



A DBTechNet course module on database SQL transactions for VET teachers training and higher education informatics education

D. A. Dervos, C. Skourlas, and M. Laiho

Citation: [AIP Conference Proceedings](#) **1644**, 147 (2015); doi: 10.1063/1.4907830

View online: <http://dx.doi.org/10.1063/1.4907830>

View Table of Contents: <http://scitation.aip.org/content/aip/proceeding/aipcp/1644?ver=pdfcov>

Published by the [AIP Publishing](#)

Articles you may be interested in

[Zero tolerance for incorrect data: Best practices in SQL transaction programming](#)

[AIP Conf. Proc.](#) **1644**, 113 (2015); 10.1063/1.4907825

[Pathway — Using a State-of-the-Art Digital Video Database for Research and Development in Teacher Education](#)

[AIP Conf. Proc.](#) **818**, 15 (2006); 10.1063/1.2177012

[Educating Teachers](#)

[Phys. Today](#) **38**, 144 (1985); 10.1063/1.2814756

[Transactional analysis for physics teachers](#)

[Am. J. Phys.](#) **44**, 491 (1976); 10.1119/1.10161

[BOOK REVIEWS: Accreditation in Teacher Education—Its Influence on Higher Education](#)

[Phys. Teach.](#) **4**, 331 (1966); 10.1119/1.2351038

A DBTechNet Course Module on Database SQL Transactions for VET Teachers Training and Higher Education Informatics Education

D. A. Dervos¹, C. Skourlas^{2,a)}, M. Laiho³

¹Alexander Technological Educational Institute, IT Department, P.O. BOX 141, 57400 Sindos, Thessaloniki, Greece

²Technological Education Institute of Athens, Department of Informatics, Aigaleo 12210, Athens, Greece

³HAAGA-HELIA UAS, IT Department, Ratapihantie 13, 00520 Helsinki, Finland

^{a)}Corresponding author: cskourlas@teiath.gr

Abstract. “DBTech VET Teachers” project is Leonardo da Vinci Multilateral Transfer of Innovation Project co-financed by the European Commission’s Lifelong Learning Programme. The aim of the project is to renew the teaching of database technologies in VET (Vocational Education and Training) institutes, on the basis of the current and real needs of ICT industry in Europe. Training of the VET teachers is done with the systems used in working life and they are taught to guide students to learning by verifying. In this framework, a course module on SQL transactions is prepared and offered. In this paper we present and briefly discuss some qualitative/quantitative data collected from its first pilot offering to an international audience in Greece during May-June 2013. The questionnaire/evaluation results, and the types of participants who have attended the course offering, are presented. Conclusions are also presented.

INTRODUCTION

“DBTech VET Teachers” Project is Leonardo da Vinci Multilateral Project Transfer of Innovation funded by European Commission and project partners (<https://sites.google.com/site/dbtechvet/project>). The aim of the project is to renew the teaching of database technologies in VET (Vocational Education and Training) institutes, and that it will be based on the current and real needs of ICT industry in Europe, and so that teaching meets the European wide standard of a pedagogical approach. The produced materials are adaptable in all partner countries and translated into national languages. Training of the VET teachers are conducted with the systems used by working life and they are taught to guide students to learning by verifying. In the framework of the LLP “DBTech VET Teachers” programme, a course module on SQL transactions is prepared and offered.

In the following sections we briefly present the DBTechNet perspective towards a framework for a Course Module on Database SQL Transactions, and the Course Module. Then, we describe the first pilot offering of the course module to an international audience in Greece in May-June 2013. The questionnaire/evaluation results, and the types of participants, who have attended the course offering, are presented and evaluated, and some conclusions are also discussed.

THE COURSE MODULE ON SQL TRANSACTION

DBTechNet (<http://www.dbtechnet.org/>) is an initiative of European Higher Education institutions and IT-companies to set up a transnational collaboration scheme of higher level educational establishments, IT enterprises and Vocational Training centres, who collaborate in order to achieve a three-fold goal, namely:

- Develop efficient Internet based tools (like a Web-based IT terminology encyclopaedia, universal database access terminal, etc.) which will organize worldwide access to database technology resources and educational/training material and references
- Design and develop virtual workshop type course modules on selected database topics that will address the wide spectrum of new trends, backed by online support from a network of educational and IT professional experts
- Promote entrepreneurship by developing a business plan of operation, which will make it possible for the collaboration scheme in question to evolve into a self-sustained consortium that will function within the new emerging reality of education and vocational training in today's information and communication technology driven society.

