

**NEW SKILLS FOR NEW JOBS:
THE ROLE OF HIGHER EDUCATION INSTITUTIONS AND
BUSINESS CO-OPERATION
Dublin, 22-23 October, 2009**



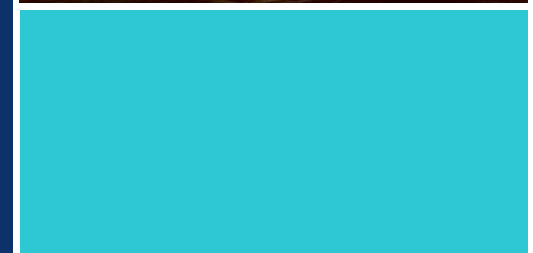
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Developing skills for innovation: what HEIs can do?

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University of Valencia and Valencia University of Technology

www.ioe.ac.uk



Higher education and the economy's potential for innovation



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- **Productivity gains, and therefore growth and development, emerge from using in production newly available knowledge**
- **Higher education contributes to build innovation potential in the economy via the supply of new graduates through their:**
 - Ability to mobilize in their jobs already-available knowledge and resources not utilized previously
 - Ability to create, adapt, and use, newly-available knowledge or resources while developing tasks and responsibilities in their jobs

Research questions



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- **Which are the competences of graduates related to innovation?**
- **Which teaching and learning modes in HEIs promote competences for innovation?**
- **What competences define innovators?**

The **Reflex** survey of higher education graduates



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- **Research project, 6th Framework Programme, UE**

- **14 European countries + Japan (+ CEC + LA +....)**

Italy	Austria	U. Kingdom	Switzerland	
Spain	Germany	Finland	Belgium	Czech R.
France	Netherlands	Norway	Estonia	Portugal

- **40,787 graduates surveyed 5 years after graduation**

- **More info in:**

www.ceges.upv.es & www.fdewb.unimaas.nl/roa/reflex

Teaching and learning modes in the survey



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To what extent were the following modes of teaching and learning emphasized in your study programme?

- § Lectures
- § Group assignments
- § Participation in research projects
- § Internships, work placement
- § Facts and practical knowledge
- § Theories and paradigms
- § Teacher as the main source of information
- § Project and/or problem-based learning
- § Written assignments
- § Oral presentations by students
- § Multiple choice exams

Competences in the survey



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A. “How do you rate your own level of competences?”

