# QUALITY, CREATIVITY AND COMPETENCY OF HIGHER EDUCATION GRADUATES

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# 1. **Introduction (1)**

*Paper objective*

**Strengthening** the **importance** and **development** of some matters on **quality**, **creativity** and **competency** as **major attributes** of higher education **graduates**.

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**Quality**, **creativity** and **competency** are invoked:
- in relevant higher education subjects,
- individually / group,
- on different levels, as

    - graduates, students, staff, institution, study programs etc.;

    - knowledge, skills, innovation, services, qualification, career, etc.;

    - attitude, relationships, loyalty, teamwork, interactivity, teaching, learning, etc.

# Introduction (2): Quality

• *Quality* means: as *standard* - **how good or bad something is**; a *feature* of someone or something; a *high standard* etc.[3].

• *Quality of education*: all *features* of a *study program* and of its *provider*, by which the *beneficiary* and the *quality standards* are fulfilled [4].

There are two important quality-related *functions*: *quality assurance* and *quality control*.

• *Quality assurance:* can be defined as any **systematic process of checking if a product/service being developed is meeting specified requirements** [5] or **systems, procedures, processes and actions intended to lead to the achievement, maintenance, monitoring and enhancement of quality** [6].

• *Quality control:* the process of **looking if all the goods are of the intended standard** [3], and is related to a set of minimum of management processes and procedures for accreditation purposes[7].

# Introduction (3): **Creativity**

• *Creativity* is the ability *to generate innovative ideas* and *manifest* them from *thought* into *reality*. The process involves *original thinking*; *generation of novel ideas* by *individuals* or *groups*, as a necessary step within the *innovation process* [8].

• The **world needs** *people* **who can combine their knowledge, skills** and **capabilities** in **creative** and adventurous **ways** to **find** and **solve complex problems**, more generally to the **health** and **prosperity** of our **society** and **economy** [9].

• Enabling **students** to be **creative** should be an explicit **part** of their higher education **experience** [10].

# Introduction (4): Competency

• *Competency* is an important skill that is needed to do a job. **Competence** is the ability to do something well [3] • *Competence* is: the capacity of someone to decide, to do something; a set of theoretical and practical information [11] • *Competency* is person's ability, formally confirmed by some document, to perform a certain valid (at a concrete quality level) and reliable (precise and fast) part / function of occupation [12] • *Competence* is a standardized requirement for an individual to properly perform a specific job. It encompasses a combination of knowledge, skills and behavior utilized to improve performance. More generally, *competence* is the state or quality of being adequately or well qualified, having the ability to perform a specific role [13].

• *Competences* are major attribute of *graduates* of a certain study level, and should be defined and achieved so that to make distinction between the graduates of different: **degree levels** - Ba, Ma, PhD; **study fields**; **study programs**. *Skills* and *knowledge* are major attributes of *students* and, implicitly, of *graduates*, acquired through certain activities, according to circumstances. *Skills* and *knowledge* should be determined so that to contribute to the creation of one or more well-defined *competences* [1].

# Introduction (5)

• **Capacity** for *creativity* and *innovation* is **part** of the *professional attributes*, and the **activities contributing** to its development are **open-ended problems, field trips, debates/ challenges, cross-disciplinary tasks,** etc. [14].

• The desired **attributes** of the higher education **graduates** include *transferable competencies*. **Learning-oriented courses** challenge students' creativity, and excitement of discovery [15].

• Providing **common fora** for **researchers** from **different disciplines** and **offering diverse learning experiences** will result in **conditions favourable to the creativity** of the higher education community. **Structured exchanges** between **arts** and **other disciplines** can be particularly fruitful [16].

• The **framework** for **quality assurance** should be created so that, on the one hand, **forces faculties** and **programme directors to engage in quality assurance**, and on the other hand, **leaves enough room for creativity** [17].

# 2. **Major entities (1)**

• **Quality**, **creativity** and **competency** are **concepts** and **characteristics/attributes**, too, depending of the contextual clues, such as defining matter, application, and author competence.

• **Quality**, **creativity** and **competency** are associated to higher education matters, on **abstract**, **general** or **particular level**.

• **Quality**, **creativity** and **competency** of the higher education **graduates** are the **result** of **various factors** - linked to students/ graduates themselves, staff, institution, etc. **These all co-exist** and **inter-act multi-directionally** and **reciprocally**.

# 2. **Major entities (2)**

• Let be **Fa** a factor of type of **student**, **graduate**, **staff**, **institution**, etc.,
and **Fab** - a matter of type of **feature**, **activity**, etc. associated to Fa.

A **correlation** between **Fa**, **Fab**, on the one hand, and the **quality**, **creativity** and **competency**, on the other hand, is proposed as follows.