A major aim of the LLP "DBTech VET Teachers" project is to facilitate the introduction of new topics and content to the HE and VET curricula; topics and content that reflect (a) the current trends in database technologies, and (b) the needs of the European labour market [1], [2], [3]. The DBTechNet Course Module conforms to the international practice focusing on a practitioners' approach based on the principles of "Learning-by-doing", and "Learn by verifying in practice" [1]. The course module starts by focusing on how the fast and reliable rollback service is implemented and proceeds to consider concurrency control and transaction isolation level implementation technologies. Learners are guided to thoroughly realize and understand that the application is responsible of the transaction logic, and the need for checking the diagnostics after every service request [4] Topics addressed in theory as well as in practice include:

"SQL transactions basics, SQL error diagnostics in various DBMS products, Concurrency issues (dirty reads, lost updates, non-repeatable reads, phantoms), ISO SQL isolation levels, Locking Scheme Concurrency Control (LSCC), Multi-Versioning Concurrency Control (MVCC), Optimistic Concurrency Control (OCC), Best practices in SQL transaction programming" [4]. Course participants are advised to experiment with and verify the services supported by the DBMS product used. [4].

TRAINING OFFERED – PLAN OF ACTIVITIES AND EXPECTED BENEFITS

The adopted blended learning approach includes distance training and hands on laboratory work. The course module was offered, on a pilot basis, to 24 participants (VET Teachers, IT professionals, HE graduates) mainly from Athens and Thessaloniki, plus two participants from the Republic of Serbia. With the exception of two 2-hour laboratory workshop sessions that were conducted simultaneously at the ATEI of Thessaloniki, and at the TEI of Athens, the rest of the course's plan of activities were conducted over the Internet, utilizing the Adobe Connect Pro tele-conferencing environment of the Helsinki Business College in Finland. More specifically, the course's calendar of events had as follows:

- 1) Kick off meeting. Tutors discussed the details of the experiment and prepared to offer the one-hour webinar sessions
- 2) Trainees' selection
- 3) Orientation lecture
- 4) Eight webinar sessions following the scheme of the synchronous face-to-face distance learning were offered. All of the latter were video recorded and, together with all the supporting educational and training material became freely available for viewing and retrieval via the University of Macedonia hosted DBTechNet portal [8]
- 5) Assignments were not included but the laboratory work was organized as a series of exercises for self-practicing. The accompanying self-training material plus all the communication between the tutors and the trainees were also offered/supported by the course's portal residing pages.
- 6) In addition to and in parallel with the above, trainees participated in the two "2-hour traditional" laboratory workshop meetings. Both of the latter were conducted simultaneously at the Athens TEI (for participants from Southern Greece), and at the Thessaloniki ATEI (for participants from Northern Greece)..
- 7) There were not final examinations but the trainees were partially evaluated through their laboratory work. Another evaluation criterion was the trainees' attendance and participation in the one-hour webinar sessions as well as their trace of content usage at the course's web portal pages [8].
- 10) The pilot course offering was evaluated by the participants via a web-based online questionnaire developed at HAAGA-HELIA University of Applied Sciences in Helsinki, Finland. Some of the questionnaire evaluation results are included in this paper.

The expected benefits for the VET trainee have been the following:

- acquire high quality training on SQL Transaction technology for free, for as long as the DBTech VET project is running
- establish a working contact with the DBTechNet network of experts
- receive an official certificate of attendance by the corresponding TEI/ILLE (co-signed by DBTechNet)
- enjoy a learning experience, utilizing the latest communication and computer virtualization technologies
- acquire knowledge and skills of an international quality and value for the CV
- obtain access to DBTechNet education and training material that can subsequently be used for conducting own training sessions on the topic

The expected benefits for the trainee's employer (if applicable) have been the following:

- have his/her employee receive high quality training of an international value, for free (for as long as the DBTech VET project is running)
- have his/her employee acquire the potential to subsequently act as an in-Company trainer
- have the opportunity (together with his/her employee) to interact with the DBTechNet experts and influence the further development of the education and training material in the direction that best serves the interests of the company/organization

PILOT COURSE - EVALUATION

In this section a first evaluation of the pilot course offering of the Database SQL Transactions course module for VET teacher training is presented and discussed. Table 1 summarizes on the pilot course's profile. The course was co-organized by the ATEI of Thessaloniki, and the TEI of Athens [8]. A certificate of attendance was given to the trainees. Table 2 sketches the course's typical trainee profile. Table 3 depicts the Course content accessing statistics. Commenting on the course evaluation results, it is noted that:

- The interest and motivation the participants reported to have in Database Technologies increased by 11.73% on the average, as a result of their participation in the DBTech VET course
- The interest and motivation the participants reported to have in the specific technology of SQL transactions have increased by 17.9%, on the average
- The participants reported an average improvement of 35% in their knowledge and skills on SQL transactions concurrency and control.