B. “What is the required level of competences in your current work?”

C. “What was the contribution of the study programme to your level of competences?” (Only in the Spanish version)

List of competences



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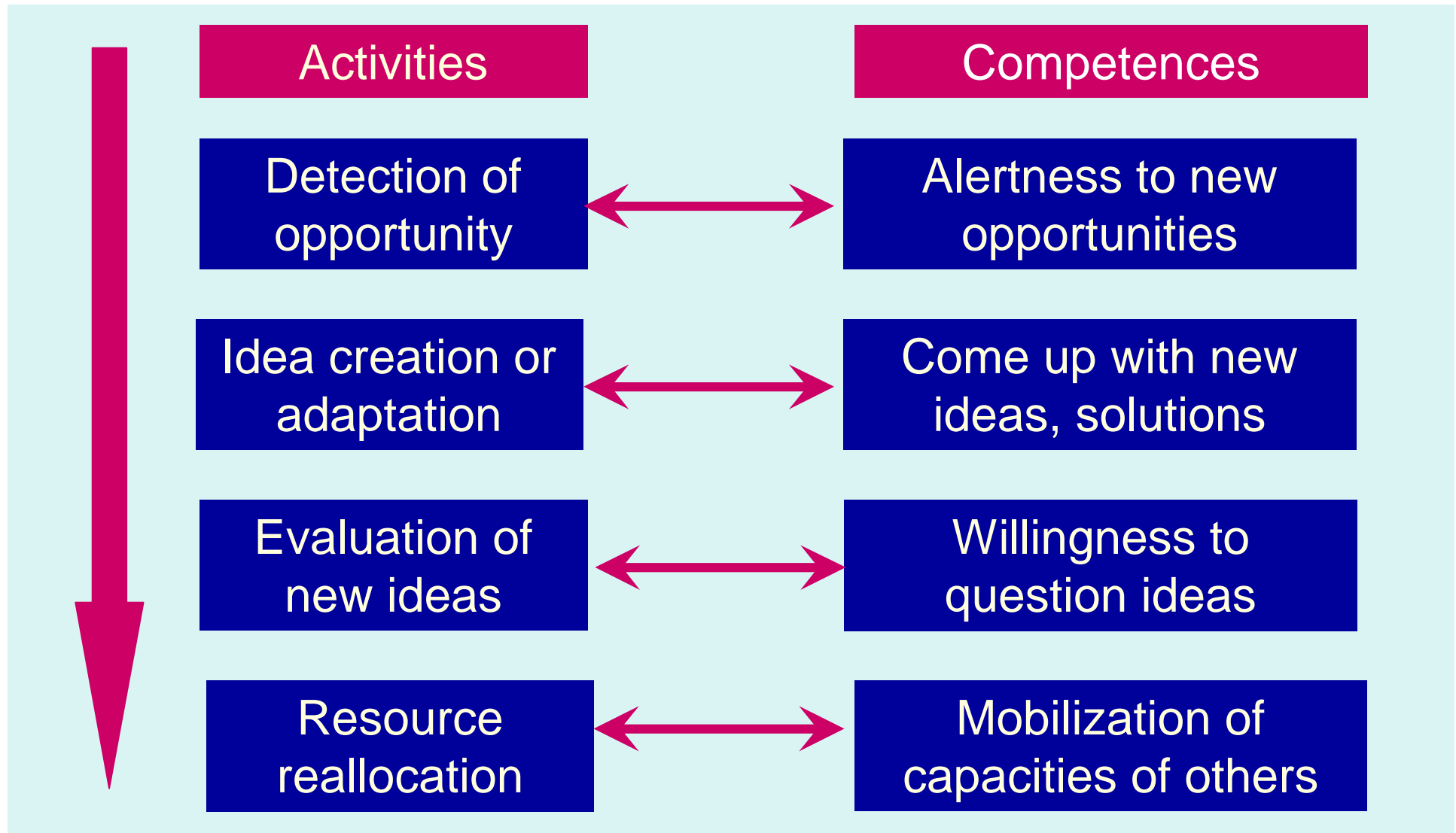
Mastery of your own field
Knowledge of other fields
Analytical thinking
Rapidly acquire new knowledge
Negotiate effectively
Perform well under pressure
Alertness to new opportunities
Coordinate activities
Use time efficiently
Work productively with others
Mobilize the capacities of others
Make your meaning clear to others
Assert your authority
Use computers and the internet
Come up with new ideas and solutions
Question your own and others' ideas
Present products, ideas or reports
Write reports, memos or documents
Write and speak in a foreign language

