

Technology-Enhanced Learning, Reflective Practices and Collaborative Learning for a Better Employability of Vocational Education Students in the UAE

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Abstract

This paper gives an overview of my doctoral studies related to the introduction of reflective practices and collaborative learning into the emerging vocational education system of the UAE, aiming at increasing the employability of the graduates. In this emerging vocational education system, these approaches are not only new, they are also timely, building on the ubiquity of smart technologies and mobile devices. The methodology uses a mix of qualitative and quantitative approaches based on design-based experiments to study the impact of introducing reflective practices and collaborative learning. The propose range of technology-enhanced pedagogical scenarios should contribute to equip our students with the skills required by the industry, who urges ADVETI to introduce new models of vocational education that will combine purely technical skills with higher level ones such as creative, reflective, and critical thinking, allowing to improve the role in context, and guarantee a smoother transition between studies and work, so as to build on the employability of the graduates. The paper includes a primary literature review about reflective practices and collaborative learning in this context, and previous research on new pedagogical scenarios supported by smart technologies, known as computer supported collaborative learning (CSCL). This research, one of the first of this kind in the UAE, advocates the use of the powerful new tools available today with mobile technologies to introduce reflective practices and collaborative learning and apply them to hands-on training.

KEYWORDS: Vocational Education, TVET, Employability Skills, Reflective Practices, Collaborative Learning, Pedagogical Scenarios.

The State of Art of TVET in the UAE

In MENA countries, Technical and Vocational Education and Training (TVET) traditionally are seen as the “poor cousin” of the education family, although the role of TVET is quickly changing in the knowledge based economy. In 2014, the UAE has established the Vocational Education and Training Awards Commission (VETAC) under the auspices of the National Qualifications Authority (NQA) to manage and coordinate the vocational, technical and professional education and training sector. In consultation with key stakeholders, VETAC’s mandate includes the development of a modern national vocational education and training system led by the industry, and monitored by quality assurance mechanisms, industry-led advisory, with improved labor-market integration and information management, development of planned policies and initiatives.

Despite such initiatives, the effective development of skills that would actually suit the needs of the employers, along with a shortage of talented teachers to develop these skills, still remains a challenge that need to be met before the poor image of TVET can change in the minds of both the population and the industry. New pedagogical models and scenarios are required to develop not only practical skills, but also higher level ones such as problem solving skills, team building, reflective and critical thinking, in order to make sure that the graduates will actually be ready to apply those skills in the context of their job.

Our own five years of personal experience that took place in the context of the Abu Dhabi Vocational Education and Training Institute – ADVETI – confirms these weaknesses of the current system. ADVETI was established to support Abu Dhabi government in its effort to build an Emirati workforce and manage the challenges of future employment, when it was clear that the current education system would not cater for the increasing demand for professional’s equipped with highly technical skills. The required skills include high level ones that have not been so far considered relevant in vocational education. In this regard, our work must be considered to be fully in line with the guidelines of the Qualification Framework Emirates (QFE) as well as with Bloom’s taxonomy of learning objectives (Bloom, Engelhart, Furst, Hill, Krathwohl, 1956) (ADVETI, 2014, November).

A recurrent problem in vocational education in the Arab world has always been the emphasis put only on hands-on psychomotor competences while ignoring the inter-relation of these with higher level cognitive and affective ones. In addition, the scope of psychomotor competences, traditional technical vocational education and training – TVET - focused mainly on lower level skills while higher level ones such as problem-solving, communication, or team-building are more and more on demand by the employers. It is ADVETI’s challenge to prepare students with the knowledge, practical skills and the maturity actually required to build an effective workforce. (Heidsiek, 2013) (ADVETI, 2014).

The sector where this demand is most urgent is the operations and maintenance in Oil and Gas fields. The trainees of these companies are mostly high school fresh graduates with no experience in the workplace, who are required at the end of their secondary studies, to spend one year in a training program offered by ADVETI, during which they are contracted and fully sponsored by the companies. Although this sponsorship model intends to be very attractive to secure employment at the end of one’s studies, both ADVETI and companies are still facing major challenges due to a lack of real employability skills of the trainees who enter the reality of the world of work at the end of their studies without the required skills (ADVETI, 2014).

