	0	1	0				
1053	hotpot	0	0	1728	subnet	20	VARCHAR	(255)	0	0	1	0				
1054	hotpot_attempts	0	0	4345	id	5	INTEGER	(10)	-1	1	1	0				
1054	hotpot_attempts	0	0	1732	userid	5	INTEGER	(10)	0	0	1	1				
1054	hotpot_attempts	0	0	1733	starttime	5	INTEGER	(10)	0	0	0	0				
1054	hotpot_attempts	0	0	1734	endtime	5	INTEGER	(10)	0	0	0	0				
1054	hotpot_attempts	0	0	1735	score	5	INTEGER	(6)	0	0	0	0				
1054	hotpot_attempts	0	0	1736	penalties	5	INTEGER	(6)	0	0	0	0				
1054	hotpot_attempts	0	0	1737	attempt	5	INTEGER	(6)	0	0	1	0				
1054	hotpot_attempts	0	0	1738	details	28	TEXT		0	0	0	0				
1054	hotpot_attempts	0	0	1739	timestart	5	INTEGER	(10)	0	0	0	0				
1054	hotpot_attempts	0	0	1740	timefinish	5	INTEGER	(10)	0	0	0	0				
1054	hotpot_attempts	0	0	6192	hotpot	5	INTEGER	(10)	-1	0	1	1				
1055	hotpot_questions	0	0	6202	id	5	INTEGER	(10)	-1	1	1	0				
1055	hotpot_questions	0	0	1743	name	20	VARCHAR	(255)	0	0	1	0				
1055	hotpot_questions	0	0	1744	type	5	INTEGER	(10)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1055	hotpot_questions	0	0	1745	text	28	TEXT		0	0	0	0	NULL			
1055	hotpot_questions	0	0	6199	hotpot	5	INTEGER	(10)	-1	0	1	1	0			
1056	hotpot_responses	0	0	1748	id	5	INTEGER	(10)	0	1	1	0				
1056	hotpot_responses	0	0	1749	attempt	5	INTEGER	(10)	0	0	1	1	0			
1056	hotpot_responses	0	0	1750	question	5	INTEGER	(10)	0	0	1	1	0			
1056	hotpot_responses	0	0	1751	score	2	SMALLINT	(8)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1752	weighting	2	SMALLINT	(8)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1753	correct	20	VARCHAR	(255)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1754	wrong	20	VARCHAR	(255)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1755	ignored	20	VARCHAR	(255)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1756	hints	2	SMALLINT	(6)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1757	clues	2	SMALLINT	(6)	0	0	0	0	NULL			
1056	hotpot_responses	0	0	1758	checks	2	SMALLINT	(6)	0	0	0	0	NULL			
1057	hotpot_strings	0	0	1760	id	5	INTEGER	(10)	0	1	1	0				
1057	hotpot_strings	0	0	1761	string	28	TEXT		0	0	1	0				
1058	journal	0	0	5993	id	5	INTEGER	(10)	-1	1	1	0				
1058	journal	0	0	1764	course	5	INTEGER	(10)	0	0	1	1	0			
1058	journal	0	0	1765	name	20	VARCHAR	(255)	0	0	0	0	NULL			
1058	journal	0	0	1766	intro	28	TEXT		0	0	0	0	NULL			
1058	journal	0	0	1767	introformat	1	TINYINT	(2)	0	0	1	0	0			
1058	journal	0	0	1768	days	2	SMALLINT	(5)	0	0	1	0	7			
1058	journal	0	0	1769	assessed	5	INTEGER	(10)	0	0	1	0	0			
1058	journal	0	0	1770	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1059	journal_entries	0	0	13942	id	5	INTEGER	(10)	-1	1	1	0				
1059	journal_entries	0	0	13940	journal	5	INTEGER	(10)	-1	0	1	1	0			
1059	journal_entries	0	0	1775	userid	5	INTEGER	(10)	0	0	1	1	0			
1059	journal_entries	0	0	1776	modified	5	INTEGER	(10)	0	0	1	0	0			
1059	journal_entries	0	0	1777	text	28	TEXT		0	0	1	0				
1059	journal_entries	0	0	1778	format	1	TINYINT	(2)	0	0	1	0	0			
1059	journal_entries	0	0	1779	rating	5	INTEGER	(10)	0	0	0	0	0			
1059	journal_entries	0	0	1780	comment	28	TEXT		0	0	0	0	NULL			
1059	journal_entries	0	0	1781	teacher	5	INTEGER	(10)	0	0	1	0	0			
1059	journal_entries	0	0	1782	timemarked	5	INTEGER	(10)	0	0	1	0	0			
1059	journal_entries	0	0	1783	mailed	5	INTEGER	(1)	0	0	1	0	0			
1060	label	0	0	1787	id	5	INTEGER	(10)	0	1	1	0				
1060	label	0	0	1788	course	5	INTEGER	(10)	0	0	1	1	0			
1060	label	0	0	1789	name	20	VARCHAR	(255)	0	0	1	0				
1060	label	0	0	1790	content	28	TEXT		0	0	1	0				
1060	label	0	0	1791	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1061	lesson	0	0	1794	id	5	INTEGER	(10)	0	1	1	0				
1061	lesson	0	0	1795	course	5	INTEGER	(10)	0	0	1	1	0			
1061	lesson	0	0	1796	name	20	VARCHAR	(255)	0	0	1	0				
1061	lesson	0	0	1797	practice	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1798	modattempts	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1799	usepassword	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1800	password	20	VARCHAR	(32)	0	0	1	0				
1061	lesson	0	0	1801	grade	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1802	custom	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1803	ongoing	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1804	usemaxgrade	1	TINYINT	(3)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1061	lesson	0	0	1805	maxanswers	5	INTEGER	(3)	0	0	1	0	4			
1061	lesson	0	0	1806	maxattempts	5	INTEGER	(3)	0	0	1	0	5			
1061	lesson	0	0	1807	review	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1808	nextpagedefault	5	INTEGER	(3)	0	0	1	0	0			
1061	lesson	0	0	1809	minquestions	5	INTEGER	(3)	0	0	1	0	0			
1061	lesson	0	0	1810	maxpages	5	INTEGER	(3)	0	0	1	0	0			
1061	lesson	0	0	1811	timed	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1812	maxtime	5	INTEGER	(10)	0	0	1	0	0			
1061	lesson	0	0	1813	retake	5	INTEGER	(3)	0	0	1	0	1			
1061	lesson	0	0	1814	tree	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1815	slideshow	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1816	width	5	INTEGER	(10)	0	0	1	0	640			
1061	lesson	0	0	1817	height	5	INTEGER	(10)	0	0	1	0	480			
1061	lesson	0	0	1818	bgcolor	20	VARCHAR	(7)	0	0	1	0	#FFFFFF			
1061	lesson	0	0	1819	displayleft	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1820	highscores	1	TINYINT	(3)	0	0	1	0	0			
1061	lesson	0	0	1821	maxhighscores	5	INTEGER	(10)	0	0	1	0	0			
1061	lesson	0	0	1822	available	5	INTEGER	(10)	0	0	1	0	0			
1061	lesson	0	0	1823	deadline	5	INTEGER	(10)	0	0	1	0	0			
1061	lesson	0	0	1824	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1062	lesson_answers	0	0	5347	id	5	INTEGER	(10)	-1	1	1	0				
