

Strategies for Training Teachers for Integrating Technology: A preliminary mapping exercise

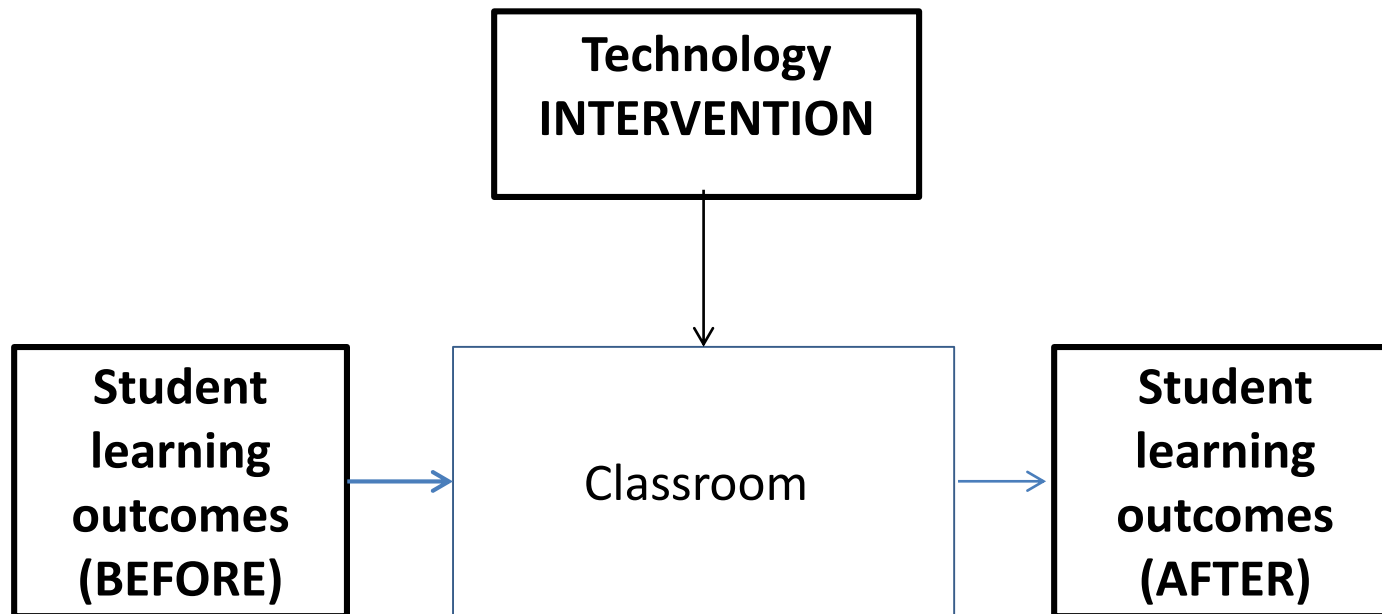
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Integration of technology (ICT) in education promised higher learning outcomes



