

# Job tasks of higher education graduates – A new instrument for measuring job requirements

Presentation at the 1st Forum “Higher Education and the Labour  
Market” (HELM)

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# Background

- increasing demand of highly qualified labour force
- changing structure and content of highly qualified work
- consequences for education and labour market stratification
- descriptive and explanatory power

# Why don't we use existing instruments?

- existing instruments
  - measure too many detailed tasks (lack of focus on highly qualified work)
  - don't differentiate enough among higher education graduates (lack of variance)

# What do we assume?

- Job Requirements Approach
  - What employees do (job tasks), reflect the job requirements.
  - To measure job tasks, it's best to ask employees themselves.
  - It's better to ask what and how often people do something, than to ask about their competences.

# What do we want to measure?

- following Hermann(2004) and Hube (2005)
  - complexity
  - innovation (novelty)
- following Kelter, Rief, Bauer and Haner (2009)
  - autonomy

# What do we not want to measure?

- literacy
- numeracy
- manual tasks
- etc.

# What exactly do we want to measure?

- complexity (Wood et al. 1986)
  - variety (component c.)
  - dependency (coordinative c.)
  - dynamic (dynamic c.)
- innovation
  - generation of new ideas

# What exactly do we want to measure?

- autonomy (Breugh 1985, Stegmann et al. 2010)
  - method
  - schedule
  - criteria
  - (decision making)



# How did we develop the instrument?

- comparison & integration (~180 items) & reduction of existing instruments
- 14 cognitive interviews (44 items) & adaptation & reduction
- online pretest survey (n=452, 39 items; EFA / CFA / SEM (FIML estimation))

# What did we ask? (example)

- complexity: dynamic

*...muss ich auf unvorhergesehene Situationen reagieren*  
[The job requires me to respond to unforeseen situations.]

*... muss ich spontan auf neue Informationen reagieren.*  
[The job requires me to react spontaneously to new information.]

*...muss ich Probleme lösen, für die es keine eindeutige Lösung gibt.*  
[The job involves me solving problems that have no obvious correct answer.]

# What did we ask? (example)

- innovation

*...bin ich innovativ.*

[The job requires me to be innovative.]

*...sind ungewöhnliche Ideen oder Problemlösungen erforderlich.*

[In my job, unusual ideas and solutions are necessary.]

*Ich finde neue Arbeitsmethoden, Vorgehensweisen oder Arbeitsmittel heraus.*

[I find out new working methods, procedures or instruments.]

# What did we ask? (example)

- autonomy: methods

*Ich habe viele Freiheiten in der Art und Weise, wie ich meine Arbeit verrichte.* [The job gives me considerable opportunity for independence and freedom in how I do the work.]

*Bei meiner Arbeit kann ich oft zwischen verschiedenen Herangehensweisen wählen.* [The job allows me to decide on my own how to go about doing my work.]

*Ich kann selbst entscheiden, mit welchen Mitteln ich zum Ziel komme.* [The job allows me to make decisions about what methods I use to complete my work.]

# Does it work? (dimension “complexity”)

- delete subdimension “dependency”

external criteria	SEM			
	dependency	dynamic 1	dynamic 2	variety
adequacy of position (1-5)	-0.021	0.166	0.484	0.380
adequacy of tasks (1-5)	-0.053	0.255	0.569	0.460
adequacy of education(1-5)	-0.049	0.190	0.459	0.349
higher ed. degree necessary (1/0)	-0.067	0.163	0.431	0.367
higher ed. degree common (1/0)	0.073	0.018	0.248	0.237
adequate degree: phd, master (1/0)	-0.013	0.253	0.658	0.532
adequate degree: bachelor (1/0)	0.010	0.290	0.354	0.406
leading position(1/0)	0.077	0.168	0.360	0.279
KldB-level: Expert (1/0)	-0.007	0.149	0.309	0.253

# Does it work? (dimension “complexity”)

- split subdimension “dynamic” (reactive, proactive)

items	complexity	
	dynamic	
The job requires me to respond to unforeseen situations.	0.74	
The job requires me to react spontaneously to new information.	0.75	
The job involves me solving problems that have no obvious correct answer.	0.84	
The Job requires me to recognize potential problems before they occur.		0.76
... to work on new tasks, which I first have to think about and familiarize myself with.		0.64
... to make decisions whose consequences are uncertain		0.67

# Does it work? (full model)

	complexity			autonomy			innovation
items	dynamic1	dynamic2	variety	methods	criteria	schedule	
The job requires me to respond to unforeseen situations.	0,74						
The Job requires me to react spontaneously to new information.	0,75						
The job involves me solving problems that have no obvious correct answer.	0,84						
The Job requires me to recognize potential problems before they occur.		0,76					
... to work on new tasks, which I first have to think about and familiarize myself with.		0,64					
... to make decisions with uncertain consequences.		0,67					
The job requires me to monitor a great deal of information.			0,84				
The job requires me to keep track of more than one thing at a time.			0,72				
The job requires me to analyse a lot of information.			0,81				
The job gives me considerable opportunity for independence and freedom in how I do the work.				0,81			
The job allows me to make decisions about what methods I use to complete my work.				0,73			
The job allows me to decide by my own which means to reach my goal.				0,80			
I can influence my job objectives (what I am supposed to accomplish).					0,70		
I have some control over my workload.					0,62		
The job allows me to set my own priorities.					0,82		
The job allows me to decide on the order in which things are done on the job.						0,79	
The job allows me to make my own decisions about how to schedule my work.						0,81	
The job allows me to plan how I do my work.						0,85	
I search out new solutions to problems.							0,84
The job requires me to be innovative.							0,84
I find unusual ideas and solutions.							0,82
I find out new working methods, procedures or instruments.							0,81
number o. c.	446						
model fit	(RMSEA/CFI/TLI) 0,056 / 0,941 / 0,927						

