

THE HONG KONG POLYTECHNIC UNIVERSITY
DEPARTMENT OF MANAGEMENT AND MARKETING

DEPARTMENTAL RESEARCH SEMINAR

Comparing E-learning Tool Success:
The Case of Instructor-Student Interactive
vs. Self-paced Tools

by

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Date : 26th Feb 2007 (Mon)

Time : 3:30 pm - 4:30 pm

Venue: M802

Abstract:

The wide acceptance and application of e-learning tools have profoundly transformed modern pedagogical approaches. Vendors are providing different types of systems, such as self-paced (SP) and instructor-student interactive (ISI) e-learning tools. The global market of e-learning tools was expected to reach US\$ 23.7 billion by 2006. Given such a large investment and the associated impact it must have had on students' learning outcomes, it is critical to evaluate the effectiveness of these e-learning tools.

In this paper, we first develop a model to evaluate e-learning tools' success by extending and contextualizing Seddon's IS success model for the e-learning environment. Furthermore, drawing on communication and education theories, we deduce four hypotheses to predict the differences in the key success factors between SP and ISI e-learning tools. The model and hypotheses are tested using survey data from 783 students of seven higher education institutes in Hong Kong. The results support the extended Seddon's model and the four hypotheses. Specifically, ISI e-learning tools outperform SP tools in terms of system quality, information quality, perceived usefulness, satisfaction, and learning outcomes. The students also have higher intention to use ISI than SP tools in the future. Discussions on the theoretical insights and practical implications are further elaborated.

All interested are welcome.

Comparing E-learning Tool Success: Instructor-Student Interactive (ISI) vs. Self-paced (SP) Tools



JJ Hsieh and Vincent Cho



Motivation

- E-learning is a promising trend in the future
 - E-learning market: US\$6.6 billion in 2002
 - Grow at 140% annually (IDC 2005)
 - Instructor – Student Interactive VS. Self-Paced Tools
- Affect student learning experiences
- Implementation of e-learning tools requires substantial resources.
- How do we evaluate the success of e-learning tools?
- Which tool is more successful?



Research Questions

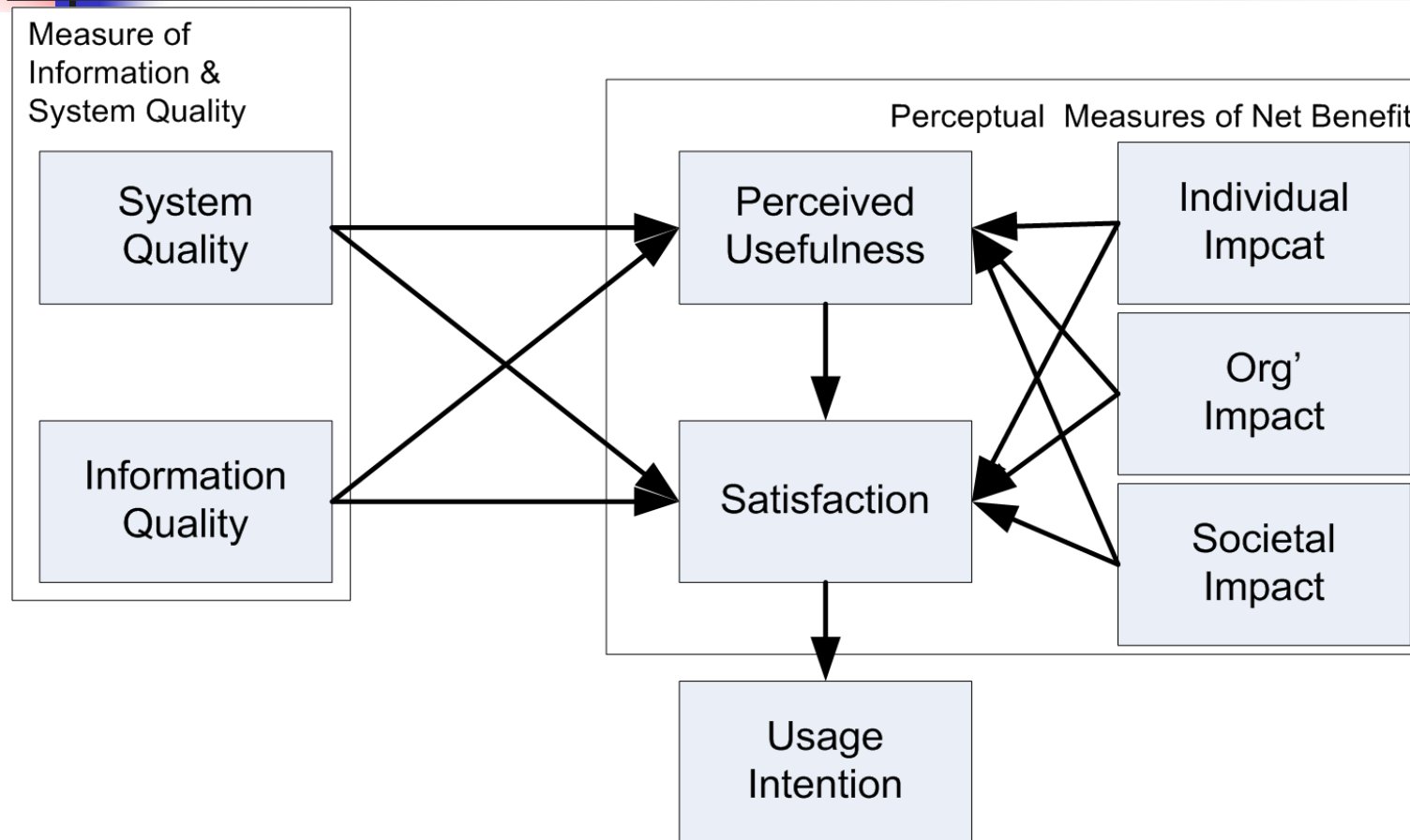
- *RQ1: What is the model for E-Learning tool success?*
- *RQ2: Between self-paced and instructor-student interactive e-learning tools, which is more effective for students' learning?*