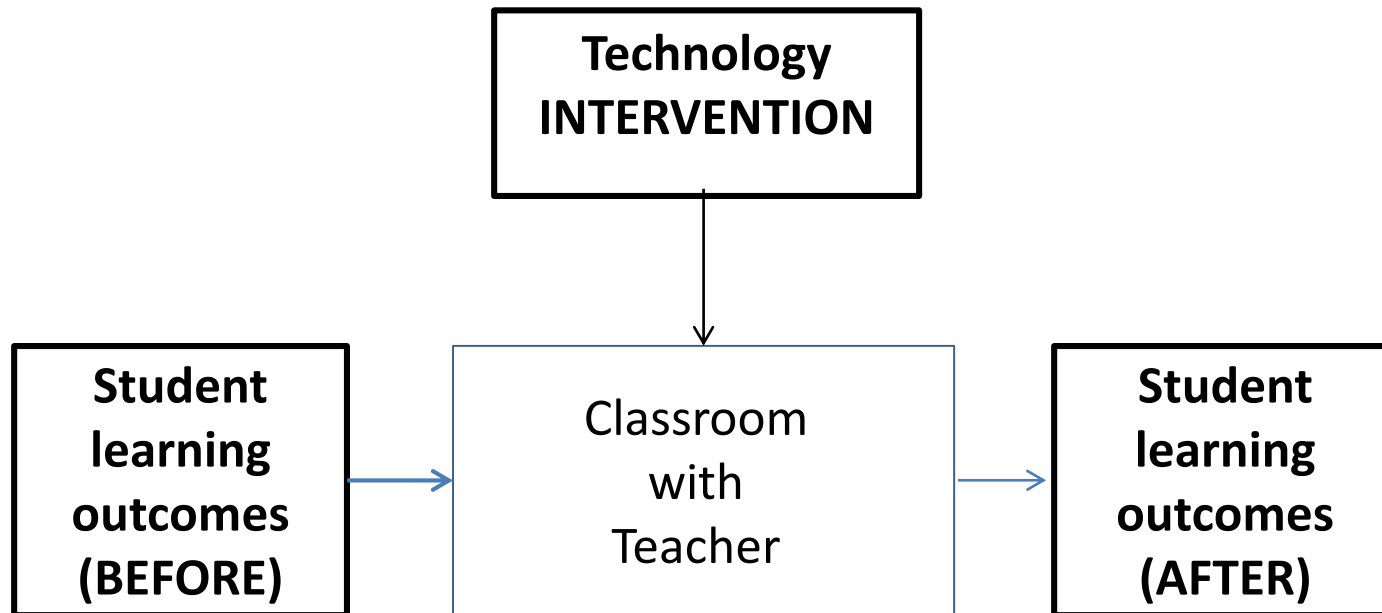
Reality is disappointing but expectations remain high

- RCT- Costa Rica
- SR – Cheung & Slavin, 2013*

*“Educational technology is making a modest difference in learning of mathematics. It is a help, but not a breakthrough. However, the evidence to date does not support complacency. New and better tools are needed to harness the power of technology to enhance mathematics achievement for all children.”

(Cheung, Alan C.K. and Slavin, Robert E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review* 9 (2013) 88–113.)

