The New Physics Curriculum and Secondary Students' Profiles

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Research Objectives

- To ascertain the impact of the 1998 physics curriculum on Lebanese secondary school students

- To compare Lebanese students to their international peers, mainly those in the U.S.

Tools: *Halloun standardized tests*

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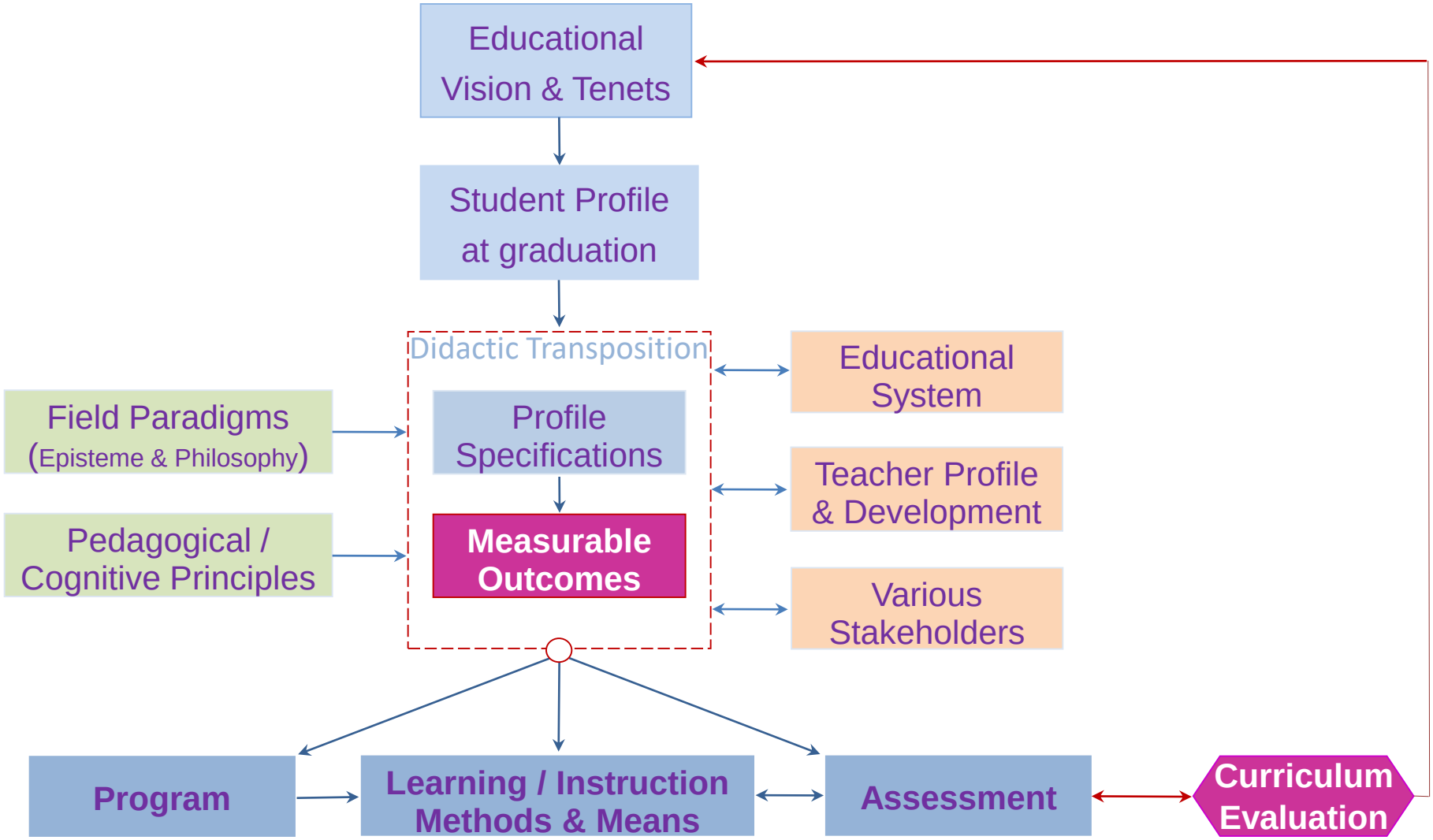
Curriculum Evaluation



Student Profile

What knowledge and habits should students develop?

Conceptions

Concepts, laws, theorems, and other theoretical statements

Processes / skills *(of scientific inquiry)*

Exploratory (descriptive / explanatory / predictive analysis ...)

Innovative (system control /change, invention of new systems…)

Dispositions

Views / attitudes about knowing and learning physics

Meaningful Learning

How do we know whether students have actually developed the target profile?