The Way Forward

This study intends to be used as a pilot to help narrow the gap between the learning outcomes of TVET for its graduates on one hand, and their actual employability and performance when joining the industry. The study, held mainly in one of ADVETI’s institutes, is the first step in proposing solutions to the broader TVET system in the UAE for a better employability of TVET graduates by the industrial employers.

The study investigates how a structured and focused usage of smart technologies in TVET can contribute effectively to develop some specific aspects of the competencies required by the employers, whose main concerns are related to digital literacy, team-working, problem-solving, communication skills. We make the hypothesis that a stronger focus on reflective and critical thinking supported by a structured usage of new collaborative tools and technologies will have an actual impact on developing these skills. Our second assumption is that the new model of TVET will contribute to change the perception of TVET by the industry on one hand, and by the population on the other.

Collaborative and Reflective Practices in Literature

Learning in authentic situations appears even more important for vocational education than any other kind of studies. Lave (1988) theory is that learning is situated and occurs in a real participation by learners within a community of practice. She states that learning is a function of the activity, situation and principles in which it occurs, which contrasts with most classroom learning which out of context. Education can be applied by basic principles of situated cognition into classroom practice by present in an authentic context, and encourage social interaction and collaboration.

Rich contexts can reflect students' understanding of the real world and improve the knowledge being transferred to them in different situations. Collaboration can lead to the delivery of strategies that can then be discussed, which in turn can enhance the process of generalizing that is grounded in students' situated understanding (Lave, 1991). Jean Lave's situated cognition will provide a rationale for some pedagogical scenarios investigating the capacity of students to solve authentic problems taken from real life situations and case studies based on the priorities set by the industry, such as health and safety of major importance in the Oil and Gas industry.

Similarly, Technology platforms are now available to enable communities' span conventional boundaries of learning and doing, as well as space and time. The key elements of communities are practice (hands-on activities in our case) and identity (being ADVETI students and trainers) development (growing employability). Communities are fundamentally self-organizing systems where learning occurs through the knowledge they develop at their core and through interactions at their boundaries (e.g. with people in the industry. Communities expand through the learning that people do together (lifelong learning through work, learning by doing, experiential learning)

Initially the concept of reflective practice was introduced by Schon (1983) in his famous book on the reflective practitioner based on his previous work on organizational learning done in collaboration with Chris Argyris (Argyris & Schön, 1978). Reflective practice is the ability to reflect on action so as to involve in a process of continuous learning. A key basis for reflective practice is that experience (hands-on in particular) alone does not necessarily lead to learning. Thoughtful reflection on experience is important to create awareness and to allow for the development of higher order skills. It could be an important foundation of professional development if applied to peer-to-peer sharing and collaboration in the context of a community of practice, as well as an effective way of bringing together theory and practice.

A person who reflects throughout his or her practice is not just looking back on past actions and events, but is taking a mindful aspect at experiences, actions, and responses, and using that information to add to his or her existing knowledge This is usually conducted through a documented reflection of the situation on hand, such as a diary, or a log (Schon, 1995, 1983).

New tools for individual, and peer to peer learning

Collaborative learning is used to bridge the gap between traditional and non-traditional learning, as network-based technologies allow traditional and non-traditional learners to learn collaboratively. A review of state of the art technology for supporting collaborative learning was published by Jermann, Jermann and his colleagues agree that the benefits of coaching student interaction (via some face-to-face intervention or a virtual one using a digital device) are clear when given appropriate helpful advices and actions. But what can students learn when presented with visualizations of data, or indicators? Students who view and analyze indicator values may learn to understand and improve their own interaction, for example by relating specific indicator configurations to successful completion of a task. (e.g. - We performed well when we were all participating actively).

In a more recent studies, Stahl (2006) and later by Jeong and Silver (2010) examine technology used in Computer Support for Collaborative Learning (CSCL). Technologies can support collaborative learning by providing a focal point of interaction around which learners discuss, argue, and explain. Also technologies can support collaborative learning by facilitating communication and interaction (chat, conferencing tools, discussion boards, or emails). The other thing technologies can be used to support collaborative learning by creating new forms of interaction (e.g. Wikipedia pages, social navigational support, or peer feedback system, interaction with non-human agents).