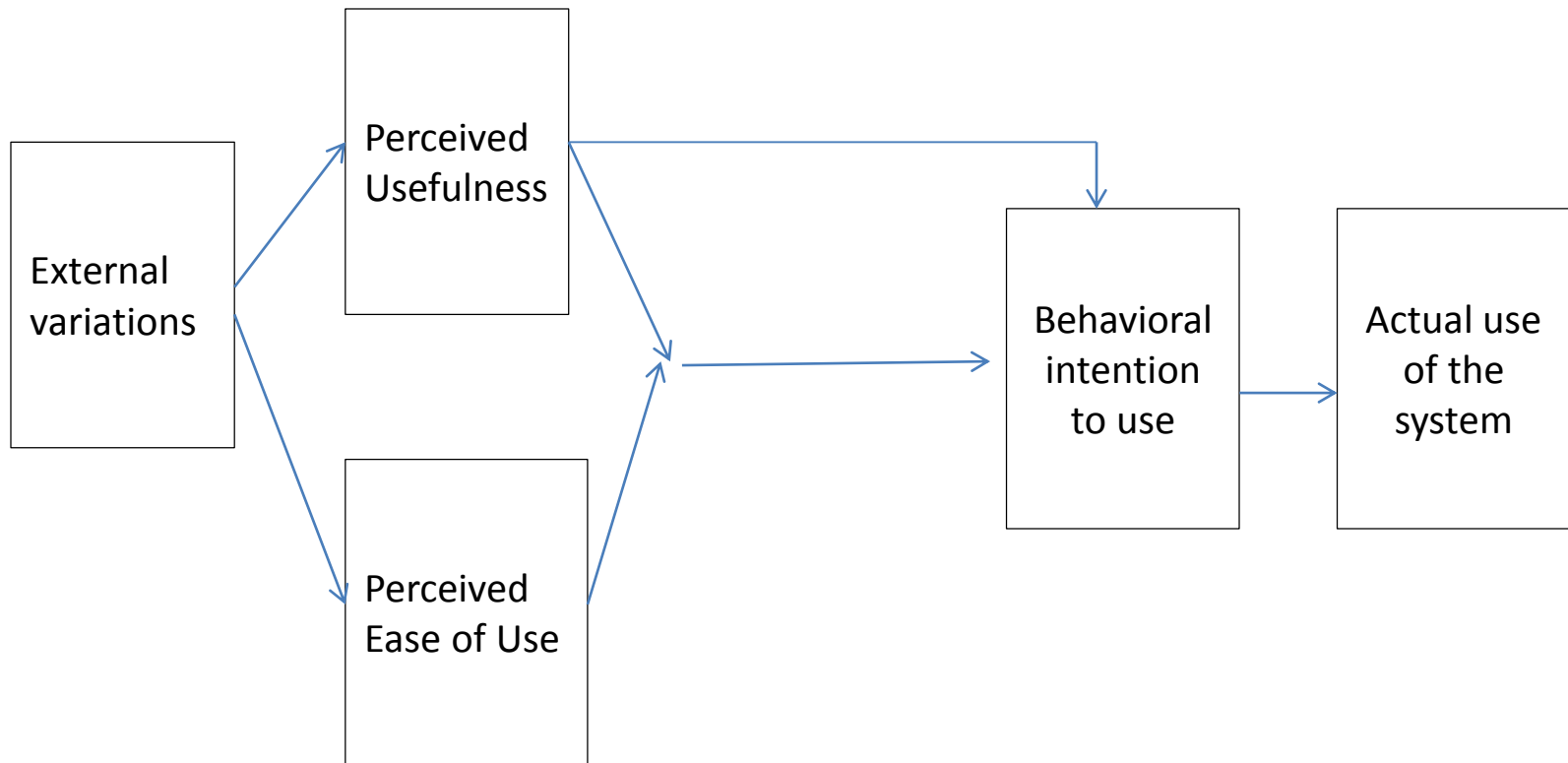
For real success we need to heed teacher factors



What makes teacher accept and integrate technology?