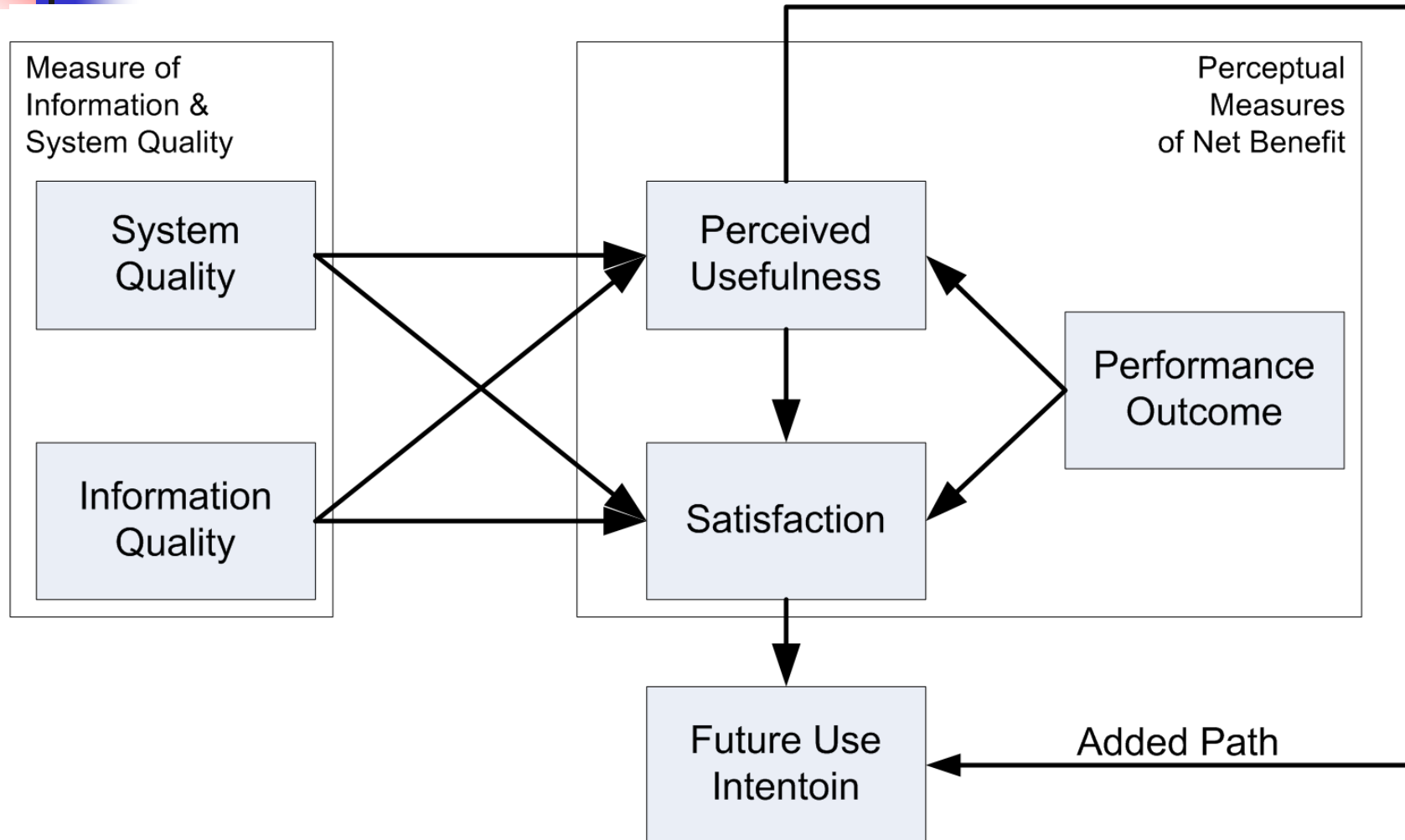
E-learning Tools

- Instructor-Student Interactive (ISI)
 - digital technologies that facilitate distribution and exchange of information between instructors and students, in addition to their classroom interaction
- Self-paced (SP)
 - computer or online learning programs that include informational resources of a course topic and assessment mechanisms for self-evaluation

Seddon's IS Success Model



Proposed E-Learning Tool Success Model





Theories

- Learning:
 - Feedback
 - Individualization

- Communication:
 - Medium Richness Theory
 - Social Presence Theory



Feedback

- Continuous loop
 - Experiencing
 - Acting
 - Reflecting
 - Evaluating
- Evaluation of the outcomes of these actions
- Continuous process of goal-directed action
- Both SP and ISI e-learning tools can help students to obtain feedback



Individualization

- Individual learners differ in their
 - Backgrounds
 - Learning styles
 - Pace of learning
 - Traits
 - Needs
- Learning activities such as experiencing and reflecting → individualized phenomenon
- Enhance learning efficiency & effectiveness



Medium Richness Theory (MRT)

- The ability of the media to “overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner”
- The richer a media, the more it has
 - immediate feedback
 - the number of cues involved
 - message personalization
 - natural languages
- Reduce Equivocality



Social Presence Theory (SPT)

- The degree to which a medium permits users to experience others as being psychologically present
- Transfer information that is beyond pure text-based messages
 - Facial expression
 - Direction of looking
 - Posture
 - Dress
 - Nonverbal cues
- High socially-present: video or voice conferencing
- Low socially-present: interaction with software packages



Hypothesis 1: Info Quality

- ISI and SP tools
 - ISI higher media richness (i.e., natural language)