According to the model defined by Ortoleva (2012) and her fellow researchers '*vocational education should take part of four types of knowledge: practical, conceptual, self-regulative, and sociocultural knowledge (knowledge that*

is embedded in the social practices of workplaces and is learnt through participation to these practices)'. The research states that theory should be combined with practical skills and conceptual tools such as activated reflection, along with tutoring, mentoring, peer-to-peer discussion, collaborative learning and writing activities.

Furthermore, Hakkarainen, Palonen, Paavola, and Lehtinen (2004) studied new models of vocational education, (in particular models of workplace learning) that can help organizations to overcome the challenges they face, and contribute to their survival in rapid changes of technological and organizational development regarding knowledge, skills, and working approaches which are required from workers.

Similarly Leijten & Chan (2012) investigated the effectiveness of peer learning in a vocational education setting. The project was aimed to determine the effectiveness of peer learning in helping with students learn skills and knowledge. Their study involved classroom and workshop learning activity observations of four different trades (Carpentry, Painting and Decoration, Electrical and Welding).

Methodology based on Design-Based Research

The design-based research (DBR) paradigm reflects through most reports and publications about research trends in ODL, Learning, and Technology-Enhanced Education. Advanced initially by Laurillard (2012) and Wang et al. (2005) design based research suggests synergistic associations among researching, designing, and engineering. Design investigates and evidences both scientific and educational values through the active involvement of researchers in learning and teaching procedures and through "scientific processes of discovery, exploration, confirmation, and dissemination". (Kelly, 2003)

Design-based research is not just an approach as it is a cycle of approaches, with the aim to producing new theories, facts, and practices that account for and potentially impact learning and teaching in realistic settings. Researchers are themselves involved in developing contexts, frameworks; tools and pedagogical scenarios. In a design-based research situation, the researcher is not only an observer, she/he is actually involved analytically into working on these contexts in ways that allow them to improve and generate evidence-based claims about the learning that actually happens.

In order for the researcher to address the proposed questions, the research design was based on different methodologies to get the expected to result needed to help the researcher to finalize this polite and primary research.

The principle of design-based research was used as it is expected to improve and generate evidence-based claims about learning that can be tested and repeatedly improved in realistic contexts and authentic situations in which the researcher herself/himself is usually involved (Brown, 1992) (Collins, 1992) (Design-Based Research Collective 2003). Design-experimentation has become, over the past decade, an gradually accepted mode of scholarly analysis suitable for the theoretical and practical study of change in day to day educational situations brought about by complex educational interventions (Bell, 2004), (Cobb et al., 2003).

This interconnection of research and practice complements the fundamentally interventionist nature of education and provides practical and theoretical progress in the field by conducting empirical research in naturalistic settings. Cobb et al. (2003) suggest:

Design experiments ideally result in greater understanding of a learning ecology—a complex, interacting system involving multiple elements of different types and levels—by designing its elements and by anticipating how these elements function together to support learning. Design experiments therefore constitute a means of addressing the complexity that is a hallmark of educational settings. (Cobb et al., 2003, P.9).

The research design was mix quantitative and qualitative approaches in order to address all specific aspects of the study questions that are trying to answer:

- To answer the first question the researcher used class observation which was used to a controlled group of students and a quantitative comparison of groups using traditional vs new pedagogical scenarios will allow measuring the impact of the change.
- To answer the second question a focus group on the opinion of industry partners about the new model used.

Overview of the field work

The pilot study was conducted in one of ADVETI campuses, Sharjah Institute of Technology, learners who are involved are oil and gas employees who in ADVETI for one year for vocational courses.

The Data was collected from as follows:

- **[Students]** on the new technology model of learning and on teaching methods:
 - Population size: 160. Sample size 40.
 - The 40 to be divided in to 2 groups with 20 students, (A) traditional group and (B) digital group.
- **[Industry Focus Groups]** focus groups will have and five industry partners, ADVETI management and curriculum development.

All ethical issues were addressed by assuring that all involved in the study (students, teachers, and industry partners) signed a consent form.