Innovative behaviour and competences



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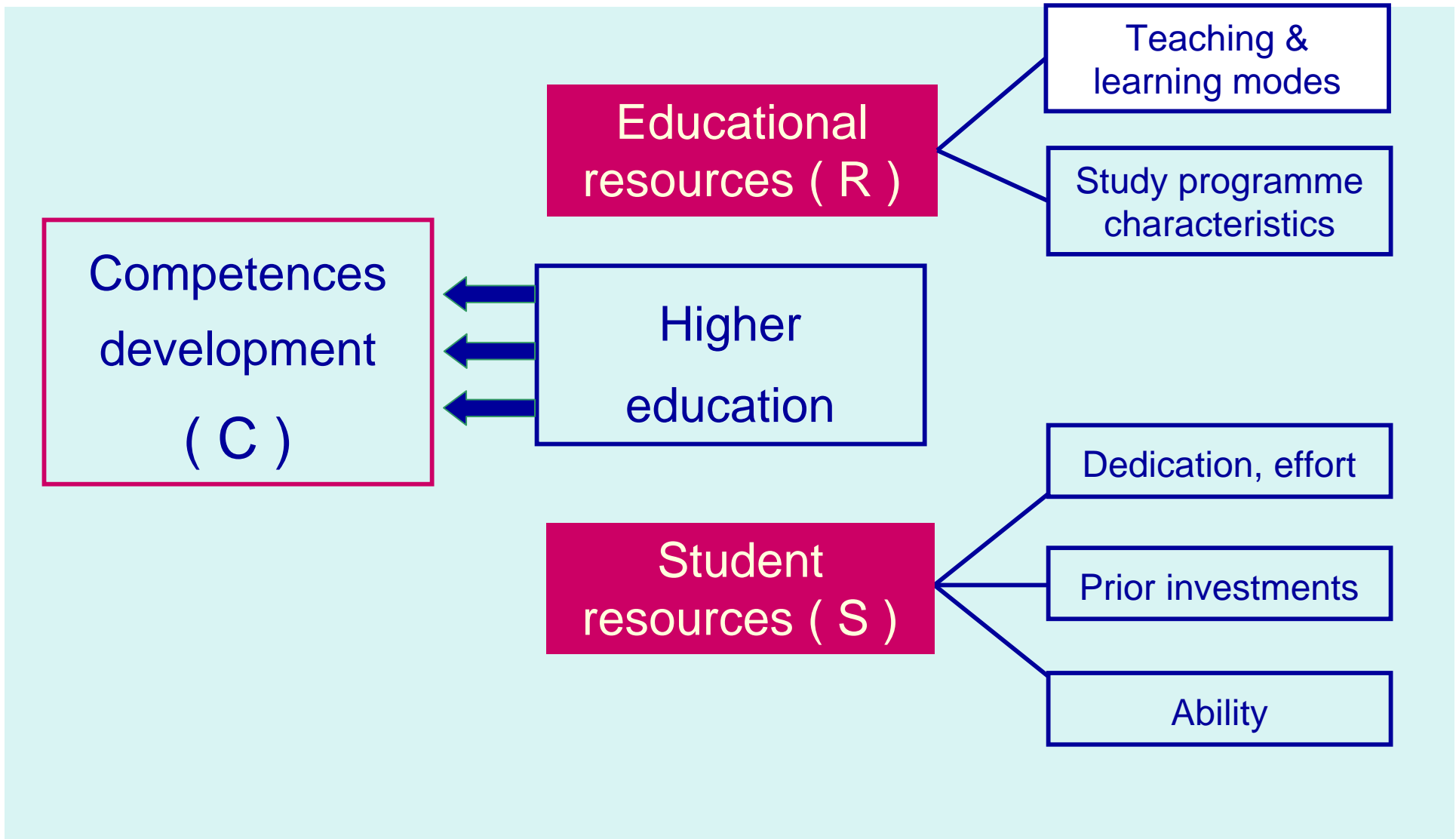
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A model for competences production



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Variance components model



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$$C_{ij} = f(R_{ij}, S_{ij}) + u_j + \varepsilon_{ij}$$

Composite error terms:

- u_j : group noise $N(0, \sigma_u^2)$: *field, institution, country*
- ε_{ij} : individual noise $N(0, \sigma_\varepsilon^2)$
- Intragroup correlation = $\sigma_u^2 / (\sigma_u^2 + \sigma_\varepsilon^2)$

