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The role of qualification frameworks in assuring appropriate selection of assessment methods for quality learning

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This paper aims to identify the role of qualification frameworks in defining appropriate assessment methods to assess the earning gained by the learners. It demonstrates a successful mechanism of mapping courses to certain life-long learning and employability skills, measured in multiple progressive stages. The paper provides tools and criteria used to support Higher Education Institutions (HEIs) while selecting appropriate assessment methods to assure high quality learning.

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1. Introduction

HEIs world-wide face the challenge of producing enough high-quality graduates to meet market needs with the required skills (Hinton, 2013). A central challenge is to adapt the life-long learning that enables employees to keep up with market needs (Hassan et al., 2015). In Bahrain, a study of the required quality of learning was conducted by Higher Education Council (2015), based on universities and industry input. The study reached conclusions concerning the skills that should be part of student learning throughout their learning experience, such as research skills, practical skills and communication skills. Allais (2010) suggested that qualification frameworks support HEIs in delivering better skills learning, which in turn produces higher quality graduates that attract employers. To support this, the Higher Education Academy (2012) established a framework to support faculty members in integrating employability skills into their curricula.

In 2014 Bahrain established its National Qualification framework, based on the Scottish Qualification Authority Standards (SQA). The purpose of establishing the framework was to improve attributes of graduate of Bahraini HEIs (Blooshi, 2013). The use of Intending Learning Outcomes (ILOs) to define the required and targeted graduate attributes has helped Bahraini HEIs develop a clear route for the students towards their expected learning outcomes for every course. Linking ILOs to appropriate assessment methods enabled improvement in assessing student outcomes, but industrial employers have argued that quality learning should be assessed differently, to assure a combination of theory and practice. For example, an International Labour

Organization (2010) study evaluated National Qualification Frameworks (NQFs) in 16 countries. An NQF was defined as a tool or an instrument helping HEIs classify qualifications according to clearly formulated learning levels. NQFs are also considered to improve the transparency of access and progression and to enhance the quality of qualifications as well as assuring the quality of graduates (Allais, 2010). In Bahrain, a model was developed taking into account the NQF requirement to develop a curriculum with high quality standards and assure expected learning outcomes as well as to develop life-long learning skills such as research, practical and experiential skills.

2. Methodology

The proposed model was tested in a case study of a private HEI in Bahrain that offered 14 academic programmes in five colleges. The data presented pertains to the College of Engineering, which offers two undergraduate degrees. The learning model was verified by various quality assurance reviews as well as by an international accreditation body, in terms of its practicality and delivery of learning, as reflected in graduate destinations and community impact.

3. Assurance of Learning Model

The model in Figure 1 was developed taking into account six major elements, which are implemented and monitored by rigorous internal quality assurance policies and procedures every semester. The elements were derived from qualification framework requirements such as [1] Justification of Need [2] Qualification Compliance [3] Qualification Design and Structure [4] Appropriateness of Assessment [5] Appropriateness of NQF Level and Credit.

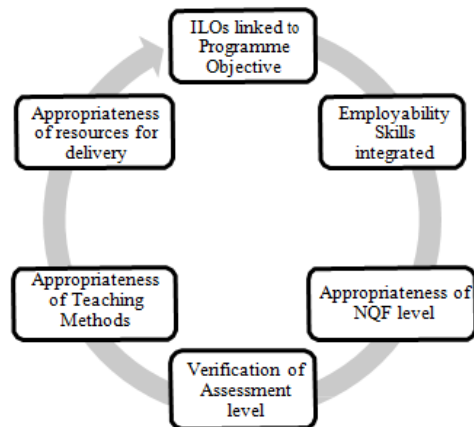


Figure 1: Assurance of Learning Model

3.1. ILOs Linked to Programme Objectives

Various studies have been conducted in teaching and learning, pedagogy, assessments and effective delivery (Biggs J., 2011; Brookes et al., 2006; Nusche, 2008; Lozano- García et al., 2008). Most researchers agree that ILOs are an effective way of planning delivery. In the case study, all academic programmes were continuously updated and delivered to learners in line with programme and university teaching and learning goals.