1062	lesson_answers	0	0	1828	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1062	lesson_answers	0	0	1829	pageid	5	INTEGER	(10)	0	0	1	1	0			
1062	lesson_answers	0	0	1830	jumpto	5	INTEGER	(11)	0	0	1	0	0			
1062	lesson_answers	0	0	1831	grade	1	TINYINT	(3)	0	0	1	0	0			
1062	lesson_answers	0	0	1832	score	5	INTEGER	(10)	0	0	1	0	0			
1062	lesson_answers	0	0	1833	flags	1	TINYINT	(3)	0	0	1	0	0			
1062	lesson_answers	0	0	1834	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1062	lesson_answers	0	0	1835	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1062	lesson_answers	0	0	1836	answer	28	TEXT		0	0	1	0				
1062	lesson_answers	0	0	1837	response	28	TEXT		0	0	1	0				
1063	lesson_attempts	0	0	5353	id	5	INTEGER	(10)	-1	1	1	0				
1063	lesson_attempts	0	0	1842	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1063	lesson_attempts	0	0	1843	pageid	5	INTEGER	(10)	0	0	1	1	0			
1063	lesson_attempts	0	0	1844	userid	5	INTEGER	(10)	0	0	1	1	0			
1063	lesson_attempts	0	0	1845	answerid	5	INTEGER	(10)	0	0	1	1	0			
1063	lesson_attempts	0	0	1846	retry	5	INTEGER	(3)	0	0	1	0	0			
1063	lesson_attempts	0	0	1847	correct	5	INTEGER	(10)	0	0	1	0	0			
1063	lesson_attempts	0	0	1848	useranswer	28	TEXT		0	0	1	0				
1063	lesson_attempts	0	0	1849	timeseen	5	INTEGER	(10)	0	0	1	0	0			
1064	lesson_branch	0	0	5203	id	5	INTEGER	(10)	-1	1	1	0				
1064	lesson_branch	0	0	1855	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1064	lesson_branch	0	0	1856	userid	5	INTEGER	(10)	0	0	1	1	0			
1064	lesson_branch	0	0	1857	pageid	5	INTEGER	(10)	0	0	1	1	0			
1064	lesson_branch	0	0	1858	retry	5	INTEGER	(10)	0	0	1	0	0			
1064	lesson_branch	0	0	1859	flag	1	TINYINT	(3)	0	0	1	0	0			
1064	lesson_branch	0	0	1860	timeseen	5	INTEGER	(10)	0	0	1	0	0			
1065	lesson_default	0	0	1862	id	5	INTEGER	(10)	0	1	1	0				
1065	lesson_default	0	0	1863	course	5	INTEGER	(10)	0	0	1	1	0			
1065	lesson_default	0	0	1864	practice	1	TINYINT	(3)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1065	lesson_default	0	0	1865	modattempts	1	TINYINT	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1866	password	20	VARCHAR	(32)	0	0	1	0				
1065	lesson_default	0	0	1867	usepassword	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1868	grade	1	TINYINT	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1869	custom	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1870	ongoing	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1871	usemaxgrade	1	TINYINT	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1872	maxanswers	5	INTEGER	(3)	0	0	1	0	4			
1065	lesson_default	0	0	1873	maxattempts	5	INTEGER	(3)	0	0	1	0	5			
1065	lesson_default	0	0	1874	review	1	TINYINT	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1875	nextpagedefault	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1876	minquestions	1	TINYINT	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1877	maxpages	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1878	timed	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1879	maxtime	5	INTEGER	(10)	0	0	1	0	0			
1065	lesson_default	0	0	1880	retake	5	INTEGER	(3)	0	0	1	0	1			
1065	lesson_default	0	0	1881	tree	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1882	slideshow	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1883	width	5	INTEGER	(10)	0	0	1	0	640			
1065	lesson_default	0	0	1884	height	5	INTEGER	(10)	0	0	1	0	480			
1065	lesson_default	0	0	1885	bgcolor	20	VARCHAR	(7)	0	0	0	0	#FFFFFF			
1065	lesson_default	0	0	1886	displayleft	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1887	highscores	5	INTEGER	(3)	0	0	1	0	0			
1065	lesson_default	0	0	1888	maxhighscores	5	INTEGER	(10)	0	0	1	0	0			
1066	lesson_grades	0	0	5050	id	5	INTEGER	(10)	-1	1	1	0				
1066	lesson_grades	0	0	1891	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1066	lesson_grades	0	0	1892	userid	5	INTEGER	(10)	0	0	1	1	0			
1066	lesson_grades	0	0	1893	grade	7	FLOAT		0	0	1	0	0			
1066	lesson_grades	0	0	1894	late	5	INTEGER	(3)	0	0	1	0	0			
1066	lesson_grades	0	0	1895	completed	5	INTEGER	(10)	0	0	1	0	0			
1067	lesson_high_scores	0	0	5054	id	5	INTEGER	(10)	-1	1	1	0				
1067	lesson_high_scores	0	0	1900	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1067	lesson_high_scores	0	0	1901	userid	5	INTEGER	(10)	0	0	1	1	0			
1067	lesson_high_scores	0	0	1902	gradeid	5	INTEGER	(10)	0	0	1	1	0			
1067	lesson_high_scores	0	0	1903	nickname	20	VARCHAR	(5)	0	0	1	0				
1068	lesson_pages	0	0	5194	id	5	INTEGER	(10)	-1	1	1	0				
1068	lesson_pages	0	0	1906	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1068	lesson_pages	0	0	5339	prevpageid	5	INTEGER	(10)	-1	0	1	1	0			
1068	lesson_pages	0	0	5340	nextpageid	5	INTEGER	(10)	-1	0	1	1	0			
1068	lesson_pages	0	0	1909	qtype	1	TINYINT	(3)	0	0	1	0	0			
1068	lesson_pages	0	0	1910	qoption	1	TINYINT	(3)	0	0	1	0	0			
1068	lesson_pages	0	0	1911	layout	1	TINYINT	(3)	0	0	1	0	1			
1068	lesson_pages	0	0	1912	display	1	TINYINT	(3)	0	0	1	0	1			
1068	lesson_pages	0	0	1913	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1068	lesson_pages	0	0	1914	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1068	lesson_pages	0	0	1915	title	20	VARCHAR	(255)	0	0	1	0				
1068	lesson_pages	0	0	1916	contents	28	TEXT		0	0	1	0				
1069	lesson_timer	0	0	5199	id	5	INTEGER	(10)	-1	1	1	0				
1069	lesson_timer	0	0	1920	lessonid	5	INTEGER	(10)	0	0	1	1	0			
1069	lesson_timer	0	0	1921	userid	5	INTEGER	(10)	0	0	1	1	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1069	lesson_timer	0	0	1922	starttime	5	INTEGER	(10)	0	0	1	0	0			