The pilot was done for four weeks of studies, using an observation method the researcher conducted different sessions with the groups. Group (A) observation which was conducted on the following subjects: English, Electrical Wiring & Testing, and Introduction to Health and Safety each course was observed 4 times with the same group, On the other hand Group (B) was introduced to a digital approach over the same period of time and the same subjects. The teachers used a free platform with smart note pad and encouraged the students to work with it to comment and share experience on daily bases with the group and others.

Table 1 describes the groups and compares each group with different criteria in the class observation conducted.

	Group A	Group B
Used method	observation	observation
No of observations	4 times	4 times
Subject	<ul style="list-style-type: none"> English Electrical Wiring & Testing Introduction to Health and Safety 	<ul style="list-style-type: none"> English Electrical Wiring & Testing Introduction to Health and Safety
Duration	4 weeks	4 weeks
Group involvement	Student's involvement was fear in the three courses(students were not engaged in to peer to peer discussions, nor to group work)	Student's involvement was good to excellent (students were more engaged to demonstrate peer to peer discussion, group work and commutation skills were used in the platform)
Attends to course interaction	medium attendance	Strong attendance in the class and the digital platform
Material used	<ul style="list-style-type: none"> Teacher used books printed material notes 	<ul style="list-style-type: none"> Teacher used posted material online Pictures videos
Course presentation	Lecture and demonstration for the vocational courses.	Demonstration for the vocational courses and group discussion in the platform

Table 1: comparison between two groups in different study area

	Group A		Group B	
	Before the study	After the study	before the study	After the study
Overall attendance	70%	70%	69%	88%
Involvements and participation	77%	77%	71%	80%
Learner academic performance	72%	73%	70%	85%

Table 2: study results comparison between two different groups

From the above results in (table 2) we can notice that the students in the oil and gas field (group B) show more interest while attending the digital classes. The percentage is increasing in each study filed for instance the percentage of student's attendances was increased by 19% to be 88% after the study instead of 69%. The other criteria looked at the involvement and participation which also showed an increase by 9% to be 80% instead of 71%.

Moreover, the last criteria focused on academic performance of the learners also there was an increase by 15% to be 85% instead of 70%.

On the other hand, the percentage of achievement in (group A) remains the same before and after the study in two criteria students attendance & involvements and participation which was 70% and 77% respectively. There was a slight increase which was shown in the academic performance of the learners by 1% to be 73% instead of 72%. Over all, students were more interested to attend their classes after introducing to a digital approach.

The above results were shown to a primary focus group which included industry partners and representative from ADVETI management and curriculum development and the researcher the following plan was agreed on:

- The researcher to work with ADVETI to propose a model which expected to strengthen and improve the work readiness of these trainees during the pre-employment and training periods and to document the relationship between the vocational practical training and theoretical studies, in a reflective practice fashion made very easy to implement nowadays, thanks to smart technologies.
- The model to investigate a set of new pedagogical scenarios with industry trainees during the hands-on training period, so as to develop conceptual and technical tools supporting the skills required in the work field such a Digital literacy, Team-working, Problem-solving, Communication.

Recommendations and Future Work

The study investigated the introduction of new learning scenarios using reflective practice supporting peer-to-peer collaboration during which personal reflections and self-evaluation can be shared, using the facilities offered by technology during the practical hands-on training. The researcher used qualitative and quantitative research methods. The qualitative research used class observation while the quantitative research used the comparison of the group's results using traditional vs new pedagogical scenarios.

A recommendation is that the new model of TVET will be introduced to a bigger group and on more courses in a one year period of time and the technology should be used in the technical and vocational educational classes in order to enhance the education by engaging students into a digital approach in their class so that the technology act as a valuable tool for the learner. The four different skills (digital literacy, team working, problem solving and communication) that initiated in the pilot study to constantly develop new ways of applying technology into teaching and learning.

The proposed pilot model which had good result to continue in developing a new learning model with different pedagogical scenarios, which will require from students to maintain reflective diaries allowing them to document their current hands-on practice, and to change it for a more conscious and reflective one. This will create a space where students are invited to comment and share their experiences, shortcomings, difficulties, and achievements, these diaries are expected to help develop storytelling, critical thinking, experiential learning, problem-solving, and team-working skills.

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