Contribution to innovation competences level of modes of teaching and learning



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	Alertness to new opportunities		Ability to come up with new ideas and solutions		Willingness to question your own and other's ideas		Ability to mobilize the capacities of others		
	Coeff.	P> z	Coeff.	P> z	Coeff.	P> z	Coeff.	P> z	
Modes of teaching and learning									
Lectures	0.023	0.465	0.022	0.267	0.037	0.090	0.015	0.501	
Group assignments	0.044	0.036	0.064	0.006	0.040	0.111	0.228	0.000	
Participation in research projects	0.120	0.001	0.086	0.000	0.079	0.000	0.099	0.000	
Internships, work placements	0.047	0.121	0.010	0.555	-0.010	0.609	0.057	0.002	
Facts and practical knowledge	0.139	0.000	0.140	0.000	0.091	0.000	0.143	0.000	
Theories and paradigms	0.013	0.614	0.107	0.000	0.173	0.000	0.039	0.106	
Teacher as main source of information	-0.012	0.767	-0.014	0.520	-0.016	0.478	-0.021	0.368	
Project and/or problem-based learning	0.160	0.000	0.168	0.000	0.136	0.000	0.136	0.000	
Written assignments	0.005	0.929	-0.032	0.152	0.008	0.751	0.028	0.247	
Oral presentations	0.063	0.026	0.082	0.000	0.140	0.000	0.093	0.000	
Multiple choice exams	0.048	0.017	0.018	0.280	-0.031	0.081	0.020	0.249	
Effort and dedication									
Weekly hours spent on study	-0.001	0.655	0.003	0.002	0.000	0.799	0.000	0.751	
Full-Time Student	-0.060	0.191	0.004	0.940	0.018	0.721	-0.117	0.021	
Did extra work	0.181	0.000	0.238	0.000	0.121	0.000	0.073	0.003	
Educational Family Background									
Father with Tertiary studies	-0.048	0.087	-0.044	0.305	-0.042	0.387	-0.124	0.008	
Mother with Tertiary studies	-0.079	0.178	0.061	0.182	0.053	0.279	0.045	0.366	
Personal characteristics									
Age	-0.002	0.769	0.008	0.142	0.014	0.034	-0.002	0.740	
Female	0.046	0.407	-0.049	0.209	-0.023	0.570	0.054	0.193	
Constant	1.823	0.000	1.181	0.000	1.798	0.000	1.514	0.000	
N level 1 (individuals)	5284		5268		5274		5288		
N level 2 (institutions)	33		33		33		33		
N level 3 (countries)	9		9		9		9		
Intragroup correlation Rho (institution, country)	9.3%		18.5%		11.6%		5.8%		
Intragroup correlation Rho (country)	7.3%		16.8%		10.1%		3.3%		