1069	lesson_timer	0	0	1923	lessontime	5	INTEGER	(10)	0	0	1	0	0			
1070	log	0	0	1925	id	5	INTEGER	(10)	0	1	1	0				
1070	log	0	0	1926	time	5	INTEGER	(10)	0	0	1	0	0			
1070	log	0	0	1927	userid	5	INTEGER	(10)	0	0	1	1	0			
1070	log	0	0	1928	ip	20	VARCHAR	(15)	0	0	1	0				
1070	log	0	0	1929	course	5	INTEGER	(10)	0	0	1	1	0			
1070	log	0	0	1930	module	20	VARCHAR	(20)	0	0	1	0				
1070	log	0	0	1931	cmid	5	INTEGER	(10)	0	0	1	0	0			
1070	log	0	0	1932	action	20	VARCHAR	(15)	0	0	1	0				
1070	log	0	0	1933	url	20	VARCHAR	(100)	0	0	1	0				
1070	log	0	0	1934	info	20	VARCHAR	(255)	0	0	1	0				
1071	log_display	0	0	1939	module	20	VARCHAR	(20)	0	0	1	0				
1071	log_display	0	0	1940	action	20	VARCHAR	(20)	0	0	1	0				
1071	log_display	0	0	1941	mtable	20	VARCHAR	(20)	0	0	1	0				
1071	log_display	0	0	1942	field	20	VARCHAR	(40)	0	0	1	0				
1072	message	0	0	1943	id	5	INTEGER	(10)	0	1	1	0				
1072	message	0	0	15448	useridfrom	5	INTEGER	(10)	0	0	1	1	0			
1072	message	0	0	15451	useridto	5	INTEGER	(10)	0	0	1	1	0			
1072	message	0	0	1946	message	28	TEXT		0	0	1	0				
1072	message	0	0	1947	format	5	INTEGER	(4)	0	0	1	0	0			
1072	message	0	0	1948	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1072	message	0	0	1949	messagetype	20	VARCHAR	(50)	0	0	1	0				
1073	message_contacts	0	0	1953	id	5	INTEGER	(10)	0	1	1	0				
1073	message_contacts	0	0	1954	userid	5	INTEGER	(10)	0	0	1	1	0			
1073	message_contacts	0	0	1955	contactid	5	INTEGER	(10)	0	0	1	1	0			
1073	message_contacts	0	0	1956	blocked	1	TINYINT	(1)	0	0	1	0	0			
1074	message_read	0	0	1959	id	5	INTEGER	(10)	0	1	1	0				
1074	message_read	0	0	14686	useridfrom	5	INTEGER	(10)	0	0	1	1	0			
1074	message_read	0	0	15066	useridto	5	INTEGER	(10)	0	0	1	1	0			
1074	message_read	0	0	1962	message	28	TEXT		0	0	1	0				
1074	message_read	0	0	1963	format	5	INTEGER	(4)	0	0	1	0	0			
1074	message_read	0	0	1964	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1074	message_read	0	0	1965	timeread	5	INTEGER	(10)	0	0	1	0	0			
1074	message_read	0	0	1966	messagetype	20	VARCHAR	(50)	0	0	1	0				
1074	message_read	0	0	1967	mailed	1	TINYINT	(1)	0	0	1	0	0			
1075	modules	0	0	1971	id	5	INTEGER	(10)	0	1	1	0				
1075	modules	0	0	1972	name	20	VARCHAR	(20)	0	0	1	0				
1075	modules	0	0	1973	version	5	INTEGER	(10)	0	0	1	0	0			
1075	modules	0	0	1974	cron	5	INTEGER	(10)	0	0	1	0	0			
1075	modules	0	0	1975	lastcron	5	INTEGER	(10)	0	0	1	0	0			
1075	modules	0	0	1976	search	20	VARCHAR	(255)	0	0	1	0				
1075	modules	0	0	1977	visible	1	TINYINT	(1)	0	0	1	0	1			
1076	quiz	0	0	1981	id	5	INTEGER	(10)	0	1	1	0				
1076	quiz	0	0	1982	course	5	INTEGER	(10)	0	0	1	1	0			
1076	quiz	0	0	1983	name	20	VARCHAR	(255)	0	0	1	0				
1076	quiz	0	0	1984	intro	28	TEXT		0	0	1	0				
1076	quiz	0	0	1985	timeopen	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	1986	timeclose	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	1987	optionflags	5	INTEGER	(10)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1076	quiz	0	0	1988	penaltyscheme	5	INTEGER	(4)	0	0	1	0	0			
1076	quiz	0	0	1989	attempts	2	SMALLINT	(6)	0	0	1	0	0			
1076	quiz	0	0	1990	attemptonlast	1	TINYINT	(4)	0	0	1	0	0			
1076	quiz	0	0	1991	grademethod	1	TINYINT	(4)	0	0	1	0	1			
1076	quiz	0	0	1992	decimalpoints	5	INTEGER	(4)	0	0	1	0	2			
1076	quiz	0	0	1993	review	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	1994	questionsperpage	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	1995	shufflequestions	1	TINYINT	(4)	0	0	1	0	0			
1076	quiz	0	0	1996	shuffleanswers	1	TINYINT	(4)	0	0	1	0	0			
1076	quiz	0	0	1997	questions	28	TEXT		0	0	1	0				
1076	quiz	0	0	1998	sumgrades	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	1999	grade	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	2000	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	2001	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1076	quiz	0	0	2002	timelimit	5	INTEGER	(2)	0	0	1	0	0			
1076	quiz	0	0	2003	password	20	VARCHAR	(255)	0	0	1	0				
1076	quiz	0	0	2004	subnet	20	VARCHAR	(255)	0	0	1	0				
1076	quiz	0	0	2005	popup	1	TINYINT	(4)	0	0	1	0	0			
1077	quiz_answers	0	0	5042	id	5	INTEGER	(10)	-1	1	1	0				
1077	quiz_answers	0	0	2009	question	5	INTEGER	(10)	0	0	1	1	0			
1077	quiz_answers	0	0	2010	answer	28	TEXT		0	0	1	0				
1077	quiz_answers	0	0	2011	fraction	20	VARCHAR	(10)	0	0	1	0	0.0			
1077	quiz_answers	0	0	2012	feedback	28	TEXT		0	0	1	0				
1078	quiz_attemptonlast_datasets	0	0	2015	id	5	INTEGER	(10)	0	1	1	0				
1078	quiz_attemptonlast_datasets	0	0	2016	category	5	INTEGER	(10)	0	0	1	1	0			
1078	quiz_attemptonlast_datasets	0	0	2017	userid	5	INTEGER	(10)	0	0	1	1	0			
1078	quiz_attemptonlast_datasets	0	0	2018	datasetnumber	5	INTEGER	(10)	0	0	1	0	0			
1079	quiz_attempts	0	0	5026	id	5	INTEGER	(10)	-1	1	1	0				
1079	quiz_attempts	0	0	2022	quiz	5	INTEGER	(10)	0	0	1	1	0			
1079	quiz_attempts	0	0	2023	userid	5	INTEGER	(10)	0	0	1	1	0			
1079	quiz_attempts	0	0	2024	attempt	2	SMALLINT	(6)	0	0	1	0	0			
1079	quiz_attempts	0	0	2025	sumgrades	20	VARCHAR	(10)	0	0	1	0	0.0			
1079	quiz_attempts	0	0	2026	timestart	5	INTEGER	(10)	0	0	1	0	0			
1079	quiz_attempts	0	0	2027	timefinish	5	INTEGER	(10)	0	0	1	0	0			
1079	quiz_attempts	0	0	2028	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1079	quiz_attempts	0	0	2029	layout	28	TEXT		0	0	1	0				
1079	quiz_attempts	0	0	2030	preview	1	TINYINT	(3)	0	0	1	0	0			
1080	quiz_calculated	0	0	5393	id	5	INTEGER	(10)	-1	1	1	0				
1080	quiz_calculated	0	0	2035	question	5	INTEGER	(10)	0	0	1	1	0			
1080	quiz_calculated	0	0	2036	answer	5	INTEGER	(10)	0	0	1	1	0			
1080	quiz_calculated	0	0	2037	tolerance	20	VARCHAR	(20)	0	0	1	0	0.0			
