# EXPERIENTIAL LEARNING: A CASE STUDY OF A MUTUALLY-BENEFICIAL DATABASE DEVELOPMENT PROJECT

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## ABSTRACT

*MBA University works in conjunction with Big University (BIGU) to provide an MBA program to the military. Limited manpower hours, reporting requirements, the need for accreditation data, and increased enrollment exacerbated the need for a database for MBAU's administration of enrollment and matriculation management. MBAU graduate staff requested the School of Business Database Management (DBM) instructor to select theirs as the fall class project. Since experiential learning is vital to student development, and this project provided students with a real world problem and a real world customer, it was selected. Using Systems Architect, a CASE tool, and Microsoft Access, students developed a database management application. This project allowed students to learn the process of database design, and provided students the opportunity to interface with actual customers and helped them to experience various pressures and difficulties not normally felt in artificial exercises. It also provided a sense of accomplishment in seeing the implementation of their class work.*

**Keywords:** Service Learning, Experiential Learning, Database Development

## INTRODUCTION

"Service learning is a pedagogy that links community service with academic experience" [2]. It is an integration of traditional classroom leaning and a mutually beneficial experiential component for students and the community [3, 8, 11, 15, 16, 19, 20]. According to Cougar [6], the highest level of knowledge is evidenced by application. Service learning incorporates practical hands-on application experience into the classroom [3, 10, 19]. This involvement "provide[s] the student with a deeper understanding of the course content…" [4, 28]. Service learning "promote[s] a more efficient integration among educational institutions, the community, and businesses" [14]. This paper presents an overview of experiential learning, the benefits of experiential learning, and a case study of a mutually-beneficial experiential learning activity in a Database Development course.

### Benefits of Experiential Learning

The literature is full of examples of the benefits of experiential learning to students: concept recollection and student outcomes [22]; critical thinking and problem solving skills [19]; ability to apply the knowledge in related situations [24]; increased student interest and motivation when working on a hands-on project [7, 18]; and improved communication skills, both oral and written [13]. Several authors commend these types of projects for their contribution to improving student creativity [6, 12, 16].

Experiential learning enhances the quality of the education a university offers. It allows teachers opportunities to challenge their students [29]. Experiential learning provides the professor theory which he/she can teach and/or apply in the classroom and allows them to maintain currency in their field [5]. Research has shown the positive effects to include improved classroom practices [23], instructional productivity [17] and "links to the external community that form the basis of teaching cases, journal articles and research streams in addition to increasing the service component of the instructor's role" [14]. This constant interface strengthens the relationship between academia and the business community [5, 9, 14, 27].

Experiential learning allows businesses to collaborate with the university and potential future employees [9, 25]. During the activity, business helps shape student thinking. The process is similar to that of hiring an intern [5]. Additional benefits to business are the valuable expertise of the instructor, the energy of enthusiastic students and the cost savings reaped from not paying consultant fees.

## MBA UNIVERSITY'S NEED FOR A DATABASE

MBA University (MBAU) is a five-year regional university located in the southwest United States that has approximately 5000 students, most of whom are commuters. The governance of MBAU was transferred to the board of the state's largest university, Big U, in 1992. The relationship with Big

U has allowed MBAU numerous opportunities. In 1997, the traditional sixteen-week night class format was changed to a weekend program to meet the needs of the military students who were often "in the field" during the week and could not attend night classes. At the same time, MBAU instituted the use of a fully-interactive audio and video distance learning system. This system allowed classes to be taught from MBAU and broadcast to practically limitless additional sites throughout the state. In 1998, Big U approached MBAU about offering its condensed format program to military students and their dependents throughout Europe. MBAU faculty were quite excited about the possibilities and quickly adapted the courses from a weekend format to a 2/1 credit hour format. The 2/1 credit hour format allows the student to receive two hours of credit for the lecture portion of the course and an additional one hour of credit for a companion directed reading and paper for the course. The changes caused the number of students in the program to grow from 25 to 125 to 450. It was clear that the solution to the wonderful problem of our growth was a database.

