

Institutional Factors and Teacher Characteristics Affecting Classroom Technology Use

A paper for presentation at the CIES conference
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Innovative use of ICT is still the domain of few teachers

- Premise: practices encouraging independent, collaborative and autonomous learning (Kozma & Anderson 2002) better prepare students for the “knowledge society”
- However, how to foster such learning is still unclear, especially in policy circles.
- Equally unclear is the proper assignment of roles for teacher recruitment and professional development – for instance between the school or the State
 - differing potentials of pre-service versus in-service training & PD
- Should schools (and policy makers and Ed Schools) focus more on supporting the teachers they have or who they recruit and attract to the profession?

The research team responsible for the Spanish data we use provides a typical lament

- “Regardless of the frequency and variety of ICT uses, educational innovation is not the main aim of the implementation of these technologies in schools. Most of the teachers who use ICT in class admit they have implemented it mainly as a support to teaching activities they already carried out (68.3%). A *mere* 17.5% of the teachers claim to have adopted ICT to introduce important changes in the way they teach and they assign tasks to their students.” (Sigalés et al, 2008, emphasis added)
- Our present study is, in part, inspired by the implications of the term “mere 17.5%”
- “Who are these 17.5%, and is that lower than one might expect?”

Spanish ICT Context in 2007-08

- Most schools, internet-connected computers located in classrooms apart from students usual work area.
- Only 13.4% of schools feature a minimum of 10 computers distributed among regular classrooms.
- Fewer than half the teachers have access to an overhead digital projector,
- only 1 out of 3 schools has a Wi-Fi zone granting internet access from the classrooms, and
- only 15.4% of teachers have access to an interactive whiteboard
- results must be taken in the Spanish context, a less-developed ICT sector than most OECD countries.
- There may be implications for the developing world as well.

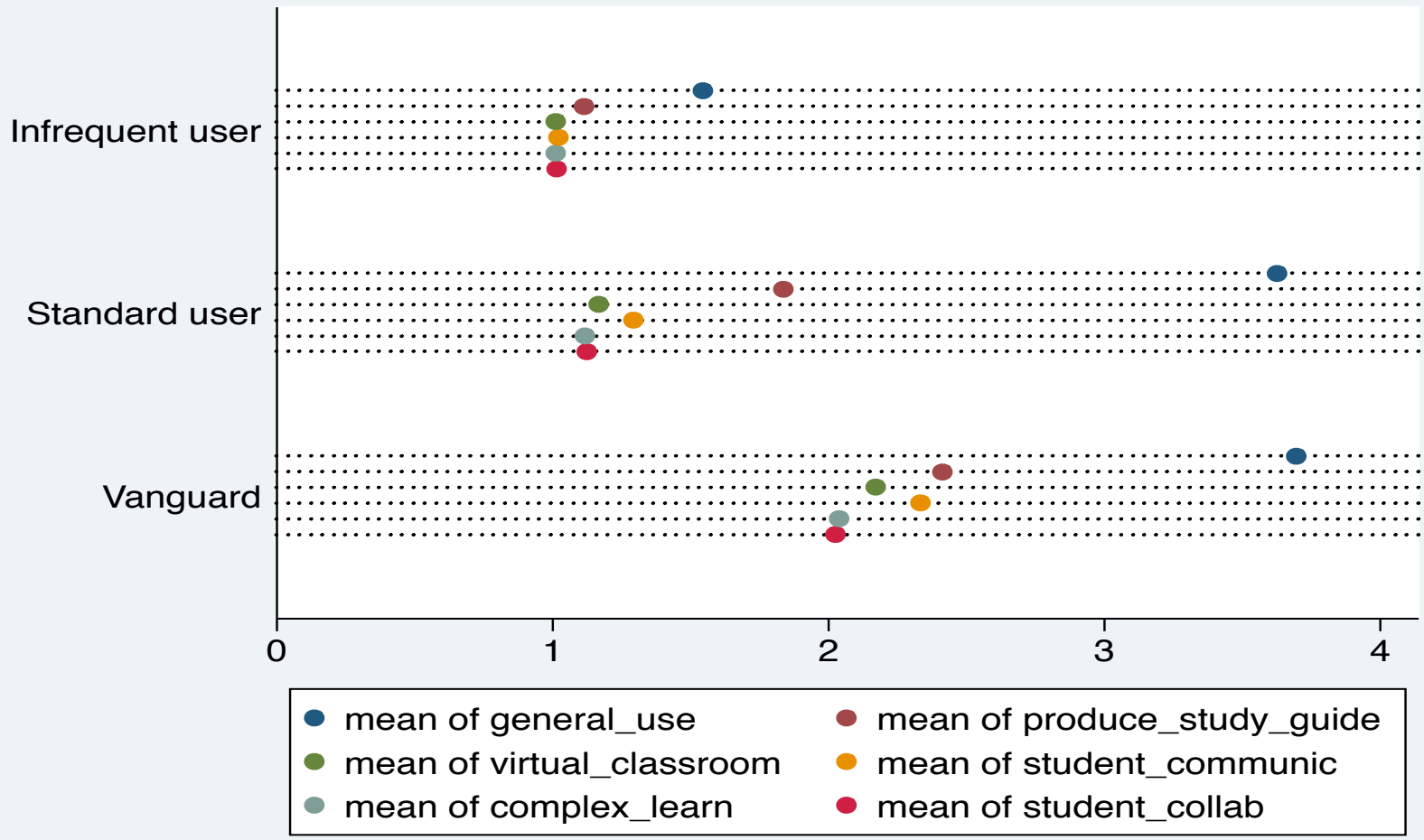
Data: Proyecto Internet España (PIE)