1080	quiz_calculated	0	0	2038	tolerancetype	5	INTEGER	(10)	0	0	1	0	1			
1080	quiz_calculated	0	0	2039	correctanswerlength	5	INTEGER	(10)	0	0	1	0	2			
1080	quiz_calculated	0	0	2040	correctanswerformat	5	INTEGER	(10)	0	0	1	0	2			
1081	quiz_categories	0	0	2044	id	5	INTEGER	(10)	0	1	1	0				
1081	quiz_categories	0	0	2045	course	5	INTEGER	(10)	0	0	1	1	0			
1081	quiz_categories	0	0	2046	name	20	VARCHAR	(255)	0	0	1	0				
1081	quiz_categories	0	0	2047	info	28	TEXT		0	0	1	0				
1081	quiz_categories	0	0	2048	publish	1	TINYINT	(4)	0	0	1	0	0			
1081	quiz_categories	0	0	2049	stamp	20	VARCHAR	(255)	0	0	1	0				

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1081	quiz_categories	0	0	2050	parent	5	INTEGER	(10)	0	0	1	1	0			
1081	quiz_categories	0	0	2051	sortorder	5	INTEGER	(10)	0	0	1	0	999			
1082	quiz_dataset_definitions	0	0	5389	id	5	INTEGER	(10)	-1	1	1	0				
1082	quiz_dataset_definitions	0	0	2055	category	5	INTEGER	(10)	0	0	1	1	0			
1082	quiz_dataset_definitions	0	0	2056	name	20	VARCHAR	(255)	0	0	1	0				
1082	quiz_dataset_definitions	0	0	2057	type	5	INTEGER	(10)	0	0	1	0	0			
1082	quiz_dataset_definitions	0	0	2058	options	20	VARCHAR	(255)	0	0	1	0				
1082	quiz_dataset_definitions	0	0	2059	itemcount	5	INTEGER	(10)	0	0	1	0	0			
1083	quiz_dataset_items	0	0	2062	id	5	INTEGER	(10)	0	1	1	0				
1083	quiz_dataset_items	0	0	2063	definition	5	INTEGER	(10)	0	0	1	1	0			
1083	quiz_dataset_items	0	0	2064	number	5	INTEGER	(10)	0	0	1	0	0			
1083	quiz_dataset_items	0	0	2065	value	20	VARCHAR	(255)	0	0	1	0				
1084	quiz_grades	0	0	5022	id	5	INTEGER	(10)	-1	1	1	0				
1084	quiz_grades	0	0	2069	quiz	5	INTEGER	(10)	0	0	1	1	0			
1084	quiz_grades	0	0	2070	userid	5	INTEGER	(10)	0	0	1	1	0			
1084	quiz_grades	0	0	2071	grade	9	DOUBLE		0	0	1	0	0			
1084	quiz_grades	0	0	2072	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1085	quiz_match	0	0	2076	id	5	INTEGER	(10)	0	1	1	0				
1085	quiz_match	0	0	2077	question	5	INTEGER	(10)	0	0	1	1	0			
1085	quiz_match	0	0	2078	subquestions	20	VARCHAR	(255)	0	0	1	0				
1086	quiz_match_sub	0	0	2081	id	5	INTEGER	(10)	0	1	1	0				
1086	quiz_match_sub	0	0	2082	question	5	INTEGER	(10)	0	0	1	1	0			
1086	quiz_match_sub	0	0	2083	questiontext	28	TEXT		0	0	1	0				
1086	quiz_match_sub	0	0	2084	answertext	20	VARCHAR	(255)	0	0	1	0				
1087	quiz_multianswers	0	0	2087	id	5	INTEGER	(10)	0	1	1	0				
1087	quiz_multianswers	0	0	2088	question	5	INTEGER	(10)	0	0	1	1	0			
1087	quiz_multianswers	0	0	2089	sequence	20	VARCHAR	(255)	0	0	1	0				
1088	quiz_multichoice	0	0	2092	id	5	INTEGER	(10)	0	1	1	0				
1088	quiz_multichoice	0	0	2093	question	5	INTEGER	(10)	0	0	1	1	0			
1088	quiz_multichoice	0	0	2094	layout	1	TINYINT	(4)	0	0	1	0	0			
1088	quiz_multichoice	0	0	2095	answers	20	VARCHAR	(255)	0	0	1	0				
1088	quiz_multichoice	0	0	2096	single	1	TINYINT	(4)	0	0	1	0	0			
1089	quiz_newest_states	0	0	2099	id	5	INTEGER	(10)	0	1	1	0				
1089	quiz_newest_states	0	0	2100	attemptid	5	INTEGER	(10)	0	0	1	1	0			
1089	quiz_newest_states	0	0	2101	questionid	5	INTEGER	(10)	0	0	1	1	0			
1089	quiz_newest_states	0	0	2102	newest	5	INTEGER	(10)	0	0	1	1	0			
1089	quiz_newest_states	0	0	2103	newgraded	5	INTEGER	(10)	0	0	1	1	0			
1089	quiz_newest_states	0	0	2104	sumpenalty	20	VARCHAR	(10)	0	0	1	0	0.0			
1090	quiz_numerical	0	0	5381	id	5	INTEGER	(10)	-1	1	1	0				
1090	quiz_numerical	0	0	2108	question	5	INTEGER	(10)	0	0	1	1	0			
1090	quiz_numerical	0	0	2109	answer	5	INTEGER	(10)	0	0	1	1	0			
1090	quiz_numerical	0	0	2110	tolerance	20	VARCHAR	(255)	0	0	1	0	0.0			
1091	quiz_numerical_units	0	0	2114	id	5	INTEGER	(10)	0	1	1	0				
1091	quiz_numerical_units	0	0	2115	question	5	INTEGER	(10)	0	0	1	1	0			
1091	quiz_numerical_units	0	0	2116	multiplier	12	DECIMAL	(40,20)	0	0	1	0	1.0000000000 0000000000			
1091	quiz_numerical_units	0	0	2117	unit	20	VARCHAR	(50)	0	0	1	0				
1092	quiz_question_datasets	0	0	2120	id	5	INTEGER	(10)	0	1	1	0				
1092	quiz_question_datasets	0	0	2121	question	5	INTEGER	(10)	0	0	1	1	0			
1092	quiz_question_datasets	0	0	2122	datasetdefinition	5	INTEGER	(10)	0	0	1	1	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1093	quiz_question_instances	0	0	5030	id	5	INTEGER	(10)	-1	1	1	0				
1093	quiz_question_instances	0	0	2126	quiz	5	INTEGER	(10)	0	0	1	1	0			
1093	quiz_question_instances	0	0	2127	question	5	INTEGER	(10)	0	0	1	1	0			
1093	quiz_question_instances	0	0	2128	grade	2	SMALLINT	(6)	0	0	1	0	0			
1094	quiz_question_versions	0	0	5373	id	5	INTEGER	(10)	-1	1	1	0				
1094	quiz_question_versions	0	0	2133	quiz	5	INTEGER	(10)	0	0	1	1	0			
1094	quiz_question_versions	0	0	2134	oldquestion	5	INTEGER	(10)	0	0	1	1	0			
1094	quiz_question_versions	0	0	2135	newquestion	5	INTEGER	(10)	0	0	1	1	0			
1094	quiz_question_versions	0	0	2136	userid	5	INTEGER	(10)	0	0	1	1	0			
1094	quiz_question_versions	0	0	2137	timestamp	5	INTEGER	(10)	0	0	1	0	0			
1095	quiz_questions	0	0	5034	id	5	INTEGER	(10)	-1	1	1	0				
1095	quiz_questions	0	0	2140	category	5	INTEGER	(10)	0	0	1	1	0			
1095	quiz_questions	0	0	2141	parent	5	INTEGER	(10)	0	0	1	1	0			
1095	quiz_questions	0	0	2142	name	20	VARCHAR	(255)	0	0	1	0				
1095	quiz_questions	0	0	2143	questiontext	28	TEXT		0	0	1	0				
1095	quiz_questions	0	0	2144	questiontextformat	1	TINYINT	(2)	0	0	1	0	0			
1095	quiz_questions	0	0	2145	image	20	VARCHAR	(255)	0	0	1	0				
1095	quiz_questions	0	0	2146	defaultgrade	5	INTEGER	(10)	0	0	1	0	1			
1095	quiz_questions	0	0	2147	penalty	7	FLOAT		0	0	1	0	0.1			
1095	quiz_questions	0	0	2148	qtype	2	SMALLINT	(6)	0	0	1	0	0			
1095	quiz_questions	0	0	2149	length	5	INTEGER	(10)	0	0	1	0	1			