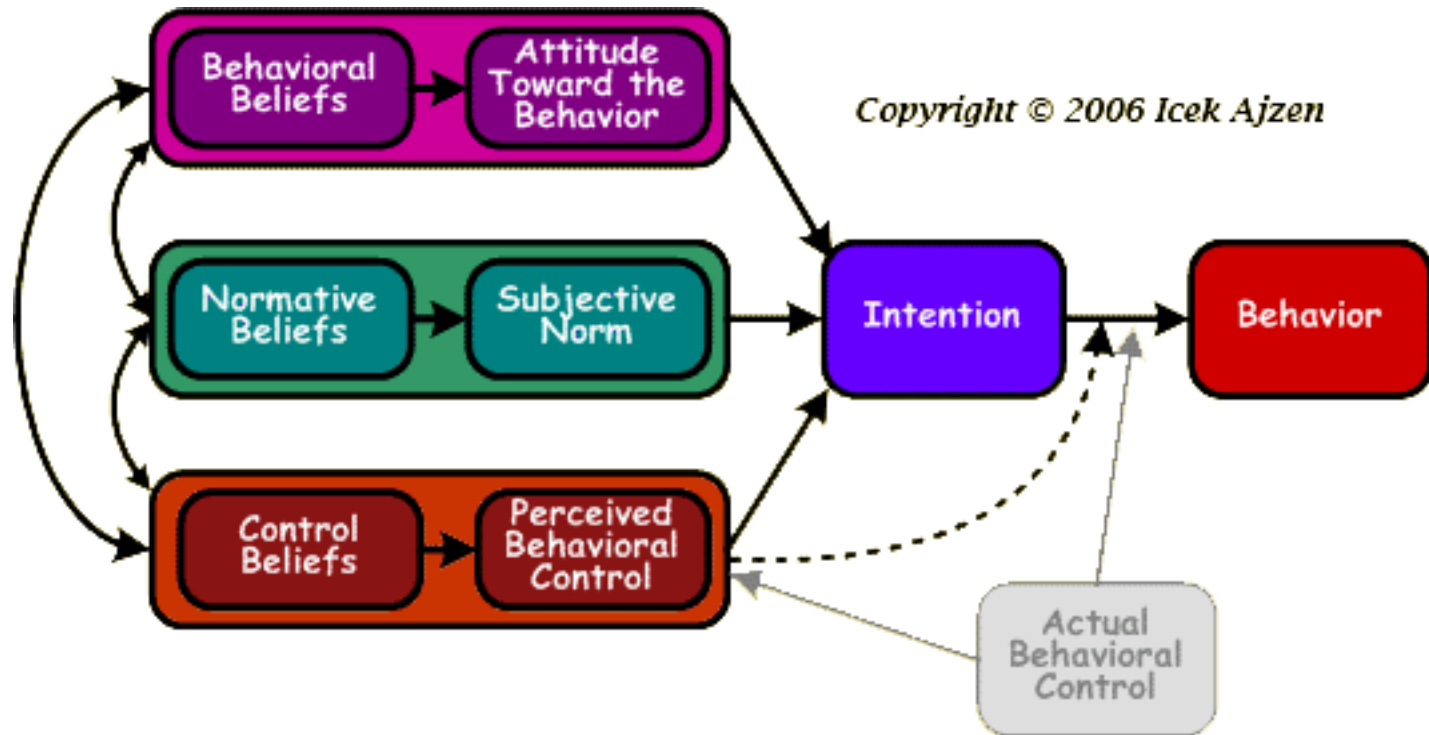
Acceptance of technology
is well theorized and
empirically grounded in
behavioral psychology