Contribution to innovation competences level of modes of teaching and learning



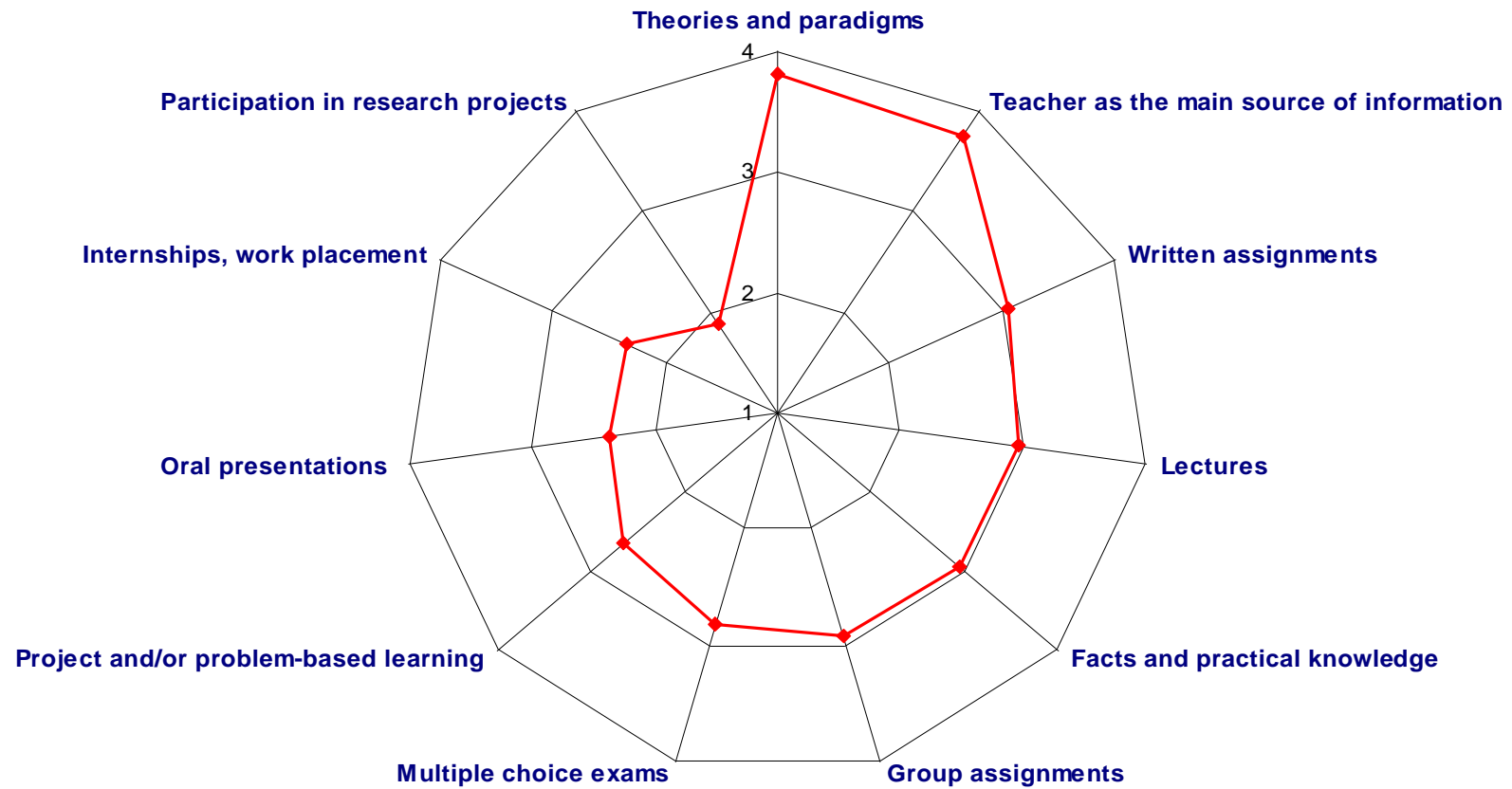
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	Alertness to new opportunities	Ability to come up with new ideas and solutions	Willingness to question your own and others' ideas	Ability to mobilize the capacities of others
Project and/or problem-based learning	+++	+++	+++	+++
Group assignments		+++	+++	+++
Participation in research projects	+++	++		+++
Internships, work placements	+++		++	+++
Facts and practical knowledge		+++	+++	++
Oral presentations by students	++		+++	+++
Theories and paradigms		++	+++	
Lectures	++			
Written assignments				
Multiple choice exams				
Teacher as main source of information				

Modes of teaching and learning (ES)