1095	quiz_questions	0	0	2150	stamp	20	VARCHAR	(255)	0	0	1	0				
1095	quiz_questions	0	0	2151	version	5	INTEGER	(10)	0	0	1	0	1			
1095	quiz_questions	0	0	2152	hidden	5	INTEGER	(1)	0	0	1	0	0			
1096	quiz_randomsamatch	0	0	2155	id	5	INTEGER	(10)	0	1	1	0				
1096	quiz_randomsamatch	0	0	2156	question	5	INTEGER	(10)	0	0	1	1	0			
1096	quiz_randomsamatch	0	0	2157	choose	5	INTEGER	(10)	0	0	1	0	4			
1097	quiz_rqp	0	0	2160	id	5	INTEGER	(10)	0	1	1	0				
1097	quiz_rqp	0	0	2161	question	5	INTEGER	(10)	0	0	1	1	0			
1097	quiz_rqp	0	0	2162	type	5	INTEGER	(10)	0	0	1	1	0			
1097	quiz_rqp	0	0	2163	source	26	LONGBLOB		0	0	1	0				
1097	quiz_rqp	0	0	2164	format	20	VARCHAR	(255)	0	0	1	0				
1097	quiz_rqp	0	0	2165	flags	1	TINYINT	(3)	0	0	1	0	0			
1097	quiz_rqp	0	0	2166	maxscore	5	INTEGER	(10)	0	0	1	0	1			
1098	quiz_rqp_servers	0	0	2169	id	5	INTEGER	(10)	0	1	1	0				
1098	quiz_rqp_servers	0	0	2170	typeid	5	INTEGER	(10)	0	0	1	1	0			
1098	quiz_rqp_servers	0	0	2171	url	20	VARCHAR	(255)	0	0	1	0				
1098	quiz_rqp_servers	0	0	2172	can_render	1	TINYINT	(2)	0	0	1	0	0			
1098	quiz_rqp_servers	0	0	2173	can_author	1	TINYINT	(2)	0	0	1	0	0			
1099	quiz_rqp_states	0	0	2175	id	5	INTEGER	(10)	0	1	1	0				
1099	quiz_rqp_states	0	0	2176	stateid	5	INTEGER	(10)	0	0	1	1	0			
1099	quiz_rqp_states	0	0	2177	responses	28	TEXT		0	0	1	0				
1099	quiz_rqp_states	0	0	2178	persistent_data	28	TEXT		0	0	1	0				
1099	quiz_rqp_states	0	0	2179	template_vars	28	TEXT		0	0	1	0				
1100	quiz_rqp_types	0	0	2181	id	5	INTEGER	(10)	0	1	1	0				
1100	quiz_rqp_types	0	0	2182	name	20	VARCHAR	(255)	0	0	1	0				
1101	quiz_shortanswer	0	0	5377	id	5	INTEGER	(10)	-1	1	1	0				
1101	quiz_shortanswer	0	0	2186	question	5	INTEGER	(10)	0	0	1	1	0			
1101	quiz_shortanswer	0	0	2187	answers	20	VARCHAR	(255)	0	0	1	0				
1101	quiz_shortanswer	0	0	2188	usecase	1	TINYINT	(2)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1102	quiz_states	0	0	5046	id	5	INTEGER	(10)	-1	1	1	0				
1102	quiz_states	0	0	2192	attempt	5	INTEGER	(10)	0	0	1	1	0			
1102	quiz_states	0	0	2193	question	5	INTEGER	(10)	0	0	1	1	0			
1102	quiz_states	0	0	2194	originalquestion	5	INTEGER	(10)	0	0	1	1	0			
1102	quiz_states	0	0	2195	seq_number	5	INTEGER	(6)	0	0	1	0	0			
1102	quiz_states	0	0	2196	answer	28	TEXT		0	0	1	0				
1102	quiz_states	0	0	2197	timestamp	5	INTEGER	(10)	0	0	1	0	0			
1102	quiz_states	0	0	2198	event	5	INTEGER	(4)	0	0	1	0	0			
1102	quiz_states	0	0	2199	grade	20	VARCHAR	(10)	0	0	1	0	0.0			
1102	quiz_states	0	0	2200	raw_grade	20	VARCHAR	(10)	0	0	1	0				
1102	quiz_states	0	0	2201	penalty	20	VARCHAR	(10)	0	0	1	0	0.0			
1103	quiz_truefalse	0	0	5385	id	5	INTEGER	(10)	-1	1	1	0				
1103	quiz_truefalse	0	0	2206	question	5	INTEGER	(10)	0	0	1	1	0			
1103	quiz_truefalse	0	0	2207	trueanswer	5	INTEGER	(10)	0	0	1	1	0			
1103	quiz_truefalse	0	0	2208	falseanswer	5	INTEGER	(10)	0	0	1	1	0			
1104	resource	0	0	2211	id	5	INTEGER	(10)	0	1	1	0				
1104	resource	0	0	2212	course	5	INTEGER	(10)	0	0	1	1	0			
1104	resource	0	0	2213	name	20	VARCHAR	(255)	0	0	1	0				
1104	resource	0	0	2214	type	20	VARCHAR	(30)	0	0	1	0				
1104	resource	0	0	2215	reference	20	VARCHAR	(255)	0	0	0	0	NULL			
1104	resource	0	0	2216	summary	28	TEXT		0	0	1	0				
1104	resource	0	0	2217	alltext	28	TEXT		0	0	1	0				
1104	resource	0	0	2218	popup	28	TEXT		0	0	1	0				
1104	resource	0	0	2219	options	20	VARCHAR	(255)	0	0	1	0				
1104	resource	0	0	2220	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1105	scale	0	0	2224	id	5	INTEGER	(10)	0	1	1	0				
1105	scale	0	0	2225	courseid	5	INTEGER	(10)	0	0	1	1	0			
1105	scale	0	0	2226	userid	5	INTEGER	(10)	0	0	1	1	0			
1105	scale	0	0	2227	name	20	VARCHAR	(255)	0	0	1	0				
1105	scale	0	0	2228	scale	28	TEXT		0	0	1	0				
1105	scale	0	0	2229	description	28	TEXT		0	0	1	0				
1105	scale	0	0	2230	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1106	scorm	0	0	2233	id	5	INTEGER	(10)	0	1	1	0				
1106	scorm	0	0	2234	course	5	INTEGER	(10)	0	0	1	1	0			
1106	scorm	0	0	2235	name	20	VARCHAR	(255)	0	0	1	0				
1106	scorm	0	0	2236	reference	20	VARCHAR	(255)	0	0	1	0				
1106	scorm	0	0	2237	version	20	VARCHAR	(9)	0	0	1	0				
1106	scorm	0	0	2238	maxgrade	7	FLOAT		0	0	1	0	0			
1106	scorm	0	0	2239	grademethod	1	TINYINT	(2)	0	0	1	0	0			
1106	scorm	0	0	2240	launch	5	INTEGER	(10)	0	0	1	0	0			
1106	scorm	0	0	2241	summary	28	TEXT		0	0	1	0				
1106	scorm	0	0	2242	browsemode	1	TINYINT	(2)	0	0	1	0	0			
1106	scorm	0	0	2243	auto	1	TINYINT	(1)	0	0	1	0	0			
1106	scorm	0	0	2244	width	5	INTEGER	(10)	0	0	1	0	800			
1106	scorm	0	0	2245	height	5	INTEGER	(10)	0	0	1	0	600			
1106	scorm	0	0	2246	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1107	scorm_scoes	0	0	6141	id	5	INTEGER	(10)	-1	1	1	0				
1107	scorm_scoes	0	0	6137	scorm	5	INTEGER	(10)	-1	0	1	1	0			
1107	scorm_scoes	0	0	2252	manifest	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2253	organization	20	VARCHAR	(255)	0	0	1	0				

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1107	scorm_scoes	0	0	2254	parent	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2255	identifier	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2256	launch	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2257	parameters	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2258	scormtype	20	VARCHAR	(5)	0	0	1	0				
1107	scorm_scoes	0	0	2259	title	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2260	prerequisites	20	VARCHAR	(200)	0	0	1	0				
1107	scorm_scoes	0	0	2261	maxtimeallowed	20	VARCHAR	(19)	0	0	1	0				
1107	scorm_scoes	0	0	2262	timelimitaction	20	VARCHAR	(19)	0	0	1	0				
1107	scorm_scoes	0	0	2263	datafromlms	20	VARCHAR	(255)	0	0	1	0				