TABLE 1. SQL Transactions Piloting (Athens, Thessaloniki) Language English

Course figure/activity	Dates/Numbers
Start date	16 May 2013
Closing date	17 June 2013
ECTS units	2
Number of applicants	35
Athens Participants	14
Thessaloniki participants	10
International participation	2
Hours of Adobe Connect Pro online meetings	9
Hours of hands-on-laboratory Sessions	4
Hours of self-study/self practicing expected	8

TABLE 2. Trainee profile and requirements

Requirements	Description
Background: knowledge/skills	Database Technology basics, SQL. Working experience as a programmer, and/or database administration was a plus

Availability, and workload requirements	The trainee was expected to allocate an average of 5-8 hours per week, depending on background and skills. Workload distribution was flexible in the case of the webinar sessions; the latter were broadcasted over the Internet during convenient afternoon hours, plus they were recorded and made available as digital videos. The two Hands-on-Laboratory (HoL) sessions were organized to take place on Saturdays.
Type of Trainee	Number of trainees
VET teacher	14 (58.00%)
IT professional	9 (38.00%)
Other	1 (4.00%) (Postdoc researcher)

TABLE 3. Statistics
CUV-Course Unit Visits, RU-Registered Users, PSV-Presentation Slides Views, DVV-Digital Video Views

Time period (2013)	CUV Total	CUV RU	PSV Total	Slides views RU	DVV Total	DVV RU
May-June	2366	1843	467	467	6	6
-15 December	1222	304	320	144	198	51
Total	3588	2147	787	611	204	57

DISCUSSION AND CONCLUSIONS

In this paper, the DBTechNet framework for Database SQL Transactions course module for VET teacher training, and the related pilot course offering are presented and discussed. A major aim of the LLP "DBTech VET Teachers" programme is to enhance the collaboration between HE institutions, VET institutions, and ICT industry. [4], [5]. Equivalently, "the aim is to facilitate the introduction of new topics and content to the HE and VET curricula; topics and content that reflect: (a) the current trends in database technologies, and (b) the needs of the European labour market" [4]. It seems that the collaboration between HE institutions was enhanced and four teacher trainers from four DBTechNet institutes were involved in the webinars of the pilot course offering/training. Course participants have reported an average improvement of 35% in their knowledge and skills on SQL transactions concurrency and control. Therefore, it seems that new topics and content taught in the pilot course could be introduced to the VET curricula.

The description of the Transaction Processing unit of the Computer Science Curricula [7] includes a series of transaction processing topics and the related learning outcomes. Transaction processing is one of the elective units, and the new CS2013 has been extended to include some new topics and learning outcomes. The DBTechNet "SQL Transactions" course module and its pilot offering conform the content of the CS2013 recommendations: transactions failure and recovery and concurrency control mechanisms are examined and discussed and the trainees learn to explain the concept of implicit commits, describe the issues specific to efficient transaction execution, explain when and why rollback is needed, explain the effect of different isolation levels, and choose the proper isolation level. The inter-relationship between transaction management and storage management technologies is also presented in one of the webinars, and the corresponding big picture is given and discussed [8]. Another webinar is focuses on application programming by embedding SQL into transactions. Best practices in SQL transaction programming are also discussed and the trainees should identify appropriate transaction boundaries in application programs.

The DBTechNet course module also extends the content of the CS2013 by focusing on the practitioners' approach based on the principles of "Learning-by-doing", and "Learn by verifying in practice". The course's motto is: "Zero Tolerance for Incorrect Data" and "Don't believe all that you read but experiment and verify (to check the services supported by the DBMS products)" [4].

The course's two Hands-on-Laboratory (HoL) sessions and the experimental learning by using free editions of current mainstream DBMS products (which have been bundled on Debian Linux platform in free virtual machine appliance with free software tools) provide a solid basis for supporting the principles of "Learning-by-doing", and "Learn by verifying in practice" [8]. It seems that the "learning-by-doing" and experimenting with the live problematic situations increase the motivation of the learners, and their interest in database technologies.