 - ISI higher social-presence (i.e., more human cue)
 - ISI higher individualization (i.e., more personalized message)
- **H1:**
Information Quality of the instructor-student interactive e-learning tools will be higher than information quality of the self-paced e-learning tools



Hypothesis 2: Perceived Usefulness

- SP Tools: computer-generated feedback
(more mechanical & generic)
- ISI tools:
 - Supplement traditional classroom learning → more flexible interaction between instructor and student
 - More specific and individualized feedback
- **H2: Perceived Usefulness of the instructor-student interactive e-learning tools will be higher than perceived usefulness of the self-paced e-learning tools.**



Hypothesis 3: Learning Outcomes

- ISI tools:
 - better understanding about individual students' need
 - continuously refined feedback based on individual needs
 - more elaborated discussions
 - more in-depth understanding of subjects

- better adjustment and regulation towards learning objectives
- Higher motivation towards learning

H3: Learning Outcomes of the instructor-student interactive e-learning tools will be higher than learning outcomes of the self-paced e-learning tools.



Hypothesis 4: Satisfaction

- Satisfaction:
 - Reflects individuals' overall feeling after interacting with the technology
 - Captures such perceptions as Information Quality, Perceived Usefulness, and Performance Outcomes
- ISI tools:
 - Social presence of instructor → represents authority of the course knowledge → more reliable and trust-worthy learning means
- **H4: Satisfaction with instructor-student interactive e-learning tools will be higher than satisfaction with self-paced e-learning tools.**



Method: Survey

- Convenient random sampling
- Students of seven higher education institutions in HK
- 738 effective respondents (445 on SP tools and 293 on ISI tools)
- 70% response rate