The statewide MBA program is administered by a Graduate Coordinator. The Dean of International Business Studies coordinates the European, USMC and ultimately the statewide MBA programs for MBAU. These two individuals, in conjunction with their secretary and a 20-hour per week student worker are responsible for all activities related to the MBA program. Daily activities include, but are not limited to, the following: checking prerequisites; evaluating transfer courses; checking student records; charting student progression through the program; locating contact information; and ensuring completion of paperwork. Most of the activities delineated above require that one of the office staff pull the student's folder, review his/her plan of study and print a transcript. Some activities would also require that various logs be checked to determine the status of particular paperwork (e.g., grade change, request to transfer graduate credits, plan of study).

In addition to the data required for the daily activities of MBAU's MBA program, numerous data are required in order to meet the reporting requirements of MBAU's School of Business (S/B) and MBAU as a whole. Specific reporting requirements include, but are not limited to, the following: faculty teaching load; student credit hours produced; payroll reconciliation reports; assessment data; and retention data. Currently, each of the above reports are created with pencil and paper through labor-intensive data mining and acrobatic memory recall activities.

MBAU is regionally and nationally accredited. Both of these agencies require MBAU and MBAU S/B to report numerous data on both semester and academic year bases. Specific required reports include, but are not limited to, the following: minimum full-time equivalent for each credit hour per semester; total credit hours taught by doctorally and professionally qualified faculty members and adjunct and overload percentages

## DATABASE MANAGEMENT COURSE

The database management course uses an integrated approach to teaching the concepts of DBM. The breakdown of this approach includes textbook readings, lecture, and behavior modeling coupled with grounded learning. Behavior modeling, considered among the most effective methods of computer training, consists of skill demonstration and subsequent hands-on practice [30]. Experiential learning allows students to interact with the topic they are studying, and additionally provides students the opportunity to work on real world problems for real world customers using real world tools. Research in experiential learning has shown students consider this type of class experience more rewarding and it provides them with more confidence in their problem-solving abilities [21]. The request by the MBA graduate staff for the DBM class to develop a database to manage graduate student records provided both a real world problem and a real world customer for the DBM class experience.

## THE DESIGN OF THE PROJECT

Specifically, the instructor designed the class to utilize the Student Team Learning approach developed at Johns Hopkins University. This approach requires "team rewards, individual accountability, and equal opportunities for success" [26] to be successful. Consequently, the rubric for the class points included points awarded to each student by his/her team members for participation in the project and extra points for the team that had their database chosen as best. The instructor also provided an additional mechanism for student individual accountability by allowing teams to "fire" team members who did not participate. Finally, each student in the team was required to take part in "in process reviews" of his/her product.

### Designing the Innovative Educational Experience

At the first class session, the instructor divided the DBM class into three teams with each team vying for the MBA database project. The students comprising

the teams played the role of systems analysts/designers. The team with the best-designed functioning database at the end of the semester would "win" the contract and gain extra-credit points toward the overall final grade. The addition of competition to the learning process made the class more exciting for the students.

**Phase 1 – Preliminary Investigation**

An opportunity to conduct an initial interview with the MBA staff came during the second class period. Additional opportunities to interview the MBA staff were provided at each major stage of database development. At these interviews, the business rules for the MBA program were established and clarified. Note: the inclusion of business rules during analysis and design stages of database development has become an actual requirement and consequently must be taught to students [1].

The deliverable for the first stage of the database development was the enterprise (contextual) model. This model and all subsequent models were created entirely in Systems Architect. The enterprise model consisted of the data model of major entities and their relationships, and definitions.

**Phase 2 – Problem Analysis**

In the next phase of database development, the students identified the attributes of each entity including an identifying attribute that would become the primary key for each entity. During this phase, the students clarified the business rules and started converting the many-to-many relationships into one-to-many relationships by adding associative and/or intersection entities to the model. Further, students began documenting metadata about the high-level entities, attributes, and relations in the repository. The deliverables for this phase included the conceptual data model, in the form of an Entity Relationship Diagram, and repository contents in the form of a logical model entity report generated from Systems Architect.