1107	scorm_scoes	0	0	2264	masteryscore	20	VARCHAR	(200)	0	0	1	0				
1107	scorm_scoes	0	0	2265	next	1	TINYINT	(1)	0	0	1	0	0			
1107	scorm_scoes	0	0	2266	previous	1	TINYINT	(1)	0	0	1	0	0			
1108	scorm_scoes_track	0	0	4663	id	5	INTEGER	(10)	-1	1	1	0				
1108	scorm_scoes_track	0	0	2271	userid	5	INTEGER	(10)	0	0	1	1	0			
1108	scorm_scoes_track	0	0	6146	scormid	5	INTEGER	(10)	-1	0	1	1	0			
1108	scorm_scoes_track	0	0	6147	scoid	5	INTEGER	(10)	-1	0	1	1	0			
1108	scorm_scoes_track	0	0	2274	element	20	VARCHAR	(255)	0	0	1	0				
1108	scorm_scoes_track	0	0	2275	value	30	LONGTEXT		0	0	1	0				
1108	scorm_scoes_track	0	0	2276	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1109	sessions	0	0	2283	sesskey	20	VARCHAR	(32)	0	1	1	0				
1109	sessions	0	0	2284	expiry	5	INTEGER	(11)	0	0	1	0	0			
1109	sessions	0	0	2285	expireref	20	VARCHAR	(64)	0	0	0	0	NULL			
1109	sessions	0	0	2286	data	28	TEXT		0	0	1	0				
1110	survey	0	0	2289	id	5	INTEGER	(10)	0	1	1	0				
1110	survey	0	0	2290	course	5	INTEGER	(10)	0	0	1	1	0			
1110	survey	0	0	2291	template	5	INTEGER	(10)	0	0	1	1	0			
1110	survey	0	0	2292	days	2	SMALLINT	(6)	0	0	1	0	0			
1110	survey	0	0	2293	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1110	survey	0	0	2294	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1110	survey	0	0	2295	name	20	VARCHAR	(255)	0	0	1	0				
1110	survey	0	0	2296	intro	28	TEXT		0	0	0	0	NULL			
1110	survey	0	0	2297	questions	20	VARCHAR	(255)	0	0	0	0	NULL			
1111	survey_analysis	0	0	16983	id	5	INTEGER	(10)	-1	1	1	0				
1111	survey_analysis	0	0	16981	survey	5	INTEGER	(10)	0	0	1	1	0			
1111	survey_analysis	0	0	2302	userid	5	INTEGER	(10)	0	0	1	1	0			
1111	survey_analysis	0	0	2303	notes	28	TEXT		0	0	1	0				
1112	survey_answers	0	0	4330	id	5	INTEGER	(10)	-1	1	1	0				
1112	survey_answers	0	0	2309	userid	5	INTEGER	(10)	0	0	1	1	0			
1112	survey_answers	0	0	6119	survey	5	INTEGER	(10)	-1	0	1	1	0			
1112	survey_answers	0	0	2311	question	5	INTEGER	(10)	0	0	1	1	0			
1112	survey_answers	0	0	2312	time	5	INTEGER	(10)	0	0	0	0	NULL			
1112	survey_answers	0	0	2313	answer1	28	TEXT		0	0	0	0	NULL			
1112	survey_answers	0	0	2314	answer2	28	TEXT		0	0	0	0	NULL			
1113	survey_questions	0	0	2320	id	5	INTEGER	(10)	0	1	1	0				
1113	survey_questions	0	0	2321	text	20	VARCHAR	(255)	0	0	1	0				
1113	survey_questions	0	0	2322	shorttext	20	VARCHAR	(30)	0	0	1	0				
1113	survey_questions	0	0	2323	multi	20	VARCHAR	(100)	0	0	1	0				
1113	survey_questions	0	0	2324	intro	20	VARCHAR	(50)	0	0	0	0	NULL			
1113	survey_questions	0	0	2325	type	1	TINYINT	(3)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1113	survey_questions	0	0	2326	options	28	TEXT		0	0	0	0	NULL			
1114	timezone	0	0	2328	id	5	INTEGER	(10)	0	1	1	0				
1114	timezone	0	0	2329	name	20	VARCHAR	(100)	0	0	1	0				
1114	timezone	0	0	2330	year	5	INTEGER	(11)	0	0	1	0	0			
1114	timezone	0	0	2331	rule	20	VARCHAR	(20)	0	0	1	0				
1114	timezone	0	0	2332	gmtoff	5	INTEGER	(11)	0	0	1	0	0			
1114	timezone	0	0	2333	dstoff	5	INTEGER	(11)	0	0	1	0	0			
1114	timezone	0	0	2334	dst_month	1	TINYINT	(2)	0	0	1	0	0			
1114	timezone	0	0	2335	dst_startday	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2336	dst_weekday	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2337	dst_skipweeks	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2338	dst_time	20	VARCHAR	(5)	0	0	1	0	00:00			
1114	timezone	0	0	2339	std_month	1	TINYINT	(2)	0	0	1	0	0			
1114	timezone	0	0	2340	std_startday	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2341	std_weekday	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2342	std_skipweeks	1	TINYINT	(3)	0	0	1	0	0			
1114	timezone	0	0	2343	std_time	20	VARCHAR	(5)	0	0	1	0	00:00			
1115	user	0	0	2345	id	5	INTEGER	(10)	0	1	1	0				
1115	user	0	0	2346	auth	20	VARCHAR	(20)	0	0	1	0	manual			
1115	user	0	0	2347	confirmed	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2348	policyagreed	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2349	deleted	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2350	username	20	VARCHAR	(100)	0	0	1	0				
1115	user	0	0	2351	password	20	VARCHAR	(32)	0	0	1	0				
1115	user	0	0	2352	idnumber	20	VARCHAR	(64)	0	0	0	0	NULL			
1115	user	0	0	2353	firstname	20	VARCHAR	(20)	0	0	1	0				
1115	user	0	0	2354	lastname	20	VARCHAR	(20)	0	0	1	0				
1115	user	0	0	2355	email	20	VARCHAR	(100)	0	0	1	0				
1115	user	0	0	2356	emailstop	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2357	icq	20	VARCHAR	(15)	0	0	0	0	NULL			
1115	user	0	0	2358	skype	20	VARCHAR	(50)	0	0	0	0	NULL			
1115	user	0	0	2359	yahoo	20	VARCHAR	(50)	0	0	0	0	NULL			
1115	user	0	0	2360	aim	20	VARCHAR	(50)	0	0	0	0	NULL			
1115	user	0	0	2361	msn	20	VARCHAR	(50)	0	0	0	0	NULL			
1115	user	0	0	2362	phone1	20	VARCHAR	(20)	0	0	0	0	NULL			
1115	user	0	0	2363	phone2	20	VARCHAR	(20)	0	0	0	0	NULL			
1115	user	0	0	2364	institution	20	VARCHAR	(40)	0	0	0	0	NULL			
1115	user	0	0	2365	department	20	VARCHAR	(30)	0	0	0	0	NULL			
1115	user	0	0	2366	address	20	VARCHAR	(70)	0	0	0	0	NULL			
1115	user	0	0	2367	city	20	VARCHAR	(20)	0	0	0	0	NULL			
1115	user	0	0	2368	country	19	CHAR	(2)	0	0	0	0	NULL			
1115	user	0	0	2369	lang	20	VARCHAR	(10)	0	0	0	0	en			
1115	user	0	0	2370	theme	20	VARCHAR	(50)	0	0	1	0				
1115	user	0	0	2371	timezone	20	VARCHAR	(100)	0	0	1	0	99			
1115	user	0	0	2372	firstaccess	5	INTEGER	(10)	0	0	1	0	0			
1115	user	0	0	2373	lastaccess	5	INTEGER	(10)	0	0	1	0	0			
1115	user	0	0	2374	lastlogin	5	INTEGER	(10)	0	0	1	0	0			
1115	user	0	0	2375	currentlogin	5	INTEGER	(10)	0	0	1	0	0			
1115	user	0	0	2376	lastIP	20	VARCHAR	(15)	0	0	0	0	NULL			