Profile of Survey Respondents

Types Demographics	Tool	Self-Paced Mode	Instructor-Student Interactive Model
Education Level			
Under-graduate		151	97
Post Graduate		294	191
Age			
18-25		291	183
26-30		61	50
31-36		44	37
37-40		18	16
>41		31	6
Gender			
Male		232	178
Female		213	113



Measurement Model Fit

Fit Indices	Self-Paced Mode	Instructor-Student Interactive Mode	Desired Levels
χ^2/df	1.891	1.675	< 3.0
CFI	0.967	0.965	> 0.95
TLI	0.960	0.958	> 0.90
RMSEA	0.045	0.048	< 0.06
Standardized RMR	0.0305	0.0432	< 0.08
GFI	0.932	0.912	> 0.90
AGFI	0.912	0.885	> 0.80
Number of Latent Variables	6	6	
Total Number of Items	22	22	

Descriptive Statistics and Reliability of Constructs

Construct (a)	Self-Paced E-Learning Mode	Instructor-student Interactive Mode
	Mean (S.D.)	Mean (S.D.)
Information Quality (5)	3.46(0.56)	3.55(0.59)
PEOU (3)	3.46(0.63)	3.61(0.62)
Perceived Usefulness (4)	3.39(0.65)	3.53(0.66)
Satisfaction (3)	3.23(0.66)	3.48(0.76)
Learning Performance (3)	3.28(0.67)	3.50(0.71)
Behavioral Intention (4)	3.40(0.68)	3.53(0.69)

- a. The number in parentheses indicates the resulting number of items in the scale.
- b. Average Extracted Variance

Squared Correlations, Reliability, and Average Variance Extracted

	Self-Paced E-Learning Mode						Instructor-Student Interactive Mode					
	IQ	SQ	PU	SAT	LO	BI	IQ	SQ	PU	SAT	LO	BI
IQ	0.51						0.51					
SQ (PEOU)	0.36	0.60					0.21	0.62				
PU	0.22	0.21	0.64				0.40	0.20	0.66			
SAT	0.19	0.16	0.20	0.56			0.32	0.20	0.33	0.62		
LO	0.26	0.21	0.33	0.39	0.65		0.32	0.20	0.31	0.39	0.64	
BI	0.26	0.23	0.36	0.28	0.35	0.63	0.33	0.25	0.30	0.40	0.35	0.64
Reliability	0.82	0.82	0.88	0.78	0.85	0.87	0.82	0.82	0.88	0.83	0.84	0.87
C.R.	0.82	0.82	0.88	0.79	0.85	0.87	0.82	0.83	0.88	0.83	0.84	0.87