The ILO categories used were:

- Knowledge and understanding
- Subject specific skills

- Critical thinking
- General and transferrable skills

In line with Biggs (2011), verification of the linkage of ILOs should be conducted prior to course delivery. Hassan et al. (2015) highlighted the importance of verification of assessment in terms of linkage to ILOs and programme objectives. However; Schuwirth et al. (2011) suggest that due to the dynamic changes and quality assurance standards, there is a need to shift from verification of assessment of learning to assessment for learning. This means that the review of how ILOs link programme objectives and courses should be detailed, while cascaded skills and assessments should be considered, to assure that a progression pathway is set for the learner. Ulicna et al. (2011) suggest that qualification frameworks play a vital role in assuring linkage between programme objectives and course ILOs, as they assure that skills permeate the programme structure and skills are developed progressively year-on-year.

In the case study, the assurance of learning model was developed and implemented by mapping ILO verification criteria to programme objectives. Prior to the conduct of the course, faculty members are requested to conduct the verification procedure using the below criteria:

- Programme ILOs are correctly delimited
- Course ILOs are relevant to programme and course aims and appropriate to the course level
- Course ILOs are aligned with programme ILOs
- Programme and course requirements are comprehensively elaborated and clearly presented to students
- The programme is designed with encouragement of social responsibility and student participation
- Expected student outcomes are clearly identified
- Programme ILOs are developed in line with NQF requirements and best-fit level
- Programme ILOs are developed in line with NQF level descriptors and provides a progression in terms of level of understanding to the topic
- There are clearly defined assessment criteria cross-referenced to each assessment method
- The programme is designed with coverage of required employability skills

While faculty members conduct the verification process for programme objectives and course ILOs, they must also assure that the objectives cover a wider range of employability skills.

3.2. Integration of Employability Skills

Pollard et al. (1998) suggest defining an employability skills framework as a set of policies and procedures to integrate skills required by graduates in employment. Zaharim et al. (2010) state that the employability framework could be implemented, but due to constant changes in market needs, frequent changes in integrated skills may be needed. As an output of the employability framework, the institution assured integration of employability skills through main ILOs covering [1] Research Skills [2] Practical Skills/ Specialized in the field [3] Soft Skills. The skills are delivered through the following ILOs as described in Table 1:

ILC	Category
A2	Contemporary Trends, Problems and Research
B1	Problem Solving
B2	Modeling and Design
B3	Application of Methods and Tools
D1	Communication
D2	Teamwork and Leadership
D3	Organizational and Developmental Skills
D4	Ethical and Social Responsibility

Table: 1 List of identified ILOs to support Employability Skills

The institution audits courses to confirm that learning is in line with the market needs, to produce higher quality graduates with the expected attributes (Blooshi, 201). According to Harvey (2001), employability components should ensure production of high quality graduates, so the Institution calculates the number of integrated skills expected to be gained by the learner. Table 2 show the distribution of the expected skills. OECD (2013) reported on the role of NQFs in assuring a fair distribution of skills across the four years of learning, and this approach to ensuring the distribution of skills has been adopted by the case study institution.

Computer Engineering								
NQF Level	A2	B1	B2	B3	D1	D2	D3	D4
5	0	3	2	2	3	2	1	1
6	5	12	9	12	12	4	7	3
7	4	13	7	11	13	4	3	4
8	8	12	10	9	12	7	4	5

Table 2: Employability Skills demonstration Programme

Schneider et al. (2005) highlight that the purpose of a NQF is transparency for employers and to allow learners to progress or transfer upon achieving a level. From the above table, it can be seen the programme has well-distributed employability skills and a high level of practical skills. Donohoe (2012) stated that to ensure gaining of the required skills, assessment methods should be set clearly with a detailed criteria. A detailed assessment should enable institutions to judge attainment of the mapped level of respective qualifications.

3.3. Appropriateness of NQF level

Qualification Frameworks provide HEIs with mapping matrices such as the European Credit Transfer System and the SQA.. The National Qualification Framework (2014) in Bahrain helped HEIs by providing a detailed evaluation matrix to enable universities to map their courses to the most appropriate level. The evaluation matrix is developed in line with international frameworks, enabling benchmarking every course with international standards. The NQF evaluation matrix focuses on ILOs and level of assessment. Bahrain developed the matrix addressing 1-10 levels starting with level 5-8 for the Bachelor's Degree level. The evaluation matrix consists of three strands as shown in Table 3.