# 2. **Major entities (3)**

| Fa | Fab | Quality | Creativity | Competency |
|---|---|---|---|---|
| … | … | | | |
| **Graduate** | Whole | H | H | H |
| | | | | |
| **Student** | Whole | H | H | n |
| | Learning | H | H | |
| | Project work | H | H | |
| | Research | H | H | H |
| | Lab work | H | n | |
| | Communication | H | n | |
| | Teamwork | H | n | |
| **Academic staff** | General | H | H | H |
| | Teaching | H | H | H |
| | Research | H | H | H |
| | Communication | H | n | |
| **Institution** | Environment | H | H | |
| | Infrastructure | H | H | |
| | … | | | |
| … | … | | | |

where: **H** denotes a **high level** of quality, creativity, competency,
which is desirable or defined by a standard/ indicator;
**n** - a **normal**/ **natural level** of quality, creativity, competency.

The considered correlations have to be interpreted contextually, i.e.:
- the higher education **graduates** should denote a **high level** of their **quality**, **creativity**, and **competency**,
- the **students** should manifest a **normal/ natural level** of **competence** required to do the study activities, etc.

Few properties of the considered entities and their correlations have to be strengthened.

- **Quality** is associated to **all factors**.

- **Creativity** should be associated to higher education **students** and **graduates,** as **permanent state of spirit**, **attitude** and **action**.

- **Competency** should be associated to *individual(s*), and, in context, to higher education **graduates** as an **important operational feature**.

- The **graduates** themselves **could contribute** to the development of the quality, creativity and competency - by their daily activity within the society/ economy, and by supporting, as *alumni*, their higher education institution(s).

- The concepts and specific characteristics of **quality**, **creativity** and **competency** should be **approached** and **developed** in a **synergism way.**

- A higher education **institution** should include definite **statements** and **actions** in its university Charta, strategic plan, and operational programs on the **quality**, **creativity** and **competency**.

# 3. **Study Case (1)**

• **Linköping University**, **LiU**, and, in particular, its **Institute of Technology**, **LiTH**, [18], have been chosen in order to illustrate advanced characteristics of an **university environment** based on a **functional quality assurance system**.

• LiU offers higher education at Ba, Ma and PhD levels for **25,000 students**, having **3,500 employees**, with: study programmes on engineering, management, teaching

and medicine; increasing number of **courses** and **master programmes in English**; more than **1,500 foreign students**; over **100 guest researchers**.

# 3. **Study Case (2)**

• LiU assures *Quality / Equal Opportunities for students and employees*

- **Norms** and **routines** assist quality assurance and reflect respect for individuals

- **Equal opportunities**, **EO**, for all people, regardless of gender, ethnicity, religion, background, age, sociability, life situation

- **Attractive study**, **work environment**, **quality** in **education** and **research**, **equitable structures** and **processes**

- **Wide-ranging contacts** in various sectors of **society** that promote EO

- LiU is **highly accessible** in terms of activities, information and premises; admission and recruitment processes are not discriminatory

- LiU should help students to **combine** their **studies** with **parental responsibilities**.

# 3. **Study Case (3)**

• LiU promotes *Open-mind spirit*

- The **students** can **knock** on the **door** of the **professors**; if the professor is busy, the student has to come back
- **All** the **persons call each other for their first name; foreign students** are very happy with this system; on the contrary, for the **Swedish students** who have been studying in certain foreign countries, the levels in behaving between teachers and students are considered quite unusual

- The **administrative staff** is trying not to complicate things, if they can be solved in an easy way
- The **administrative staff develops** their **level of competency** by participating to conferences in Sweden or abroad due to their tasks, or by doing any other special activity useful for the job, for instance going in France to exercise their French if working with lots of French students
- The **relationships between employees** are based on respect, trust and involvement from both sides

# 3. **Study Case (4)**

• LiU promotes *Questionnaire to the staff*

- LiU considers its **main asset** its **employees**. A **key success factor** is that **every employee understands LiU** as an **attractive workplace**. In this direction, LiU implements employee **surveys every two years**, to investigate the working conditions
- The **results** are presented in **separate reports** broken down by each institution and its subdivisions

- The inquiry should be seen as a **mapping** of the **working conditions** and the integration of **systematic work** in institutions and units, in the action plans

- The summary from the employee survey in 2008, e.g., is showing the followings: employee index rose from 59 in 2004 to 65 in 2008; **employees feel involved in the design of their duties** and also feel that they have sufficient skills and experience to perform their activities in a satisfactory manner; **employees feel proud** of continuing to work within LiU and a high proportion can recommend LiU as an employer; 79% say that the next manager is easy to work with; 68% of employees indicate that performance appraisals are meaningful.

# 4. **Conceptual modeling (1)**

The relevant information about the higher education graduates, students, quality, creativity, competency, etc., as above, could be structured and organized in a system of databases.

A conceptual modeling regarding the considered entities associated to higher education has been developed, as a ground for a system of databases, as follows.