# Does it work? (full model)

<b>Fallzahl</b>	446
<b>Modellfit (RMSEA/CFI/TLI)</b>	0.056 / 0.941 / 0.927

	<b>dyn.1</b>	<b>Dyn.2</b>	<b>variety</b>	<b>methods</b>	<b>criteria</b>	<b>schedule</b>	<b>inno- vation</b>
<b>dyn.1</b>	1.000						
<b>dyn.2</b>	0.746	1.000					
<b>variety</b>	0.775	0.887	1.000				
<b>methods</b>	0.426	0.687	0.648	1.000			
<b>criteria</b>	0.257	0.568	0.487	0.877	1.000		
<b>schedule</b>	0.140	0.472	0.423	0.816	0.845	1.000	
<b>innovation</b>	0.624	0.706	0.650	0.730	0.648	0.440	1.000



# Conclusion

- we developed an instrument for measuring higher education graduates' job requirements with regard to knowledge work
- 3 dimensions, 7 subdimensions, 22 items
- short instrument
- good discriminant, convergent and criterion validity

Thank you for your attention!

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# Does it work? (autonomy)

- measure with 3 subdimensions...

# Does it work? (autonomy)

Variable	CFA		
	F1	F2	F3
Alpha	0.835	0.749	0.873
aut_m1	0.836		
aut_m2	0.696		
aut_m3	0.849		
aut_c1		0.687	
aut_c2		0.625	
aut_c3		0.827	
aut_s1			0.783
aut_s2			0.821
aut_s3			0.856
RMSEA	0.058		
CFI	0.976		
TLI	0.963		
Faktorkorrelationen	F1-F2: 0,871 F1-F3: 0,818 F2-F3: 0,844		

# Does it work? (autonomy)

- ... or in one general dimension

Variable	CFA
	F1
Alpha	0.904
aut_m1	0.777
aut_m2	0.648
aut_m3	0.791
aut_c1	0.656
aut_c2	0.610
aut_c3	0.783
aut_s1	0.730
aut_s2	0.751
aut_s3	0.818
RMSEA	0.091
CFI	0.933
TLI	0.911

# Does it work? (dimension “complexity”)

- subdimension “variety” works

I have to keep an eye on a lot of different information.	0.84
I have to care about a lot of different things at the same time.	0.72
I include a lot of different informations in my work.	0.81

# Does it work? (innovation)

- measure with 3-4 items

I find new solutions to problems.	0.84
The job requires me to be innovative.	0.84
I find unusual ideas and solutions.	0.82
I find out new working methods, procedures or instruments	0.81

# Does it work? (full model)

complexity			autonomy			innovation
dynamic1	dynamic2	variety	methods	criteria	schedule	
0,74						
0,75						
0,84						
	0,76					
	0,64					
	0,67					
		0,84				
		0,72				
		0,81				
			0,81			
			0,73			
			0,80			
				0,70		
				0,62		
				0,82		
					0,79	
					0,81	
					0,85	
						0,84
						0,84
						0,82
						0,81

number o. c.: 446
modelfit (RMSEA/CFI/TLI) 0,056 / 0,941 / 0,927
BIC 19974,803
AIC 19613,975



# conclusion

- might describe differences in job requirements
- might explain labour market positions, stratification, returns to education
- not measuring acts but overall characteristics
- no direct link to education

# Does it work? (dimension “complexity”)

- delete subdimension “dependency”

External criteria	SEM			
	dependency	dynamic 1	dynamic 2	variety
adequacy of position (1-5)	-0.021	0.166	0.484	0.380
R <sup>2</sup>	0.000	0.027	0.235	0.144
adequacy of tasks (1-5)	-0.053	0.255	0.569	0.460
R <sup>2</sup>	0.003	0.065	0.323	0.212
adequacy of education(1-5)	-0.049	0.190	0.459	0.349
R <sup>2</sup>	0.002	0.036	0.210	0.122
higher education degree necessary (1/0)	-0.067	0.163	0.431	0.367
higher education degree common (1/0)	0.073	0.018	0.248	0.237
R <sup>2</sup>	0.015	0.023	0.129	0.092
adequate degree: phd, master (1/0)	-0.013	0.253	0.658	0.532
adequate degree: bachelor (1/0)	0.010	0.290	0.354	0.406
R <sup>2</sup>	0.000	0.056	0.265	0.176
leading position(1/0)	0.077	0.168	0.360	0.279
R <sup>2</sup>	0.006	0.028	0.130	0.078
KldB-level: Expert (1/0)	-0.007	0.149	0.309	0.253
R <sup>2</sup>	0.000	0.022	0.095	0.064