**Phase 3 – Requirements Analysis**

During this phase of development, the students created a normalized (third-normal form) logical model of the database. Teams committed to the relational model during this phase. Integrity and operational constraints were documented. Inside Systems Architect, students updated primary and foreign keys. Deliverables included the logical model and the repository contents.

**Phase 4 – Design**

In the design phase, data types were chosen for each of the attributes, and data integrity controls were established. Deliverables included a physical model of the database.

**Phase 5 – Implementation**

Actual implementation was carried out through Systems Architect. The software created the data definition language (DDL), which was saved as a text file. Students designed forms and reports from the examples provided by the Dean of the Graduate School. Students also created a switchboard in Access. Forms and reports were checked using a straw man database. Additionally, queries were made that supported specific periodic questions the graduate staff needed answered. Deliverables included a hard copy of the DDL, the functioning database with appropriate user views, and all documentation leading up to the development of the database.

**Experiential Learning (Class Two) Versus Canned Projects (Class One)**

The initial database management class (Class One) used a "canned" project. Students were given a project for a fictitious library. The project was overly simple, with a simple solution. The instructor acted as the client. There were numerous problems associated with the initial class. Most of these problems were overcome with the adoption of Systems Architect and the use of an actual client during Class Two. Student evaluations were surveyed based on a five-point Likert scale with 5 = highest and 1 = lowest.

**Student Evaluations**

Evaluation of the student data was carried out using a Student t-Test which indicated that there was a significant difference ($t = -2.96$; $p = 0.01$) in the way students perceived the course.

## OUTCOMES OF EXPERIENTIAL LEARNING

Incorporating experiential learning to actual customer projects, such as this one for MBAU, can lead to a mutually beneficial end product for both the students and the customer. Working on an actual customer databases while learning the art of database design during a three-credit lecture course is challenging for both the students and the instructor. Time has to be devoted to both the fundamentals of design and to the

project itself. Additionally, customers must be made aware that there is no guarantee of a successfully working database at the conclusion of the class (a fact about which the students are unaware). This leads to an interesting set of dynamics! Students' initial comments immediately after the project were both relief and pride in accomplishments.

The experiential learning project seems to have been very beneficial to the employment of at least a few of these students. Toshiba in Houston, Texas, recently interviewed for employment one student who was in the class. The instructor for the Database class was asked to recommend her for the position at Toshiba. After the telephone interview with the instructor, the hiring manager stated that the student was the number one choice largely due to her "comfort level with relational databases." Yet another student involved in the project recently participated in the database design competition at the National Collegiate Association of Information Technology Professionals (AITP) in Omaha, Nebraska. Seventy-four teams participated in the competition. Her team received an honorable mention for their efforts.

## THE PROJECT IN RETROSPECT

"Providing students with real world experiences is one of the best methods to prepare . . . [students] to be successful in their careers." [9]. This project provided the students of the database management class with an opportunity not only to successfully complete an actual project, but also, as Fox discussed, it provided them with an opportunity to strengthen oral and written communication and manage interpersonal conflicts [9]. While the primary goal of this class was to learn the steps of database design and the processes of database management, student teams were adamant about completing a working product and having the "winning" database design.

## CONCLUSION

Possibly of even greater value was the interaction with the community required by experiential learning. Specifically, in this class, it placed the instructor in a facilitator role and forced teams to interact with both the instructor and with the client. Teams developed team contracts and provided continual feedback to the client. Through this process, experiential learning provided several desirable outcomes for the students outside of a working knowledge of database management. Due to the stress of creating and completing the project in the time allotted, students were forced to expand both their personal and interpersonal development. By using an actual client, students also ended the semester with a greater ability to understand and apply knowledge. This project engaged their curiosity, and allowed for reflective practice by forcing them to meet deadlines, but allowing them the autonomy to decide how to meet those deadlines. This project also forced critical thinking skills. Each student team developed a different solution to the problems of MBAU [2]. This case study clearly illustrates the positive effects the experiential learning project has had on these students—inside the classroom, in later academic pursuits, and on their careers.

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