- Survey was funded by The Telefónica Foundation
- nationally representative, stratified sample
- administered to students, teachers and school directors in primary and secondary schools across all autonomous regions of Spain.
- 536 primary 273 secondary schools. 1093 teachers.
- Nationally representative at the teacher-level
- Yield generalizable answers to (perhaps) less interesting questions than typical in the field

Cluster analysis: develop a taxonomy of teacher classroom ICT use

- Variables: frequency of use as a baseline measure. Other five relate to ICT use to foster student-centered pedagogy; “deeper” than simply using equipment for convenience
- Use kmeans cluster technique

	General frequency of ICT use in teaching	Teacher: Produce study guide (teaching aid) with ICT	Teacher: Maintain virtual classroom	Student-to-student communication via ICT	Students learn in complex learning environment	Students collaborate on projects via ICT
Mean	2.56	1.53	1.19	1.27	1.15	1.17
Std. deviation	1.30	0.72	0.52	0.59	0.44	0.47
Range	1 - 4	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3



Infrequent users	581	53.16%
Standard users	393	35.96%
Vanguard	119	10.89%

Determinants of Grouping: Variables

	Exogenous	Endogenous??
Teacher-level	Age (age) Gender (female) Teaching experience (experience) Seniority (seniority) Educational achievement (highereduc) Is technology teacher (tech_teach) Is ICT coordinator (ict_coord) Internet experience (inter_exp) Internet access at home (inter_home)	Positive ICT attitudes (pos_att)? Positive ICT evaluation (pos_impact)? Internet access frequency (access_freq) Advanced Internet literacy (adv_int_lit) Confidence in pedagogical ICT use (eduseconf)? Effectiveness of ICT training in past 3 years (training) Time availability (time_avail)
	Contextual	Cultural
School-level	ICT infrastructure availability (pcs_at_school) ICT infrastructure adequacy (ict_adquacy) Student ICT access outside of classroom (stud_out_ict)	Technical and pedagogical support (support) Organizational development (orgdev)

