Professional Accreditation and Competency-Based Computing Education

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ABSTRACT

Professional accreditation in medicine and religious organizations started in the 1800s; business and engineering followed in the early 1900s. Program accreditation in computing commenced in the 1980s after computer science, informatics, and information systems programs had become widespread. In 2008, accrediting bodies in eight countries signed the Seoul Accord to set up mutual recognition of professional computing degrees. Although competency-based learning has existed for centuries, it has only made headway in computing in the last dozen years. Computing Curricula 2020 defined competency as the amalgamation of knowledge, skills, and dispositions. This working group report examines professional accreditation in computing, exploring aspects of professional accreditation criteria that support competency-based learning. The report will help educators understand professional accreditation and competency-based learning worldwide. Finally, it will also guide future efforts contributing to competency-based accreditation.

CCS CONCEPTS

• **Social and professional topics** → **Accreditation**; **Computing education programs**.

KEYWORDS

ITiCSE working group, professional accreditation, Seoul Accord, Washington Accord, computing education, competency-based education.

ACM Reference Format:
Rajendra K. Raj, John Impagliazzo, Sherif G. Aly, David S. Bowers, Harold Connamacher, Stan Kurkovsky, Bonnie MacKellar, Tom Prickett, Maíra Marques Samary, and Krassen Stefanov. 2022. Professional Accreditation and Competency-Based Computing Education. In *Proceedings of the 27th ACM Conference on Innovation and Technology in Computer Science Education Vol 2 (ITiCSE 2022), July 8–13, 2022, Dublin, Ireland.* ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/3502717.3532171

1 MOTIVATION

Accreditation has existed for more than a century in business, medicine, and teaching disciplines. Unlike institutional accreditation, which indicates that an institution has met established benchmarks, program accreditation informs that a program has satisfied the quality assurance criteria that professional societies have defined for their discipline. For decades, these accreditation criteria focused on knowledge needed by graduates to enter the profession.

Some accreditation criteria actively promote competency that includes academic knowledge, applicable skills, and human dispositions. For example, the Accreditation Council for Continuing Medical Education requires the provider have "expected results articulated in terms of changes in competence, performance, or

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ITiCSE 2022, July 8–13, 2022, Dublin, Ireland

ACM ISBN 978-1-4503-9200-6/22/07.
https://doi.org/10.1145/3502717.3532171

patient outcomes that will be the result of the program" [11]. Likewise, accreditation criteria for business and accounting schools focus on "competencies and what students expect to demonstrate upon completion of their program of study" [1].

Recent computing curricular reports have included competencies: software engineering [8], information systems [10, 15], information technology [13], and data science [6]. In particular, Computing Curricula 2020 defines professional competency as the combination of knowledge, skills, and dispositions in the context of performing a goal-oriented task [4].

Program accreditation in computing began in the United States when the Computing Sciences Accreditation Board (CSAB) [5] through its Computer Science Accreditation Commission (CSAC) began accrediting programs in the mid-1980s. In the United Kingdom (UK), the Chartered Institute for IT (BCS) [3] started accrediting programs in 1990, initially for engineering-related programs under the auspices of the Washington Accord [9] under license from the UK Engineering Council [16]. Other countries developed their accreditation criteria for computing disciplines.

The International Engineering Alliance established and enforces "internationally benchmarked standards for engineering education and expected competence for engineering practice" [9]; these include the Washington Accord (for engineering) and the Sydney Accord (for engineering technology), which cover several flavors of computing programs. To cover the entirety of worldwide computing education, accrediting bodies in eight countries signed the Seoul Accord in 2008 "to ensure transparency in accreditation, remove arbitrary practices and policies, become the international authority on quality assurance, and develop and promote best practices to improve education in computing" [14]. The European Quality Assurance Network for Informatics Education (EQANIE) provides a similar role in a European context.

One of the Seoul Accord signatories, ABET, has accreditation criteria that require competency "to the knowledge, skills, and behaviors that students acquire" [2]. UK's Engineering Council defines competence as: "the ability to carry out appropriate tasks to an effective standard. Achieving competence requires the right level of knowledge, understanding and skill, as well as a professional attitude" [16, p. 40]. The BCS, another Seoul Accord signatory and EQANIE member, uses this definition of competence to underpin accreditation related to several of its professional registrations. EQANIE itself requires graduates to meet "quality standards for knowledge, skills, and competences" [7].

2 WORKING GROUP OBJECTIVES

Building on earlier ITiCSE working group efforts (e.g., [12], this working group will:

(1) Review professional accreditation bodies in *non-computing* fields and explore how they factor competency as a requirement for accreditation.
(2) Review worldwide professional accreditation bodies in *computing* fields [9, 14] and explore how, if at all, they address competency as a requirement for accreditation.
(3) Identify practical computing competencies for computing disciplines needed for accreditation.
(4) Examine competency assessment approaches in the computing and non-computing professions and suggest evaluation guidelines in computing accreditation.
(5) Make recommendations for the need for and use of practical computing competencies in accreditation.

These objectives will guide the group's investigations and future recommendations for competency-based computing accreditation.

The working group activities will inform computing educational communities about the increasing relevance of competency-based approaches within computing and how professional accreditation criteria can help realize the goal of viewing computing as a profession akin to medicine, business, and teaching.

ACKNOWLEDGMENTS

This work builds on prior efforts in accreditation and competency-based computing education. Raj acknowledges support by the National Science Foundation under Awards 1922169 and 2110771.

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