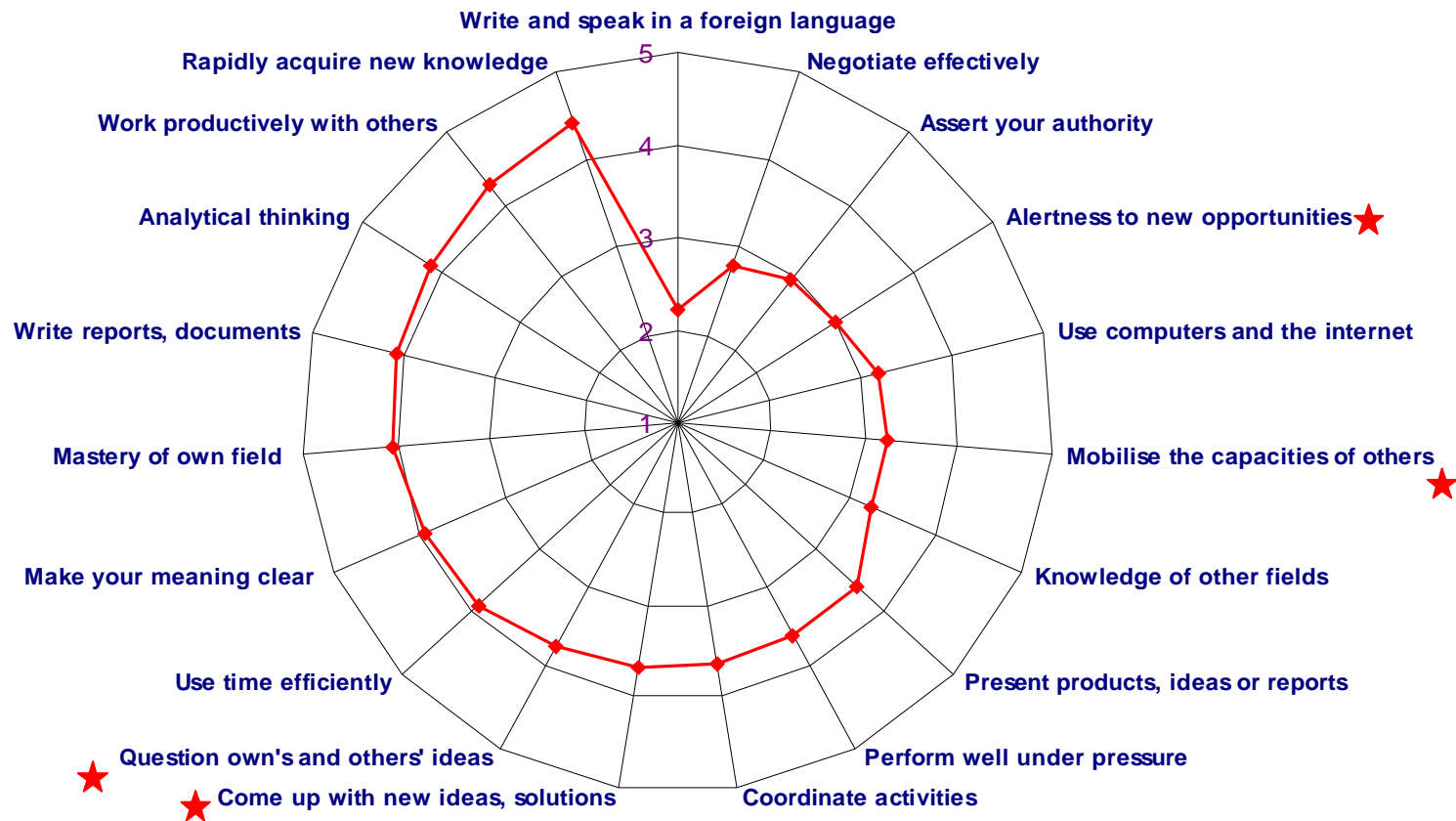
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Contribution of higher education to competences development (ES)