Determinants of Grouping: *Ordered Logit estimation*

Ordered Logit Regression Analysis of 1093 Teachers' ICT user type								
	<i>(I)</i>		<i>(II)</i>		<i>(III)</i>		<i>(IV)</i>	
Predictor	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
private	-0.113	-0.146	-0.043	-0.154	-0.065	-0.159	-0.133	-0.164
secondary	-0.311*	-0.149	-0.351*	-0.155	-0.359*	-0.162	-0.364*	-0.167
urban	0.062	-0.147	0.206	-0.154	0.102	-0.16	0.139	-0.163
age	0.004	-0.006	0.019**	-0.007	0.021**	-0.008	0.020**	-0.008
female	-0.247*	-0.123	0.017	-0.133	0.075	-0.138	0.022	-0.141
highereduc	-0.037	-0.146	-0.041	-0.153	-0.038	-0.158	0.018	-0.162
tech_teach	1.386***	-0.22	1.095***	-0.229	0.897***	-0.236	0.804***	-0.244
ict_coord	0.669**	-0.232	0.005	-0.244	-0.122	-0.254	-0.289	-0.261
inter_exp			0.174	-0.111	0.078	-0.116	0.1	-0.12
training			0.229***	-0.043	0.143**	-0.045	0.104*	-0.047
adv_int_lit			0.591***	-0.11	0.234	-0.127	0.296*	-0.13
inter_home			-0.202	-0.238	0.022	-0.247	0.089	-0.251
access_freq			0.330***	-0.095	0.142	-0.101	0.084	-0.103
eduseconf					0.461***	-0.136	0.412**	-0.14
time_avail					0.287***	-0.081	0.144	-0.088
pos_att					-0.005	-0.154	0.022	-0.157
pos_impact					0.884***	-0.151	0.828***	-0.154
pcs_at_school							0.496*	-0.198
ict_adequacy							0.467***	-0.088
stud_out_ict							0.124*	-0.057
support							-0.079	-0.082
orgdev							0.139	-0.11
<i>Summary Statistics</i>								
Pseudo R-squared	0.036***		0.108***		0.167***		0.196***	
BIC	2061.17		1948.58		1853.979		1828.062	
Log likelihood	-995.602		-921.815		-860.521		-830.071	

*, **, ***: significant at the 10%, 5% and 1% levels of significance. BIC: Bayesian Information Criterion. Source: Calculation by the authors using STATA's OLOGIT routine.

Determinants of Grouping: *Change effects*

Odds ratios and discrete probability effects for Ordered Logit Model IV							
		Min -> Max			± 0.5 std. deviation around mean		
Predictors	Odds ratio	Infrequent user	Standard user	Vanguard	Infrequent user	Standard user	Vanguard
Private	-12.4						
Secondary	-30.5	0.090	-0.070	-0.019	NA		
Urban	14.9						
Age	2	-0.215	0.164	0.050	-0.046	0.036	0.010
Female	2.2						
Highereduc	1.8						
tech_teach	123.4	-0.197	0.138	0.059	NA		
ict_coord	-25.1						
inter_exp	10.5						
Training	11	-0.103	0.080	0.023	-0.040	0.031	0.009
adv_int_lit	34.4	-0.073	0.057	0.016	-0.055	0.043	0.012
inter_home	9.3						
access_freq	8.7						
Eduseconf	51	-0.102	0.079	0.022	-0.079	0.062	0.017
time_avail	15.5						
pos_att	2.2						
pos_impact	128.9	-0.202	0.157	0.045	-0.133	0.104	0.029
pcs_at_school	64.2	-0.120	0.096	0.023	NA		
ict_adequacy	59.5	-0.429	0.327	0.103	-0.112	0.087	0.024
stud_out_ict	13.2	-0.123	0.095	0.028	-0.039	0.030	0.008
Support	-7.6						
Orgdev	14.9						

Conclusions: training may matter

- support both for the need to attract teachers likely to become Vanguard users to the profession and for the possibility of training teachers into the Vanguard;
- perhaps surprising level of support for the ability of school and other government-level policies to effect increases in the Vanguard among current teachers.
- increases likely small compared to those focused on initial recruitment and training, but they are not insignificant.
- In particular, good in-service training does appear to have a positive impact.

Access is still an issue in Spain

- Results do support *access to internet and ICT resources at school* as important predictor for innovative use of ICT.
- Addressing infrastructure bottlenecks might still be an appropriate intervention for schools encouraging innovative ICT use

More advanced skills potentially impactful

- *digital literacy for advanced internet use* important predictor for innovative use of ICT
- refocusing some of the efforts in ICT education for teachers beyond basic computer skills on more intermediate internet and Web 2.0 competences might hold payoffs.

Holding positive view of effects of ICT on learning & adaptability of ICT to teaching has large impact

- Suggests the importance of highlighting successes to improve the overall views teachers have of the potential positive impact of ICT on learning and innovation.
- Still, the nature and characteristics of teachers recruited to the profession is key, especially since it's particularly difficult to impact attitudes through policy or even training and professional development.
- And while somewhat manipulable, teacher's who hold positive views of the effects of ICT on learning are likely as not to hold those views at the time they are recruited to the profession.

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