Knowledge	Theoretical Understanding
	Practical Application
Skills	Generic Problem Solving and Analytical Skills
	Communication, ICT and Numeracy
Competence	Autonomy, Responsibility and Context

Table 3: NQF Bahrain Mapping Strands

The institution aligned the three NQF strands with the defined ILOs for employability, enabling mapping to NQF and assuring delivery of the required outcomes to the learners. The linkage provided a smooth method of mapping, while customization of ILOs of linkage was through mapping as follows:

- Knowledge - Theoretical Understanding with A2
- Knowledge - Practical Application with B1, B2 & B3
- Skills - Generic Problem Solving and Analytical Skills with A2
- Skills - Communication, ICT and Numeracy with D1
- Skills - Autonomy, Responsibility and Context with D2, D3 & D4.

The level of the mapped strands is confirmed through the level of achievement expected from the learner and the rationale stated by the subject expert.

3.4. Verification of Assessment level

Palomba et al. (1999) investigated assessment essentials including selection of assessment as part of planning and delivery of the programme as well as for single courses. Brown et al. (1994) suggested that the best method to assess learners in higher education was by assessing life-long learning skills for students admitted in degree programmes, stating that for assurance of appropriateness of assessment, benchmarking should be conducted on assessment methods used, taking into account the level of the course, as well as peer or external examiners review of equivalence and reliability. Fitzpatrick et al. (2004) highlighted that programme evaluation from a quality perspective could act as verification of methods for assessing students against programme graduate attributes. Greenstedt et al. (2014) stated that Intended Learning Outcomes (ILOs) can only be achieved by the students if the knowledge is transferred to them in appropriate manner, which depends on teaching and learning methods. Ming (2012) argued that the ILO achievement should be measured to assure student adaptability of skills. In the case study, methods for assessing highly-achieved learning outcomes were studied by calculating the average score of successful achievement in relation to each individual ILO used in a course. In terms of practicality, Collegiate Assessment Academic Proficiency (CAAP/ACT) and Collegiate Learning Assessment (CLA) focused on assessing achievement of core ILO components of the course.

The institution has developed a clear assessment matrix (Table 4) that enables instructors to select the best assessment method cross-referenced to each ILO. This is expected to enable judging on the mapped level to be placed on the NQF. The matrix provides for more than one assessment method to be selected for each ILO, so instructors may choose the best method to assess learners according to the expected outcome from the level.

ILO	Assessment Methods
A2	Online Research Assignment/Report Literature Review Book or article review
B1	Practical training exercise (external) Simulations/ Role-play External visit/ visitor reportage
B2	Problem sets Graded Homework In-lab exercises Examinations
B3	Projects In-lab exercises
D1	Oral participation/inquiry Debate Essay-based exams (closed-book or open) involving essays Essay (project) report writing Oral presentation
D2	Group projects Group discussions Group in-class/lab work
D3	Assignments (involving techniques or organizing information or involving progressive skill development) Research project (involving extraction of relevant data); Reflective practice record
D4	Case studies Examinations (closed book) Lab or work-based observation Essay

Table 4: ILOs Assessment Matrix

Hassan et al. (2015) and Fitzpatrick et al. (2004) highlight the importance of linking teaching and assessment methods. Therefore; the case study institution developed a matching matrix for teaching methods that could be used to deliver required ILOs to the learner.

3.5. Appropriateness of Teaching Methods

McKernan (2013) and McGuinness (1999) highlight that the method of learning and delivery is critical in encouraging students to gain skills as lifelong learning skills rather than a milestone of successful completion of a degree. Zaharim. et al (2010) suggest that there is a need to develop an employability framework which consist of research skills that can be implemented at HE Level, but that it is important to take into account changes in the market needs. Pollard et al. (1998) suggest that a research or employability skills framework could be defined as a set of policies and procedures to support integrating certain skills required by graduates while proceeding with employment. Harvey (2001) investigated the measures for assessing employability skills in higher education, with the measures set and tested in a Welsh university; finding that employability skills rely on both soft skills and subject-specific skills, requiring clear assessment criteria to assess the students against the

defined graduate attributes.

Arends (2014) defined teaching principles that could be adapted by the HEIs as part of teaching towards life-long learning. One of the most recommended styles was the interactive style in-class or through virtual learning. This style was recommended to support the gaining of analytical skills. Gibbs (1981) and MacKenzie (1970) both argued that student-centered learning, mainly using in-class teaching methods, is one of the best methods to enable adaptability of research skills. Accordingly, the case study institution has developed a teaching and learning matrix (Table 5) to support the delivery of learning, to be customized based on the nature of the programme and the environment in which it is delivered.

