Global Competency Rubric

A rubric has been created that makes sense for accessing skills related to global competence and can be categorized in terms of awareness, perspectives and participation. Lohmann doesn't talk about assessment in terms of Student Outcomes. But they coursework, language and travel components can be interpreted similarly to awareness, perspectives and participation.

Deardorff[10] suggests assessment techniques for intercultural competence, although not specifically for engineers. The pyramid model of Intercultural Competence shown in Figure 1 provides an excellent example of the progression of knowledge that is required for assessing student competency in an intercultural environment.

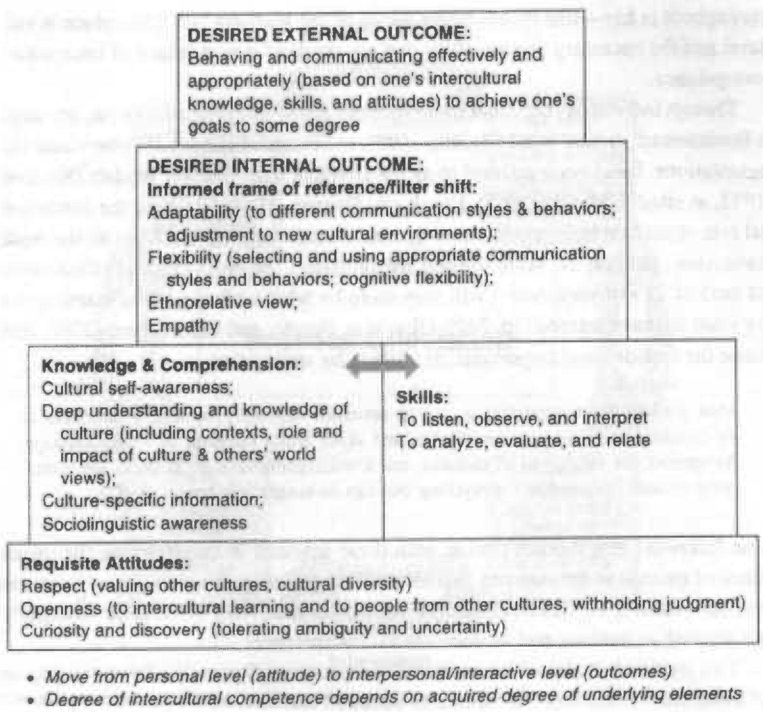

Figure 1- Pyramid Model of Intercultural Competence[10]

The pyramid model includes a base of appropriate attitudes or awareness, with skills and knowledge stemming from that. The desired internal outcome is an informed frame of reference that creates a suitable perspective on intercultural issues. Finally, the desirable external outcome becomes an active participation that enables successful intercultural interaction. These steps can be employed to identify and access the progression of student learning for engineers.

The AAC&U adopts Bennett's[11] Intercultural Knowledge and Competence Value Rubric that connects knowledge, skills and attitudes first to a benchmark of awareness, then to several milestones of perspectives and finally to a capstone of demonstration that includes articulating insights and actively initiating participation with culturally different others. Intercultural Knowledge and Competence is defined as "a set of cognitive, affective and behavioral skills and characteristics that support effective and appropriate interaction in a variety of cultural contexts".

Braskamp, et al[12] defines student global learning and development in a similar way to Deardorff's intercultural competence. Braskamp uses a scale spanning both the cognitive and intrapersonal domains. Cognitive includes knowing and knowledge. The intrapersonal includes identity, affect interaction and responsibility.

Downey et al describes a typology of methods for achieving global competency for engineers that includes international enrollment, project, work placement and field trips, and integrated class experience[13]. The learning criterion and outcomes are defined in Figure 2. These learning outcomes suggest a scale of assessment that progresses from demonstrating knowledge or awareness, to demonstrating ability to analyze having a more global perspective to finally to displaying a disposition to value contributions of different perspectives and to bring those perspectives into problem solutions.