- Diagonal Elements: AVE of each construct



Structural Model Fit

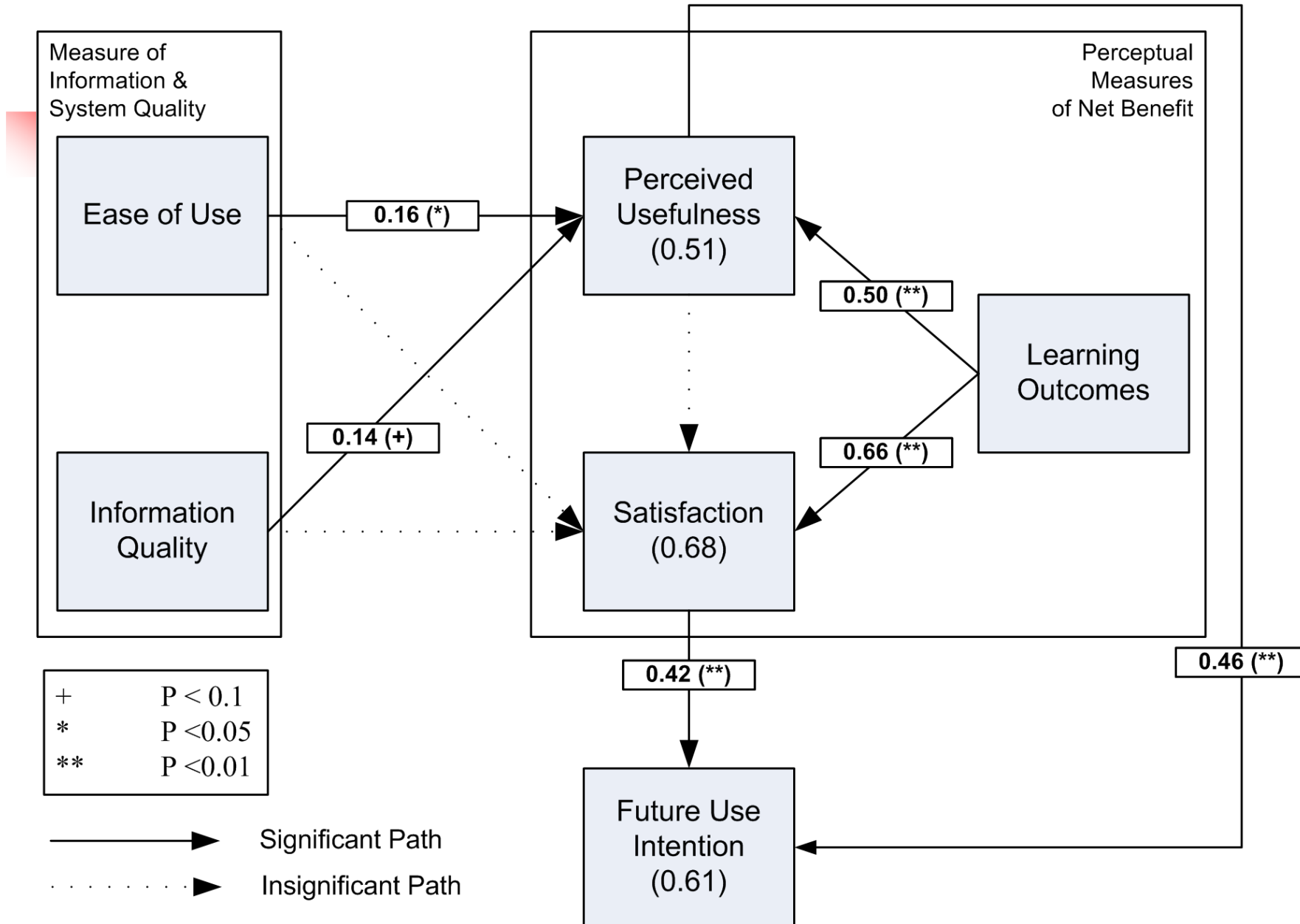
Fit Indices	Self-Paced Mode	Instructor-Student Interactive Mode	Desired Levels
χ^2/df	1.971	1.737	< 3.0
CFI	0.963	0.961	> 0.95
TLI	0.957	0.955	> 0.90
RMSEA	0.047	0.050	< 0.06
Standardized RMR	0.0379	0.0484	< 0.08
GFI	0.929	0.909	> 0.90
AGFI	0.909	0.883	> 0.80