ILO	Teaching and Learning Methods
A2	Seminars Independent Learning E-learning
B1	Demonstrations (by faculty member showing how to solve a problem) In class/lab or practice-based supervised work
B2	In class /lab supervised work Computer aided design/modeling, simulation
B3	In lab exercises using software, Simulation Practical skills laboratory Clinical tool/machine usage (in- lab/on work site)
D1	Oral presentation/participation In-class or out-of-class writing practice Debate Role-play Dissertation supervision
D2	In-class group work/ role-play, Group (research) projects
D3	Demonstration Independent learning In-class supervised work Dissertation supervision
D4	Lectures, In-class (group) work Class participation/debate Independent learning E-Learning Work-based learning

Table 5: Teaching and Learning Matrix

3.6. Appropriateness of resources for delivery

Hassan et al. (2015) stated that quality assurance and management policies and procedures were required to assure effectiveness of delivery. Therefore, in the case study institution, a procedure was developed to assure appropriateness of resources for delivery in terms of:

1. Human resources, which include faculty members, research assistants and other support staff
2. Physical resources, which include library, hardware or software needed

3. Infrastructural resources, which include class rooms, laboratories and seminar halls etc.

4. Employers Satisfaction Rate

McKenzie et al. (2001) and Harris et al. (2004) investigated the improvements that could be made to the programmes in line with feedback from Internship Supervisors, both arguing that the relationship between HEIs and industry should be built on the assurance that graduates' skills and knowledge are up-to-date, by activating the qualification frameworks to ensure that programmes are in line with market needs. Internship Employer feedback was obtained on the level of satisfaction with the learners and their ability to convert learnt theories into practice. Internship supervisors had a 92% satisfaction rate with learners and agreed that the skills gained during their learning period are valid and up-to-date with market needs.

5. Further research needed

Bahrain is a very small country, in population terms, only about 1.25 million people, but in an important part of the world. It is noted for its focus on managing transition to a post-oil economy, with significant investments in financial services and tourism and in their supporting infrastructure (especially telecommunications and transport). It is also noted for its progress in broadening participation of women and different ethnic and religious groups at senior levels of industry and government. These developments make education a particularly important part of Bahrain's growth and development, especially to ensure full use of limited human resources. This importance is underlined in the country's strategic plan, which references the need to find employment for the rapidly growing numbers of young Bahrainis, particularly in the private sector, which as in many Gulf countries in the past tended to be underdeveloped compared to an overdeveloped public sector funded by oil revenues. The country's plan (Vision 2030) envisages the need to grow particularly fast in manufacturing, transport and information technology to achieve this (Kingdom of Bahrain Economic Development Board, 2010). Bahraini authorities will need to pay particularly attention to overcoming any cultural factors that might prevent progress, and may also need to move to a more Western approach of involving students in determining the future of their own education and of educational structures and performance. Industry will also need to be closely involved - hence the importance of qualification frameworks. Therefore, progress in implementing the above described framework and deriving benefit from it will need to be researched in order to identify success and problems and any changes required in the approach.

6. Limitations

The limitations of this study mostly relate to the relatively small size of the Bahraini education and industrial communities. Following the same process would normally be considered much more difficult in a large country. As mentioned above, the approach has been adopted at a time of great transition in the country's economy and society, producing a high level of environmental change, which may make it difficult to implement the approach or derive benefits from it. At the same time, the clear need for improvement in this area may be a solid reinforcing factor in terms of securing the required gains.

7. Conclusions and Recommendations

Despite significant efforts in the Gulf region, Gulf education systems do not yet have the full NQF implementations cycle, and so does not support the standards to be implemented, e.g. recognition of prior learning which supports learning and progression pathways. Such a standard is

the main issue that should be considered by Gulf Cooperation Council (GCC) countries, in order to establish a reference framework, which in turn should expedite implementing NQF across the GCC and then into other Arab regions and internationally. In Bahrain, cross-referencing with other international frameworks (NQF Credit Guidelines 2017) is established as part of Bahrain Educational vision for 2030 and beyond. This is expected to lead to opportunities for Bahraini qualifications to become more recognized and endorsed internationally. To achieve this, the following areas were identified as needing attention by Gulf policy makers and HEIs:

1. Defining assessment weightage at each level, to assure accruing learning outcomes and skills
2. Having detailed assessments to measure practical components, to assure effectiveness of learning
3. Conducting regular benchmarking on the level of assessments with international standards
4. Measuring the effectiveness of the assurance of learning model subsequent to implementation in a full cohort.

GCC countries may also consider further research into measurement of recognition of prior learning and set milestones that could be adapted as part of admission criteria. This could support progression pathways to learners in line with established framework practices.

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