It also seems that the DBTechNet framework could form a basis for a curriculum for VET Teachers Training, Higher Education Informatics Education, and IT professionals training, by the development of useful course modules on SQL transactions, and the creation of a flexible, transferable learning model for lifelong learning training. It is also expected that the DBTechNet course module is to influence the database curricula of all the DBtech VET project members: HE institutes, VET centers, and VET co-ordinating authorities.

Moreover, future researchers should also consider IT issues such as information security [9],[10] as well as other influential factors of the teaching quality provided (e.g. culture, leadership, commitment and satisfaction [11],[12]).

ACKNOWLEDGEMENTS

This research is partly funded by the European Commission's Lifelong Learning Programme. "DBTech VET Teachers" Project is Leonardo da Vinci Multilateral Project Transfer of Innovation funded by European Commission and project partners.

The authors wish to thank Ms. Chrisi Moisiadi (Thessaloniki ATEI), administrator of the University of Macedonia hosted DBTechNet portal, for maintaining and reporting on the course's portal usage statistics, and Mr. Kari Silpiö (HAAGA-HELIA University) for developing and reporting on the course's online evaluation questionnaire. Last but not least, special thanks are due to Dr. Ismael Navas Delgado (University of Malaga, Spain) for having contributed the teaching of the one 1-hr webinar session entitled "Experimenting with Oracle Transactions, an Overview of" [8].

References

1. Dervos D.A., Laiho M., Aldana-Montes J., Riihelä P., (2013), A DBTechNet Project for VET Teacher Training on Database SQL Transactions, Balkan Conference in Informatics (BCI'13), pp. 149-155, Thessaloniki, Greece, ACM 2013 ISBN 978-1-4503-1851-8,
2. Laiho, M., Dervos, D.A., Aldana-Montes, J.F., Laux, F. (2010). DBTech EXT: Education and Hands-on Training for the Database Professional. ADBIS'10, pp 15-22, Springer-Verlag.
3. Laux, f., Laiho, M., Connolly, T. (2012). E-learning with Hands-On Labs in Higher European Education. ICIW 2012, pp 231-237.
4. Laiho M., Skourlas C., Dervos D.A. (2014), Zero Tolerance for Incorrect Data: Best practices in SQL transaction programming, 4th International Conference on Integrated Information, September 5-8, 2014, Madrid, Spain (accepted)
5. Longenecker, H.E., Feinstein, D.L., Babb, J.S. (2013). Is There a Need For a Computer Information Systems Model Curriculum?, Proceedings of the Information Systems Educators Conference ISSN: 2167-1435, USA, v30 n2528
6. Topi, H., Valacich, J-H., Wright, R.T., Kaiser, K.M., Nunamaker, J.F., Sipior, J.C., de Vreede, G.J. (2010). Curriculum Guidelines for Undergraduate Degree Programs in Information Systems, ACM & AIS.
7. The Joint Task Force on Computing Curricula, Association for Computing Machinery and IEEE-Computer Society, Computer Science Curricula 2013, Final Report 0.9 (Pre-release version), October 2013, <http://ai.stanford.edu/users/sahami/CS2013/final-draft/CS2013-Final-v0.9-prerelease.pdf>
8. Damianos Sakas , Dimitris Vlachos , Dimitris Nasiopoulos (2014). Modelling strategic management for the development of competitive advantage, based on technology. Journal of Systems and Information Technology (pp. 187 - 209)
9. DBTech VET "SQL Transactions", publicly available educational and training material from the pilot course offering, 16 May – 17 June 2013. Accessed on 7 July 2014 at: <http://dbtech.uom.gr/mod/resource/view.php?id=823>
10. Metalidou E., Marinagi C., Trivellas P., Eberhagen N., Giannakopoulos G., Skourlas C., (2014) Human factor and information security in higher education, *Journal of Systems and Information Technology*, 16(3), 210 – 221.

11. Metalidou E., Marinagi C., Trivellas P., Eberhagen N., Skourlas C., Giannakopoulos G., (2014) The Human Factor of Information Security: Unintentional Damage Perspective, *Procedia - Social and Behavioral Sciences*, 147, 424-428.
12. Trivellas P. and Dargenidou D. (2009), Organisational Culture, Job Satisfaction and Higher Education Service Quality. The case of Technological Educational Institute of Larissa, *the TQM Journal*, Vol. 21 No. 4, pp. 382-399.
13. Trivellas P and Dargenidou D. (2009) Leadership and Service Quality in Higher Education: The case of the Technological Educational Institute of Larissa, *International Journal of Quality and Service Sciences*, Vol. 1, Issue 3, pp. 294-310.