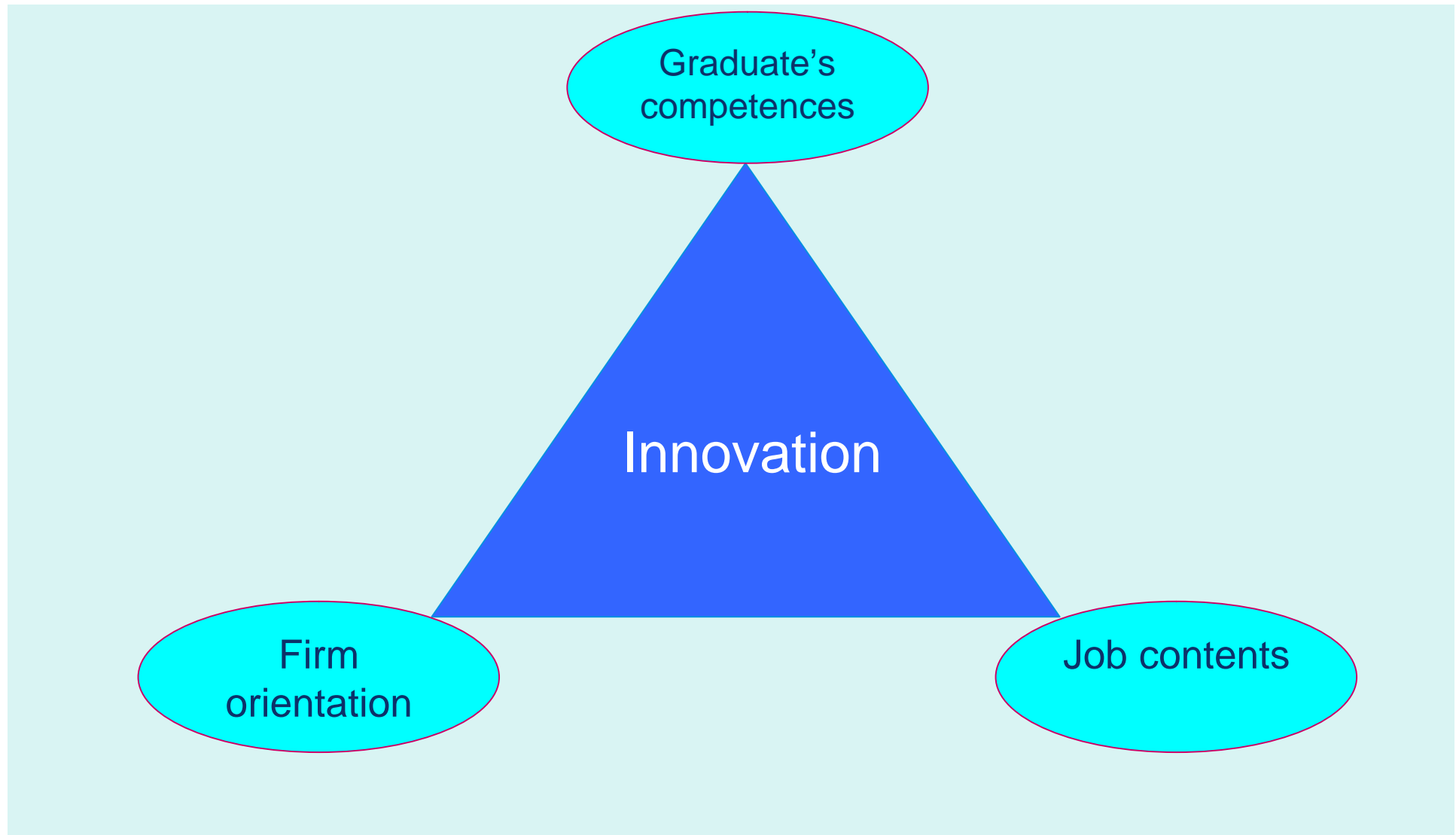
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Determinants of innovative behaviour



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What define an innovator?



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- **Y_1 (graduate involved in innovation) as a function of**
 - Graduate's **own level** of competences (**all of them**)
 - Firm orientation regarding innovation
 - Job contents & responsibilities
 - Controlled by personal characteristics
- **Y_2 (graduate involved in product innovation)**
- **Y_3 (graduate involved in knowledge innovation)**
- **Y_4 (graduate involved in technological innovation)**

Characteristics of innovators



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	INN	PROD-INN	KNOW-INN	TECH-INN
Job in a highly innovative organization	(+)	(+)	(+)	(+)
Position at HE graduate level	(+)	(+)	(+)	(+)
Mobilize the capacities of others	(+)		(+)	(+)
Come up with new ideas and solutions	(+)		(+)	(+)
Present products, ideas or reports		(+)		
Use computers and the internet				(+)
Mastery of your own field				
Analytical thinking				
Negotiate effectively	(-)		(-)	(-)
Use time efficiently	(-)			
Work productively with others	(-)			(-)

Conclusions



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- **Acquisition of competences for innovation depends on the prevalence of some pro-active teaching and learning modes:**
 - § Project and/or problem-based learning
 - § Group assignments
 - § Participation in research projects
 - § Internships, work placement
 - § Facts and practical knowledge
 - § Oral presentations by students
- **Most prevalent modes in teaching and learning contribute little, if any, to develop competences for innovation**
- **Innovators work in innovative firms in a position matching their educational level and they have two specific competences:**
 - § Ability to mobilize the capacities of others
 - § Ability to come up with new ideas and solutions



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Thanks for your attention

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