1115	user	0	0	2377	secret	20	VARCHAR	(15)	0	0	0	0	NULL			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1115	user	0	0	2378	picture	1	TINYINT	(1)	0	0	0	0	NULL			
1115	user	0	0	2379	url	20	VARCHAR	(255)	0	0	0	0	NULL			
1115	user	0	0	2380	description	28	TEXT		0	0	0	0	NULL			
1115	user	0	0	2381	mailformat	1	TINYINT	(1)	0	0	1	0	1			
1115	user	0	0	2382	maildigest	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2383	maildisplay	1	TINYINT	(2)	0	0	1	0	2			
1115	user	0	0	2384	htmleditor	1	TINYINT	(1)	0	0	1	0	1			
1115	user	0	0	2385	autosubscribe	1	TINYINT	(1)	0	0	1	0	1			
1115	user	0	0	2386	trackforums	1	TINYINT	(1)	0	0	1	0	0			
1115	user	0	0	2387	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1116	user_admins	0	0	3990	id	5	INTEGER	(10)	-1	1	1	0				
1116	user_admins	0	0	2402	userid	5	INTEGER	(10)	0	0	1	1	0			
1117	user_coursecreators	0	0	5017	id	5	INTEGER	(10)	-1	1	1	0				
1117	user_coursecreators	0	0	2407	userid	5	INTEGER	(10)	0	0	1	1	0			
1118	user_preferences	0	0	5012	id	5	INTEGER	(10)	-1	1	1	0				
1118	user_preferences	0	0	2412	userid	5	INTEGER	(10)	0	0	1	1	0			
1118	user_preferences	0	0	2413	name	20	VARCHAR	(50)	0	0	1	0				
1118	user_preferences	0	0	2414	value	20	VARCHAR	(255)	0	0	1	0				
1119	user_students	0	0	5006	id	5	INTEGER	(10)	-1	1	1	0				
1119	user_students	0	0	13948	userid	5	INTEGER	(10)	0	0	1	1	0			
1119	user_students	0	0	2420	course	5	INTEGER	(10)	0	0	1	1	0			
1119	user_students	0	0	2421	timestart	5	INTEGER	(10)	0	0	1	0	0			
1119	user_students	0	0	2422	timeend	5	INTEGER	(10)	0	0	1	0	0			
1119	user_students	0	0	2423	time	5	INTEGER	(10)	0	0	1	0	0			
1119	user_students	0	0	2424	timeaccess	5	INTEGER	(10)	0	0	1	0	0			
1119	user_students	0	0	2425	enrol	20	VARCHAR	(20)	0	0	1	0				
1120	user_teachers	0	0	6045	id	5	INTEGER	(10)	-1	1	1	0				
1120	user_teachers	0	0	2433	userid	5	INTEGER	(10)	0	0	1	1	0			
1120	user_teachers	0	0	2434	course	5	INTEGER	(10)	0	0	1	1	0			
1120	user_teachers	0	0	2435	authority	5	INTEGER	(10)	0	0	1	0	3			
1120	user_teachers	0	0	2436	role	20	VARCHAR	(40)	0	0	1	0				
1120	user_teachers	0	0	2437	editall	5	INTEGER	(1)	0	0	1	0	1			
1120	user_teachers	0	0	2438	timestart	5	INTEGER	(10)	0	0	1	0	0			
1120	user_teachers	0	0	2439	timeend	5	INTEGER	(10)	0	0	1	0	0			
1120	user_teachers	0	0	2440	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1120	user_teachers	0	0	2441	timeaccess	5	INTEGER	(10)	0	0	1	0	0			
1120	user_teachers	0	0	2442	enrol	20	VARCHAR	(20)	0	0	1	0				
1121	wiki	0	0	2448	id	5	INTEGER	(10)	0	1	1	0				
1121	wiki	0	0	2449	course	5	INTEGER	(10)	0	0	1	1	0			
1121	wiki	0	0	2450	name	20	VARCHAR	(255)	0	0	1	0				
1121	wiki	0	0	2451	summary	28	TEXT		0	0	1	0				
1121	wiki	0	0	2452	pagename	20	VARCHAR	(255)	0	0	0	0	NULL			
1121	wiki	0	0	2453	wtype	31	ENUM	(\ateacher\a,\agroup\a,\astudent\a)	0	0	1	0	group			
1121	wiki	0	0	2454	ewikiprinttitle	1	TINYINT	(4)	0	0	1	0	1			
1121	wiki	0	0	2455	htmlmode	1	TINYINT	(4)	0	0	1	0	0			
1121	wiki	0	0	2456	ewikiacceptbinary	1	TINYINT	(4)	0	0	1	0	0			
1121	wiki	0	0	2457	disablecamelcase	1	TINYINT	(4)	0	0	1	0	0			
1121	wiki	0	0	2458	setpageflags	1	TINYINT	(4)	0	0	1	0	1			
1121	wiki	0	0	2459	strippages	1	TINYINT	(4)	0	0	1	0	1			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1121	wiki	0	0	2460	removepages	1	TINYINT	(4)	0	0	1	0	1			
1121	wiki	0	0	2461	revertchanges	1	TINYINT	(4)	0	0	1	0	1			
1121	wiki	0	0	2462	initialcontent	20	VARCHAR	(255)	0	0	0	0	NULL			
1121	wiki	0	0	2463	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1122	wiki_entries	0	0	16968	id	5	INTEGER	(10)	-1	1	1	0				
1122	wiki_entries	0	0	16966	wikiid	5	INTEGER	(10)	0	0	1	1	0			
1122	wiki_entries	0	0	2468	course	5	INTEGER	(10)	0	0	1	1	0			
1122	wiki_entries	0	0	2469	groupid	5	INTEGER	(10)	0	0	1	1	0			
1122	wiki_entries	0	0	2470	userid	5	INTEGER	(10)	0	0	1	1	0			
1122	wiki_entries	0	0	2471	pagename	20	VARCHAR	(255)	0	0	1	0				
1122	wiki_entries	0	0	2472	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1123	wiki_pages	0	0	16218	id	5	INTEGER	(10)	-1	1	1	0				
1123	wiki_pages	0	0	2480	pagename	20	VARCHAR	(160)	0	0	1	0				
1123	wiki_pages	0	0	2481	version	5	INTEGER	(10)	0	0	1	0	0			
1123	wiki_pages	0	0	2482	flags	5	INTEGER	(10)	0	0	0	0	0			
1123	wiki_pages	0	0	2483	content	29	MEDIUMTEXT		0	0	0	0	NULL			
1123	wiki_pages	0	0	2484	author	20	VARCHAR	(100)	0	0	0	0	ewiki			
1123	wiki_pages	0	0	2485	userid	5	INTEGER	(10)	0	0	1	1	0			
1123	wiki_pages	0	0	2486	created	5	INTEGER	(10)	0	0	0	0	0			
1123	wiki_pages	0	0	2487	lastmodified	5	INTEGER	(10)	0	0	0	0	0			
1123	wiki_pages	0	0	2488	refs	29	MEDIUMTEXT		0	0	0	0	NULL			
1123	wiki_pages	0	0	2489	meta	29	MEDIUMTEXT		0	0	0	0	NULL			
1123	wiki_pages	0	0	2490	hits	5	INTEGER	(10)	0	0	0	0	0			
1123	wiki_pages	0	0	16216	wiki	5	INTEGER	(10)	0	0	1	1	0			
1124	workshop	0	0	2494	id	5	INTEGER	(10)	0	1	1	0				
1124	workshop	0	0	2495	course	5	INTEGER	(10)	0	0	1	1	0			
1124	workshop	0	0	2496	name	20	VARCHAR	(255)	0	0	1	0				
1124	workshop	0	0	2497	description	28	TEXT		0	0	1	0				
1124	workshop	0	0	2498	wtype	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2499	nelements	1	TINYINT	(3)	0	0	1	0	1			
1124	workshop	0	0	2500	nattachments	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2501	phase	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2502	format	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2503	gradingstrategy	1	TINYINT	(2)	0	0	1	0	1			
1124	workshop	0	0	2504	resubmit	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2505	agreeassessments	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2506	hidegrades	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2507	anonymous	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2508	includeself	1	TINYINT	(2)	0	0	1	0	0			