Technology Acceptance Models (Davis, 1983)



Theory of Planned behavior

Icek Ajzen (1989, 2006)



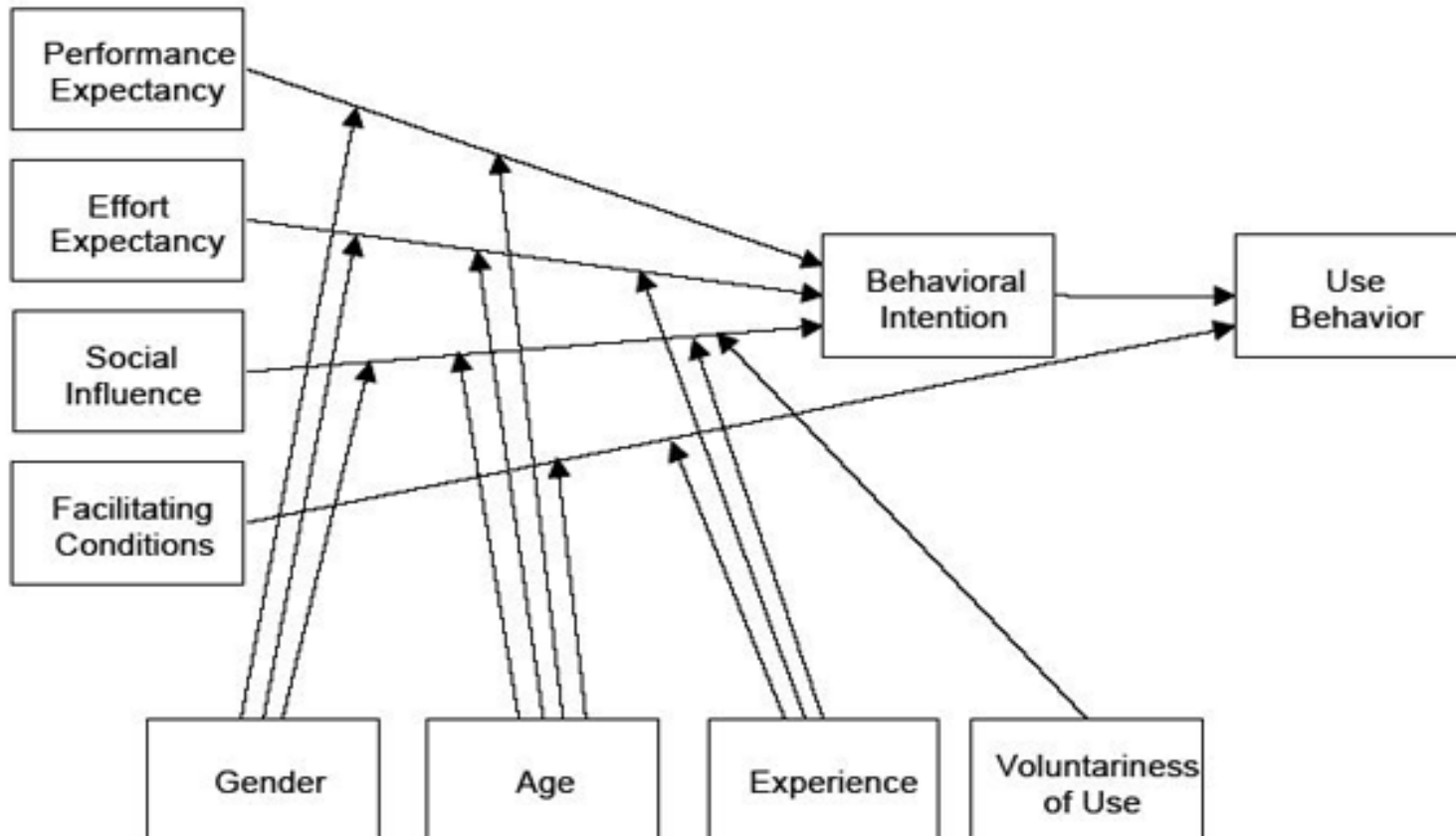
Theory of planned behavior

types of variables

- Behavioral Perceived usefulness and ease of use
- Normative Perceptions of those important to you
- Functional Training, Support, infrastructure & other

