IEA/WFEO Working Group
IEA GAPC Review: Summary of Work Done and the Nature of Changes

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Definition of GAPC

Graduate attributes is a set of individually assessable outcomes that are indicative of a **graduate's potential** to acquire competence to practice at the appropriate level. The attributes are clear, succinct statements of the expected capability.

P*rofessional competency profiles* are the elements of competency necessary for performance that a professional is expected to be able to demonstrate at the stage of **attaining registration.**

Relevance of GAPC to IEA and WFEO

Requirements of Rules and Procedures Documents of IEA

"The *graduate outcomes standard* applied for accreditation [by a signatory] is substantially equivalent to that of the Accord graduate attributes exemplar."

"*Competence profiles* applied by the jurisdiction [of an agreement partner] are substantially equivalent with those specified in the Professional Competencies document."

Objective in WFEO Constitution

"to encourage the application of engineering and technological advancement to economic and social progress throughout the world"

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Work Behind the Revision Proposal

PROGRESS MADE IN November 2019-January 2020

1) A workshop "IEA WFEO Working Group on the IEA Graduate Attributes and Professional Competency benchmark standards meeting" was held in WEC 2019.

2) A questionnaire was distributed to all IEA signatories and agreement parties.

3) A review of drawbacks/advantages of the GAPC used in 2015-2020 based on the accreditation agencies' evaluation experiences was done.

4) A summary of the experience of engagement with the IFEES network, concerning the future engineering qualifications/competencies, was made.

5) The first WG progress report "WFEO-IEA-Working-Group-Report-To-IEA-GG-January-2020" was conveyed to IEA Governing Group in February 2020.

6) Various reports/surveys/investigations that are composed by a number of companies/organizations are studied.

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Work Behind the Revision Proposal (continued)

PROGRESS MADE IN January 2020-May 2020

1) The first proposed revisions "GAPC-Tables-with-Revisions-04032020.docx" to GAPC was ready by the beginning of March 2020 and has been commented, discussed and revised by members of the WG for about two months.

2) A major step was taken by the document "IEA GAPC-Tables-Revisions and Reasons 29032020_30042020.docx," that was the result of online consultations with IFEES, Centre for Engg Edu. Malaysia, ICEE, MEngC, UNESCO, and WFEO representatives

3) All IEA (signatories, agreement parties whether full or provisional, and associates) have been presented with the documents "A Proposal to Update the GAPC Tables" and "WFEO-IEA-Working-Group-Report-To-IEA-GG-May-2020."

4) In a pre-recorded session in IEAM 2020, the presentation entitled "IEA WFEO Working Group: Graduate Attributes and Professional Competencies" has been offered, inviting all to comment

5) A report on the status of the WFEO-IEA MoU and the Declaration on Engineering Education has been presented at the closing session of IEAM 2020.

Tables that characterize GAPC

1) **Range of Problem Solving Capabilities**: problem solving capabilities that distinguish the 4-5-year programs with engineer graduates from those that have a teaching duration of 3-4 years for technologists or 2 years for graduating technicians

2) **Range of Engineering Activities**: complex activities for an engineer, broadly-defined activities for a technologist, and well-defined activities for a technician

3) **Knowledge and Attitude Profile**: can be viewed as describing what the curriculum of an engineering program must contain at a minimum

4) **Graduate Attribute Profiles**: the qualifications (assimilated knowledge, skills, and attitudes) of an engineer or technologist or technician at the time of graduation

5) **Professional Competency Profiles**: the competencies for a qualified engineer/technologist/technician attained, not only during school education but also, through lifelong learning and professional development.

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What a change in GA or PC implicates

When an new entry in GA Table 4 is made, the questions arise:

Is this consistent with Range of Activities Table 2?
Is this consistent with Knowledge and Attitude Table 3?
Is this attainable in the relevant program?
Is this measurable?
Is this assessable?
Is this demonstrable?

When an new entry in PC Table 5 is made, the questions arise:

Is this consistent with Range of Activities Table 2?
Is this consistent with Knowledge and Attitude Table 3?
Is this attainable in the relevant program?
Is this attainable during professional development?
Is this demonstrable?

Example on emerging technologies and disciplines

(Table 4: Graduate Attributes) ~~Modern~~ Digital Tool Usage: Level of understanding of the appropriateness of technologies and ~~various~~ tools	WA5: Create, select and apply appropriate techniques including prediction and modelling, computing and information tools, and data analytics ~~and modern engineering and IT tools including prediction and modelling~~, to *complex* engineering problems, with an understanding of the limitations. **(WK6)**
(Table 3: Knowledge and Attitude Profile)	**WK6**: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
(Table 2 : Range of Engineering Activities) Range of resources	**EA1:** Involve the use of diverse resources ~~(and for this purpose resources includes~~ including people, data and information natural, financial and physical resources and appropriate technologies ~~money equipment, materials, information and technologies)~~

The new entry "data analytics" in "Tool Usage" row is consistent and is supported by Table 2 "Range of Resources" row and the item "diverse resources," and by Table 3 , row-6 and the item "knowledge of engineering practice."

This is easily attainable as a separate course in Computer Science and Engineering programs but is also so in other engineering programs through a variety of activities scattered throughout the curriculum.

This is assessable, measurable, demonstrable via the documents of individual students' work in the span of 4 years.

As an example to the contrary, an item like "database systems" or "parallel computing" would not be attainable by even an electrical engineering program.

Difficulty of assessment

Outcome based evaluation or assessment involves *performance evaluation* at its core.

Whether a student has attained the GAs or not is as difficult to determine as whether an academician has reached a level of professorship or not.

Whether an engineer has attained the PCs is as difficult to determine as whether a company product satisfies all the specifications or not.

The level of difficulty is no more no less.

We need to be aware of this while judging the appropriateness of the changes suggested to GAPC.

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Your Contribution is Needed

There are two documents you may reach via the WFEO website: .

- "WFEO-IEA-Working-Group-Report-To-IEA-GG-May-2020.pdf" contains an account of the role, purpose, and composition of the IEA GAPC Working Group, the proposed and updated plans of work, a summary of the progress of work in the interval November 2019-May 2020 are given. A summary of the identified main emergent points that are taken into account in a revision of GAPC tables is also included.

- "A Proposal to Update the GAPC Tables19052020.pdf" contains the five tables with changes (deletions and additions) on the present GAPC tables.

- In order to add your comments, you may use the same file "A Proposal to Update the GAPC Tables.pdf" and the tables therein, and insert your suggestions of changes in the relevant cell using sticky notes. Insert your explanatory notes, if any, at the end of that row.

- You may return the file, after an extension of the filename with your name or your institution's name, as appropriate, to "ozguler@ee.bilkent.edu.tr."

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Thank You

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