By combining fundamental aspects of these definitions, a new compilation can be created. The three simple themes that emerge for assessing international engagement include global awareness, meaning recognition of the need to consider ourselves global citizens. The next level of outcome is global perspectives, the ability to describe influence relationships between culture, social, religious and linguistic differences between societies. The last level of outcome is global participation, the direct connection of two cultures with intent to study differences in order to solve larger problems within a larger framework. Global competence can be achieved at any of these levels and can be assessed by implementing a standard rubric scale from basic knowledge to exemplary achievement.

Learning Criterion	Through course instruction and interactions, students will acquire the knowledge, ability and predisposition to work effectively with people who define problems differently than they do.
Learning Outcomes	1. Students will demonstrate substantial knowledge of the similarities and differences among engineers and non-engineers from different countries. 2. Students will demonstrate an ability to analyze how people's lives and experiences in other countries may shape or affect what they consider to be at stake in engineering work. 3. Students will display a predisposition to treat co-workers from other countries as people who have both knowledge and value, may be likely to hold different perspectives than they do, and may be likely to bring these different perspectives to bear in processes of problem definition and problem solution.

Figure 2 – Minimum Learning Criterion and Learning Outcomes for Global Competency[13]

A rubric is presented in Table 1 that incorporates these levels of engagement for the ABET criteria c, h, j and k. Each level, starting from a basic awareness to analyzing with perspective and then incorporating the ideas into solutions increases the complexity of the cognitive behaviors expected. The awareness aspect affects the underlying attitude that students will have on this issue. It encompasses the ability to identify global factors. The perspective is a personal understanding of how global issues will affect everyone, and having the skills and knowledge to do something about it. Perspective includes an analysis of global factors. Participation is the enactment of the attitude, skill and knowledge in a demonstrable form. The ability to apply the analysis corresponds to a form of participation[14]. The understanding of each outcome shifts from knowledge to analysis and then to a synthesis of the information into action.

Table 1: Rubric for ABET Student Outcomes c, h, j, and k

	Awareness	Perspectives	Participation
c) Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	Identifies realistic constraints in a global context	Determines realistic constraints in a global context	Assesses realistic constraints in a global context
h) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context	Discusses impact of engineering solutions on global context	Examines impact of global perspective on engineering solutions	Justifies impact of engineering solution in a global context
j) Knowledge of contemporary issues	Describes contemporary issues in modern global context	Distinguishes contemporary issues in modern global context	Evaluates contemporary issues in modern global context
k) Ability to use techniques, skills and modern engineering tools necessary for engineering practice	Describes tools necessary for engineering practice in a global context	Identifies tools necessary for engineering practice in a global context	Incorporates tools necessary for engineering practice in a global context

Conclusions

Globalization is now impacting engineering education in many ways. The education of students includes a component of global competency, and the competency needs to be seen as having a large number of assessment techniques. The ABET student outcomes Criterion 3, only mentions the word global one time, but it can be easily interpreted as a component of three other outcomes.

The student outcomes are broken down into two categories. The first category is hard, or technical skills, the other category is professional skills. The student outcomes readily related to global competence are c, j, h and k which include two technical skills and two professional skills. The hard skills are assessed differently than professional skills, and professional skills like h in particular require an assessment of "awareness" of an issue. The hard skills are assessed in the usual methods, with the assignment including a global aspect to it that is imbedded into the assignment. The professional skills need to be assessed with testing of attitudes and behavior observation.

A rubric has been created for the engineering solutions in a global context of the student outcomes c, h, j and k. The rubric describes competence in terms of awareness, perspective and participation for each of the four relevant student outcomes. Assessment of global competence for engineers can be made using all of the measurement methods proposed by Prus and Johnson since two of the outcomes are hard skills and two are professional skills. The rubric uses a progressive scale of examining, evaluating and incorporating skills as indicators of the level of incorporation of each of the four criteria into global competency. The assessment of global competency in engineering is not limited to measurements of student outcomes c, h, j and k. A global component can be inferred in all of the other a-k student outcomes as well, and widespread expansion of the definition of the expectations would go a long way towards ensuring that all engineering programs educate their engineers for global competence.

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