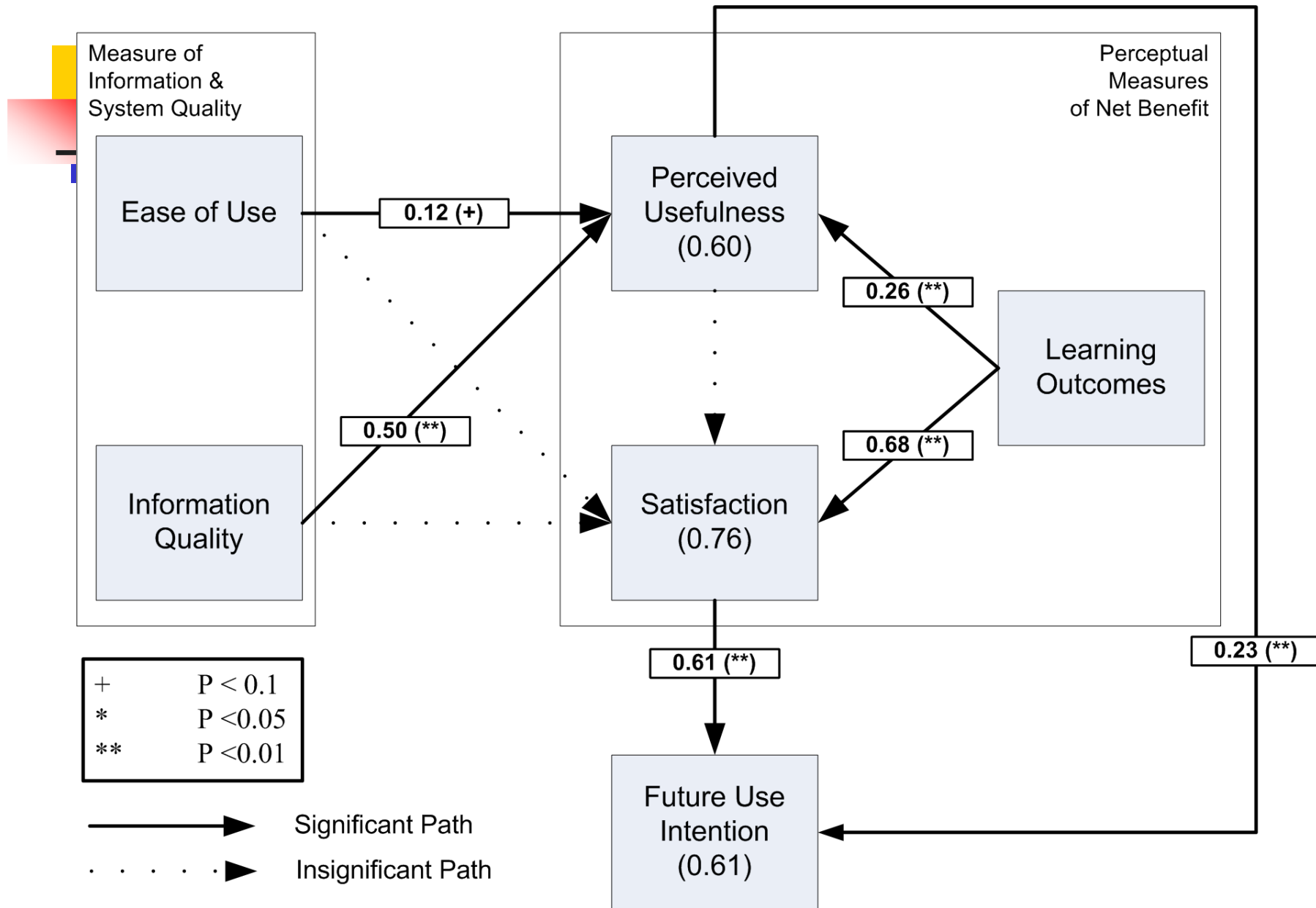
Analyses for RQ1

- *RQ1: What is the model for E-Learning tool success?*
- ➔ Evaluate the structural model of ISI and SP success.

Structural Model of Self-Paced Tools



Structural Model of ISI Tools





Analyses for RQ2

- *RQ2: Between self-paced and instructor-student interactive e-learning tools, which is more effective for students' learning?*
- Compare latent construct means between groups.



Measurement Invariance

- **Configural Invariance**
 - Congeneric Item loading patterns across Groups
- **Metric Invariance**
 - Equal Item Loading Scales across Groups
- **Scalar Invariance**
 - Equal Measurement Intercepts across Groups
- Hierarchical order: configural → metric → scalar
- Change in CFI between two nested models is smaller than 0.01, then more complex invariance is supported (Cheng and Rensvold 2002)

Measurement Invariance Analysis

Goodness of Fit Indices	Configural Invariance	Metric Invariance	Scalar Invariance	Desired Level
$\chi^2 / D.F.$	1.783	1.756	1.773	< 5
TLI	0.945	0.944	0.941	> 0.90
CFI	0.966	0.965	0.963	> 0.95
SRMR	0.0305	0.0339	0.0355	< 0.06
RMSEA	0.033	0.032	0.032	< 0.08

Mean Comparison of Latent Constructs across Groups

Constructs	Self-Paced E-Learning Mode		Instructor-student Interactive Mode	Support Hypothesis?
System Quality	- 0.266 **	<	0	No hypothesis
Information Quality	- 0.175 **	<	0	H1 (✓)
Perceived Usefulness	- 0.244 **	<	0	H2 (✓)
Learning Outcomes	- 0.342 **	<	0	H3 (✓)
Satisfaction	- 0.385 **	<	0	H4 (✓)
Behavioral Intention	- 0.190 **	<	0	No hypothesis

significant at (**: $p < 0.01$, *: $p < 0.05$)



Limitations

- Cross-sectional study
- Additional factors not modeled:
 - Individual learning styles
 - Nature of studied subjects
 - Instructors' teaching philosophy

Contributions and Implications: Theory



- Identified the Success Model for E-learning Tools.
- Theoretical deduced and empirically validated relative effectiveness of different types of e-learning tools
- The role of feedback in e-learning contexts
 - Format, Timing
- Technology advance → replace human beings?

Contributions and Implications: Practice



- Cost & limitations of e-learning tools
- When to use ISI or SP tools?
- Access to e-learning tools