1124	workshop	0	0	2509	maxbytes	5	INTEGER	(10)	0	0	1	0	100000			
1124	workshop	0	0	2510	submissionstart	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2511	assessmentstart	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2512	submissionend	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2513	assessmentend	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2514	releasegrades	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2515	grade	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2516	gradinggrade	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2517	ntassessments	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2518	assessmentcomps	1	TINYINT	(3)	0	0	1	0	2			
1124	workshop	0	0	2519	nsassessments	1	TINYINT	(3)	0	0	1	0	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1124	workshop	0	0	2520	overallocation	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2521	timemodified	5	INTEGER	(10)	0	0	1	0	0			
1124	workshop	0	0	2522	teacherweight	1	TINYINT	(3)	0	0	1	0	1			
1124	workshop	0	0	2523	showleaguetable	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2524	usepassword	1	TINYINT	(3)	0	0	1	0	0			
1124	workshop	0	0	2525	password	20	VARCHAR	(32)	0	0	1	0				
1125	workshop_assessments	0	0	5957	id	5	INTEGER	(10)	-1	1	1	0				
1125	workshop_assessments	0	0	2529	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1125	workshop_assessments	0	0	16212	submissionid	5	INTEGER	(10)	-1	0	1	1	0			
1125	workshop_assessments	0	0	2531	userid	5	INTEGER	(10)	0	0	1	1	0			
1125	workshop_assessments	0	0	2532	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1125	workshop_assessments	0	0	2533	timegraded	5	INTEGER	(10)	0	0	1	0	0			
1125	workshop_assessments	0	0	2534	timeagreed	5	INTEGER	(10)	0	0	1	0	0			
1125	workshop_assessments	0	0	2535	grade	7	FLOAT		0	0	1	0	0			
1125	workshop_assessments	0	0	2536	gradinggrade	5	INTEGER	(3)	0	0	1	0	0			
1125	workshop_assessments	0	0	2537	mailed	1	TINYINT	(3)	0	0	1	0	0			
1125	workshop_assessments	0	0	2538	resubmission	1	TINYINT	(3)	0	0	1	0	0			
1125	workshop_assessments	0	0	2539	donotuse	1	TINYINT	(3)	0	0	1	0	0			
1125	workshop_assessments	0	0	2540	generalcomment	28	TEXT		0	0	1	0				
1125	workshop_assessments	0	0	2541	teachercomment	28	TEXT		0	0	1	0				
1126	workshop_comments	0	0	6215	id	5	INTEGER	(10)	-1	1	1	0				
1126	workshop_comments	0	0	2548	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1126	workshop_comments	0	0	6211	assessmentid	5	INTEGER	(10)	-1	0	1	1	0			
1126	workshop_comments	0	0	2550	userid	5	INTEGER	(10)	0	0	1	1	0			
1126	workshop_comments	0	0	2551	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1126	workshop_comments	0	0	2552	mailed	1	TINYINT	(2)	0	0	1	0	0			
1126	workshop_comments	0	0	2553	comments	28	TEXT		0	0	1	0				
1127	workshop_elements	0	0	4994	id	5	INTEGER	(10)	-1	1	1	0				
1127	workshop_elements	0	0	2560	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1127	workshop_elements	0	0	2561	elementno	1	TINYINT	(3)	0	0	1	0	0			
1127	workshop_elements	0	0	2562	description	28	TEXT		0	0	1	0				
1127	workshop_elements	0	0	2563	scale	1	TINYINT	(3)	0	0	1	0	0			
1127	workshop_elements	0	0	2564	maxscore	1	TINYINT	(3)	0	0	1	0	1			
1127	workshop_elements	0	0	2565	weight	1	TINYINT	(3)	0	0	1	0	11			
1127	workshop_elements	0	0	2566	stddev	7	FLOAT		0	0	1	0	0			
1127	workshop_elements	0	0	2567	totalassessments	5	INTEGER	(10)	0	0	1	0	0			
1128	workshop_grades	0	0	6226	id	5	INTEGER	(10)	-1	1	1	0				
1128	workshop_grades	0	0	2571	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1128	workshop_grades	0	0	6222	assessmentid	5	INTEGER	(10)	-1	0	1	1	0			
1128	workshop_grades	0	0	2573	elementno	5	INTEGER	(10)	0	0	1	1	0			
1128	workshop_grades	0	0	2574	feedback	28	TEXT		0	0	1	0				
1128	workshop_grades	0	0	2575	grade	1	TINYINT	(3)	0	0	1	0	0			
1129	workshop_rubrics	0	0	4981	id	5	INTEGER	(10)	-1	1	1	0				
1129	workshop_rubrics	0	0	2580	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1129	workshop_rubrics	0	0	2581	elementno	5	INTEGER	(10)	0	0	1	1	0			
1129	workshop_rubrics	0	0	2582	rubricno	1	TINYINT	(3)	0	0	1	0	0			
1129	workshop_rubrics	0	0	2583	description	28	TEXT		0	0	1	0				
1130	workshop_stockcomments	0	0	4978	id	5	INTEGER	(10)	-1	1	1	0				
1130	workshop_stockcomments	0	0	2586	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1130	workshop_stockcomments	0	0	2587	elementno	5	INTEGER	(10)	0	0	1	1	0			

ID	Tablename	TableType	TablePrefix	ID2	ColName	idDatatype	DataDesc	DatatypeParams	Width	PrimaryKey	NotNull	IsForeignKey	DefaultValue	ID3	IndexName	IndexKind
1130	workshop_stockcomments	0	0	2588	comments	28	TEXT		0	0	1	0				
1131	workshop_submissions	0	0	4985	id	5	INTEGER	(10)	-1	1	1	0				
1131	workshop_submissions	0	0	2591	workshopid	5	INTEGER	(10)	0	0	1	1	0			
1131	workshop_submissions	0	0	2592	userid	5	INTEGER	(10)	0	0	1	1	0			
1131	workshop_submissions	0	0	2593	title	20	VARCHAR	(100)	0	0	1	0				
1131	workshop_submissions	0	0	2594	timecreated	5	INTEGER	(10)	0	0	1	0	0			
1131	workshop_submissions	0	0	2595	mailed	1	TINYINT	(2)	0	0	1	0	0			
1131	workshop_submissions	0	0	2596	description	28	TEXT		0	0	1	0				
1131	workshop_submissions	0	0	2597	gradinggrade	5	INTEGER	(3)	0	0	1	0	0			
1131	workshop_submissions	0	0	2598	finalgrade	5	INTEGER	(3)	0	0	1	0	0			
1131	workshop_submissions	0	0	2599	late	5	INTEGER	(3)	0	0	1	0	0			
1131	workshop_submissions	0	0	2600	nassessments	5	INTEGER	(10)	0	0	1	0	0			