Students often pass their exams, some with bright colors, without necessarily understanding what they are being tested about

- ☞ Rote vs. meaningful learning

- ☞ Tests of conceptual / qualitative understanding

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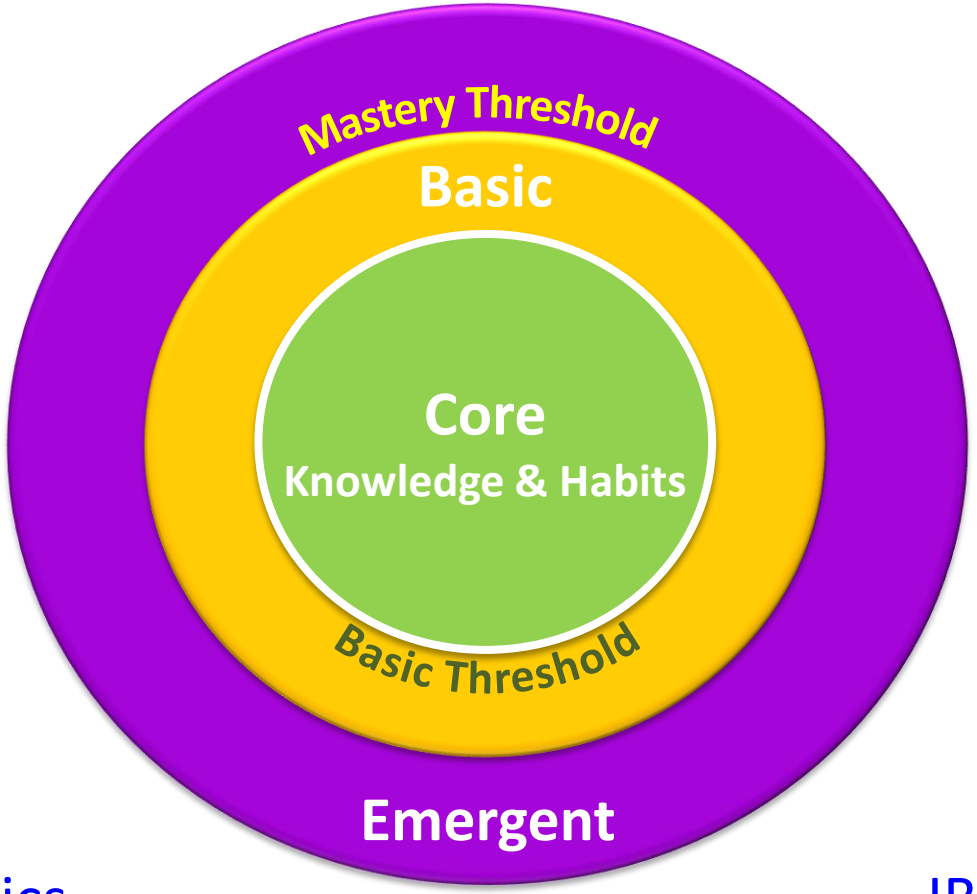
Inventories of Basic Conceptions



IBC – Mechanics

IBC – DC Circuits

Inventories of Basic Dispositions: VASS

Views About Science Surveys:

- What is physics about, and how physicists go about doing physics?
- Why and how we should learn physics?

Contrasting Alternatives rating scale (CArs)

VASS – Physics

Validity & Reliability

Tests' validity:

content (sampling & item); face; predictive

Tests' reliability:

internal consistency (Cronbach $\alpha > 0.80$),
test-retest reliability, stability or equivalence

Outcomes

ANOVA (p<.005):

Gender

Males > females on IBCs but not VASS

Schools

IBC-Mechanics only, f(economic background)

Grades

G10 < G11 on IBC-DC but not on the other 2 tests

Language

Mixed differences on IBCs but not VASS

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IBC Outcomes

Average score

32% on IBC-Mechanics (37%, Highest)

43% on IBC-DC circuits (54%, Highest)

Average gain

< 8% post-post across all 3 grades (G10, 11, 12)

<0 post G(x) – pre G(x+1)

A decade earlier

Better outcomes on IBC-mechanics (35%) in 1998

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VASS Outcomes

Average score

Idle in low 60% at all grade levels, in all schools

Correlation VASS – IBCs

> .4 in all 3 grades

Naïve realism

6 years earlier

About the same in 2000-2001

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Lebanon *vs* USA

U.S. students

Not satisfactory, on average

By comparison to their LB peers:

Better on IBCs

About the same on VASS

Reform in the U.S.

No significant improvement yet, except where **Modeling Theory** & few others are implemented

The Bottom Line

The new physics curriculum FAILED its mission

Why?

- Teacher-centered rather than student-centered
- Information instead of formation (No Profile)
- Rote instead of meaningful learning

Solution?

Model best practices around the world, especially those like the **modeling** approach

Thank you

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