Unified theory on technology acceptance and use

Venkatesh , 2003

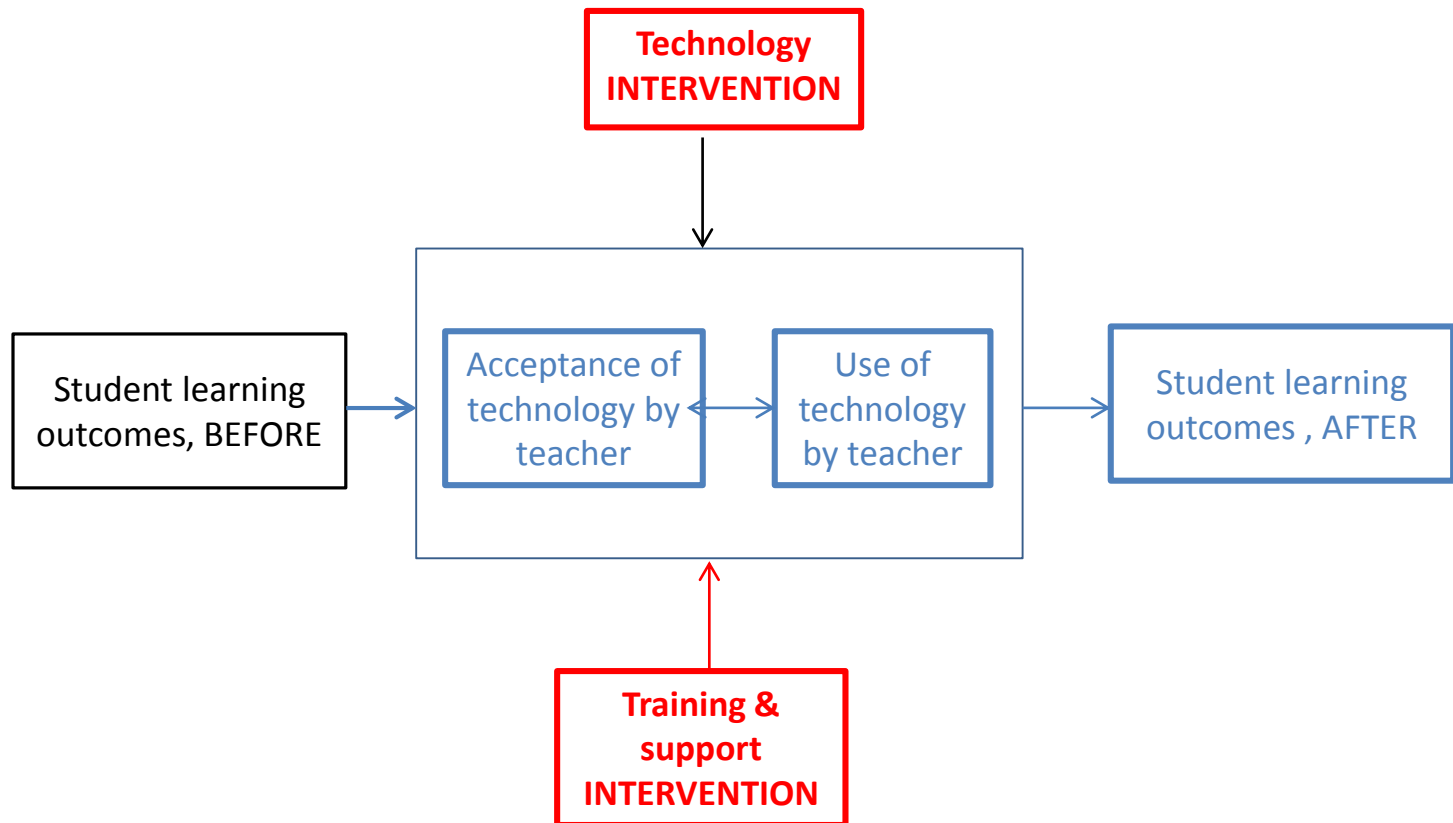


A framework for mapping

Full picture of ICT in Education

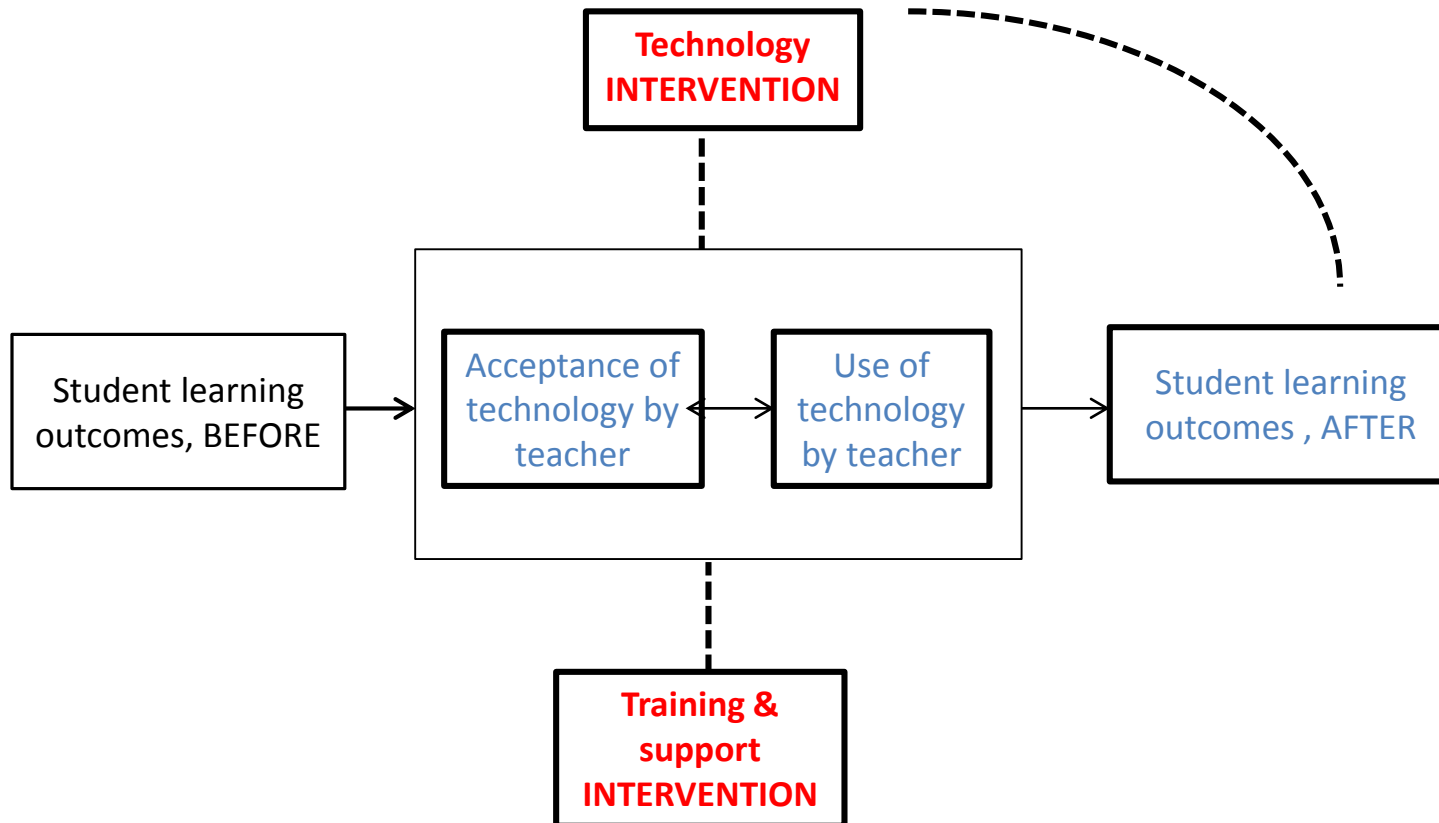
INTERVENTIONS: (1) Technology
(2) Teacher training & support/Other

OUTCOMES:- (1) Acceptance and/or integration of technology by teachers
(2) Learning outcomes



Mapping the literature on ICT interventions in Education

Three types of literature



Next, more detailed mapping in:

- Types of interventions
- Measures of acceptance
- Measures of Use

In the 'technology acceptance-integration'
literature

Method

systemic review method (*lite*)

- SEARCH scholar.google.com search for technology integration*
- SCREEN for empirical studies concerning technology use**
- APPRAISE for quality in terms sampling and explanatory power
- MAP the studies in terms of the mapping questions

*Search terms: (ICT OR technology) AND (integration OR use) in the title for studies published between 1990-2014;

**Exclusion criteria:

- concerns ICT/Technology use/integration in the classroom
- concerns primary or secondary education
- Is an empirical study

Result

- 950+ hits
- 400+ empirical studies
- 11 observational studies* of 'quality'**

Studies included in SRs

- Exptl. design (RCTs)
- Quasi-experimental (with comparison group)
- Natural experiments (treatment is exogenous)
- Observational studies*

Screening criteria for quality (or RoB)

- Selection bias**
- Confounding variables bias
- Motivation bias
- Performance bias
- Reporting bias
- Type 1/Type II errors
- Other biases

Measures of technology use

	Frequency	Level of use
Baek_2006		
Fordham_2004		
Hastings_2009		
Hong_2009		
Johnson_2006		
Pynoo_2011		
Rickman_2009		