- Let's consider the entities $E_i$, i =1 … e , where $E_i$ could be graduate, student, ..., quality, creativity, competency, etc.
- Relevant themes, $T_{i.j}$, are associated to each entity $E_i$, i.e.,

$$T_{i.j} \; \varepsilon \; E_i \; , j =1 ... n, n = n(E_i)$$

Name of $T_{i.j}$, $N(T_{i.j})$, could be General Characteristics, Quality Assurance, Creativity Culture, etc., and the code of $T_{i.j}$, $C(T_{i.j})$, could be GC, QA, CC, etc.

- Thematic groups, $G_{i.j.k}$, are constituted inside of each theme $T_{i.j}$, i.e.,

$$G_{i.j.k} \; \varepsilon \; T_{i.j}, k = 1...q, q = q(T_{i.j})$$

Name of a group $G_{i.j.k}$, $N(G_{i.j.k})$, is $N(T_{i.j.k}) - N(SE)$, where $N(T_{i.j.k})$ is derived from the name of the theme $T_{i.j}$, and $N(SE)$ – the name of the state entity or similar. So, $N(T_{i.j.k})$ could be General Characteristics 01, Quality Assurance 01, Creativity Culture 01, etc., and $N(SE)$ - Romania, European Union, etc. The code of a group $G_{i.j.k}$, $C(G_{i.j.k})$, is $C(T_{i.j.k}) - C(SE)$, where $C(T_{i.j.k})$ is the code of the thematic area $T_{i.j.k}$, and $C(SE)$ – the code of the state entity or similar. For instance, $C(T_{i.j.k})$ could be GC 01, QA 01, CC 01, etc., and $C(SE)$ - RO, EU, etc.

# 4. **Conceptual modeling (2)**

• A thematic group Gi.j.k is constituted of **definite characteristics Ci.j.k.p**, i.e., Ci.j.k.p ε Gi.j.k, p = 1 … r , r = r(Gi.j.k)

Each Ci.j.k.p has a significance in the context, as legislative stipulations, quality standards, etc.

• **Thematic documents Di.j.k** are determined, so that, the content Cont(Di.j.k) includes the content of the thematic group Gi.j.k / the definite characteristics Ci.j.k.p, i.e.,

$$\text{Cont(Di.j.k)} = \text{Cont(Gi.j.k)},$$

$$\text{Cont(Di.j.k)} = \{\text{Ci.j.k.p} \mid p = 1…r, r = r(\text{Gi.j.k})\}, k = 1 … q, q = q(\text{Ti.j})$$

The name of a document Di.j.k, N(Di.j.k), is defined as N(Ei) - N(Gi.j.k), i.e., N(Di.j.k): N(Ei) - N(Ti.j.k) - N(SE), where N(Ei), N(Ti.j.k) and N(SE) have the significances presented above. The code of a document Di.j.k, C(Di.j.k), is defined as C(Ei) - C(Gi.j.k), i.e., C(Di.j.k): C(Ei) - C(Ti.j.k) - C(SE), where C(Ei), C(Ti.j.k) and C(SE) have the significances presented above.

# 4. Conceptual modeling (3)

• **Thematic databases**, **BDi.j**, associated to the themes Ti.j, are determined as union of the documentes Di.j.k, i.e., **BDi.j** =U **Di.j.k**. The name, N(BDi.j), and the code, C(BDi.j), of BDi.j are given in the context.

• **Structural databases**, **BDi**, are determined as union of the thematic databases BDi.j, i.e., **BDi** = U **Bi.j**. The name, N(BDi), and the code, C(BDi), of BDi are given in the context.

• **The system of databases**, **SBD**, is determined as union of the structural databases BDi, i = 1 … e, i.e.,

$$\textbf{SBD = \{ BD1, BD2, .., BDi, ..., BDe\}.}$$

The name, N(SBD), and the code, C(SBD), of SBD are given in the context.

**Based on the above model and by integrating real data, an operational system of databases could be determined.**

# 5. **Conclusions**

- In order to realize the understanding, design, production, exploitation and recycling processes and systems satisfying the sustainable development needs, the higher education **graduates** should **have proper attributes**. **Quality**, **creativity** and **competency** are among these.

- There are **various views on quality, creativity and competency**, being **associated** to **graduates/ students, staff, knowledge, skills, innovation, services, qualification, attitude, teaching, etc., individual** or in **a group, on different levels of development**, etc.

- The quality, creativity and competency of the higher education graduates depend on numerous factors - linked to students/ graduates themselves, staff, institution, etc., which co-exist and inter-act multi-directionally and reciprocally. **Quality** is associated to all factors. **Creativity** should be associated to higher education students and graduates as a permanent state of spirit, attitude and action. **Competency** should be associated to higher education graduates as an important operational feature.

- The concepts and specific characteristics of **quality, creativity** and **competency** should be approached and developed in a **synergism way**.

- The relevant information about the higher education graduates, students, quality, creativity, competency, etc., should be structured and organized in a **system of databases**.

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