Informatics Higher Education in Europe: Readiness and Core Skills

The workshop, chaired by **Andreas Bollin (University of Klagenfurt, Austria)** and **Agustín Yagüe (Universidad Politécnica de Madrid, Spain)**, explored the transition from school to higher education in informatics and the role of informatics competencies across disciplines. Through presentations, interactive polls, group activities, and discussions, participants examined student readiness, common informatics foundations, and opportunities to improve educational pathways.

An opening poll among **16 participants from seven countries** revealed concerns about student readiness: nine considered students moderately prepared for higher education in informatics, five slightly prepared, and only two well prepared.

The first session addressed competency mapping and readiness gaps. Andreas Bollin presented GECKO, a graph-based approach to curriculum analysis. Examples from university informatics and Austrian teacher education curricula demonstrated how rule-based, AI-assisted, and graph-based analyses can reveal competency dependencies, curricular coverage, cognitive progression, and structural inconsistencies, supporting curriculum transparency and quality assurance.

A second poll identified **self-directed learning and persistence (9 responses)** as the most frequently perceived readiness gap, followed by **algorithmic thinking and problem-solving (8)**, **mathematical and logical reasoning (8)**, and **abstraction and modeling (7)**. Programming and debugging, computer systems and networks, and data and AI fundamentals received fewer selections. Open responses further emphasized autonomy, critical thinking, resilience, and independent learning, highlighting the importance of both disciplinary knowledge and self-directed learning.

The second session, led by Agustín Yagüe, examined informatics competences across engineering disciplines. Drawing on a taxonomy of 14 fields and 76 subfields aligned with the CS2023 knowledge areas and the ACM CCS, participants explored the shared foundations of algorithms, data, programming, computing systems and AI. The session presented an analysis of 17 non-informatics engineering degrees from nine universities in five countries, covering about 1,189 course guides. The results showed that the classic computational core is well covered, but many of the skills industry now needs are missing from the curricula. Professional use of generative AI and cyber hygiene are critical gaps in every degree analyzed, followed by IoT, enterprise systems, data mining, machine learning and computer vision. After the presentation, participants worked in groups to validate these taxonomy, identify discipline-specific needs, and distinguish between competences expected before university and those developed in the early years of higher education.

The final session featured a moderated discussion with **Peter Puschner (TU Vienna, Austria)** and **Eduardo García Pardo (Universidad Rey Juan Carlos, Spain)**. Topics included mismatches between student preparation and university expectations, the responsibilities of schools and universities, and improvements through clearer entry expectations, institutional cooperation, shared competency frameworks, and targeted first-year support.

The workshop highlighted that many desired entry competencies, including independent learning, critical thinking and persistence, are transversal rather than specifically informatics-related. This prompted a discussion on **informatics as a standalone school subject**. One moderator referred to

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the German Stifterverband study *Informatik für alle!* (2022), which associated compulsory standalone informatics education with higher ICT competencies and smaller gender gaps compared with cross-curricular, optional or absent instruction. These findings supported the argument that cross-curricular approaches alone are insufficient to ensure equitable informatics education. Participants agreed to strengthen collaboration, exchange experiences, and maintain contact via email, laying the groundwork for further European cooperation on informatics competencies and educational transitions.