Measures of technology use

	Frequency	Type/Level of use
Baek_2006	(1) none, (2) rarely, (3) Moderate (4) high—almost weekly per semester	Teacher use/student use
Fordham_2004	-1 to 5, with participants' survey responses according to a five-point scale, ranging from "never" to "several times a week."	LOW: Focuses on the teacher using technology to get their job done. MODERATE: Involves teacher facilitation of large group learning activities and student HIGH: productivity use of technology.Promotes students to be actively engaged in using tech. in individual and collaborative learning activities
Hastings_2009	never, less than once per week, once per week, 3 times a week, and daily	(1) Teacher-Use of Technology for Delivering Instruction (TUTDI);(2) Teacher-Use of Technology for Class Preparation (T-UTCP) (3) Teacher-Directed Student Use of Technology to Create Products (T-DSUTCP); (4) Teacher-Directed Student Use of Technology during Class Time (T-DSUTCT).
Hong_2009	5-point Likert scale ranging from never to daily use	utilization, integration, reorientation, and evolution (Welliver, 1989)
Johnson_2006	"never (1)" to "daily (7)".	DLE, Communication, Administration, all together (smartschools.be)
Pynoo_2011	0-3 (i.e., never, monthly, weekly, daily).	Drill & Practice, Tutorial, Simulation, Instructional Games, Problems Solving, Productivity Entry, adoption, adaptation, appropriation, and invention Sandholtz (1997)
Rickman_2009	developed by van Braak et al. (2004). It consists of six 5-point Likert items (never, every term, monthly, weekly, daily)	Supportive use/classroom use

Measures of technology acceptance

	Theory	Acceptance related variables
Baek_2006	[UTAUT]	<p>Possible to synthesize under the</p> <ul style="list-style-type: none"> • behavioral • normative and • functional <p>Categories</p>
Fordham_2004	TPCK	
Hastings_2009	TPCK	
Hong_2009	TPCK	
Johnson_2006	TPCK	
Pynoo_2011	UTAUT	
Rickman_2009	TPCK	
Sang_2010	[TPCK]	

Measures of technology acceptance

	Theory	Acceptance related variables
Baek_2006	Extractors the factors underlying the lay person implicit ideas or beliefs by surveying the users would provide a more authentic and ecologically valid prospect.	<ul style="list-style-type: none"> • using the basic functions of technology, • using the enhanced functions of technology • deriving attention • adapting to external requests and others' expectations • class preparation and management • relieving physical fatigue • (TEACHER DERIVED)
Fordham_2004	TPCK (Technology factors/Teacher factors); Technology factors (Marcinkiewicz, 1994; Vannatta & O'Bannon, 2002),	<ul style="list-style-type: none"> • openness to change • no. of hours of technology training • no. of hours worked beyond contractual work week
Hastings_2009	TPCK/Tiers of Technology by Washington State Technology Integration into the Curriculum Working Group (2005).	<ul style="list-style-type: none"> • Teacher Proficiency: Productivity Software • Beliefs and Behaviors about classroom technology use • Perceived Benefits of using technology
Hong_2009	TPCK (Teacher/Environment)	<ul style="list-style-type: none"> • Attitude toward computer technology • Attitude toward computer technology • Computer literacy skills • Hours of teachers' technology education (10 hours) • Number of computers in the classroom • Age
Johnson_2006	TPCK & Welliver's (1989) Instructional Transformation Model (utilization, integration, reorientation, and evolution).	<ul style="list-style-type: none"> • Years of teaching experience (total model score) • Hours of professional development (familiarization) • Level of education completed by teachers (reorientation) • Teachers' perception of principals' knowledge of technology (utilization)
Pynoo_2011	UTAUT	<ul style="list-style-type: none"> • Performance expectancy • Effort expectancy • Social influence • Facilitating conditions • Acceptance (Attitude, behavioural intention, s-r use)
Rickman_2009	'Teacher+Env ('Teacher Personal Attribute + Environmental Variables= Variation in a Teacher's use	<ul style="list-style-type: none"> • Teacher variables • teaching philosophy • software proficiency

Findings

- Technology use
Can be generalized as “Frequency X Stage of use” measure.
- Acceptance
Possible to re-categorize as behavioral, normative and functional
- Interventions too can be categorized
Work in progress

Implications for Future use of *SR-lite* in

- 1) Literature reviews ?
- 2) Expanding qualitative research in social sciences to quantitative research?