



Innovative Teaching and Learning Tools for Foundation in Engineering Education

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$G \cdot R: \rho = \frac{E}{V} = \frac{h^2}{8\pi^2} \frac{1}{V} \sim 10^{-23}$
 $\rho = \frac{E}{V} = \frac{ST}{V} \sim \frac{M^3 L}{M^3 L} \sim 1$
 $\rho = \frac{E}{V} = \frac{S}{2TR} = \frac{S}{2TR} \sim \frac{1}{R^3}$
 $p \sim \frac{1}{R^3}$

Notes include: "reprocessing collections", "cur. frames all over at each SU", "signal phot. at eq. A. zero-point (sub)str.", "Hubble diagram", "Rates", "Space-time/Probabilistic view", "individual strongly obs.", "vars. v/ dist. ratios", "target selection/ binary", "the spectra+ the sample", "CSP joint", "high z prod".

QCMBS-based paper argument (Main Thm)
 $H_a = \sum_{ik} h_{ik}^k \sigma_i^k + \frac{\alpha}{2} \sum_{ijkl} J_{ijkl} \sigma_i^k \sigma_j^l$
 Then: $\mathcal{Y}_a = -\frac{1}{\beta} \ln(\text{Tr}\{e^{-\beta H_a}\}) - \sum_{ik} h_{ik}^k \langle \sigma_i^k \rangle$
 Entropy of N: $\mathcal{Y}_0 + \sum_{n=1}^{\infty} \alpha^n \frac{\partial \mathcal{Y}_a}{\partial \alpha^n} \Big|_{\alpha=0}$
 $= -\frac{S_0}{\beta} + \sum_{ijkl} J_{ijkl} \langle \sigma_i^k \rangle \langle \sigma_j^l \rangle$
 $+ \sum (J_{ijkl})^2 (\langle \sigma_i^k \sigma_j^l \rangle | \langle \sigma_i^k \sigma_j^l \rangle_0)$

MATLAB using "gamma.h"
 $P < 1/2$ for $N \geq 23$
 $< 1/3$ for $N \geq 29$
 $< 1/10$ for $N \geq 41$
 $< 1/100$ for $N \geq 70$

$p = \text{Prob } N \text{ numbers drawn uniformly from } \{1, 2, \dots, 365\} \text{ are distinct}$
 $\Rightarrow p = \frac{365 \cdot 364 \cdot \dots \cdot (365 - N + 1)}{365^N}$
 $p = \frac{365!}{(365 - N)! 365^N}$
 As $\ln N! \approx N(\ln N - 1)$
 $\ln p = \ln 365! - \ln(365 - N)! - N \ln 365$
 $\ln p \approx (365 - N) \ln \left(\frac{365}{365 - N}\right) - N$

Notes: "Main Product", "Commutative, 2-time product".

CPC L4

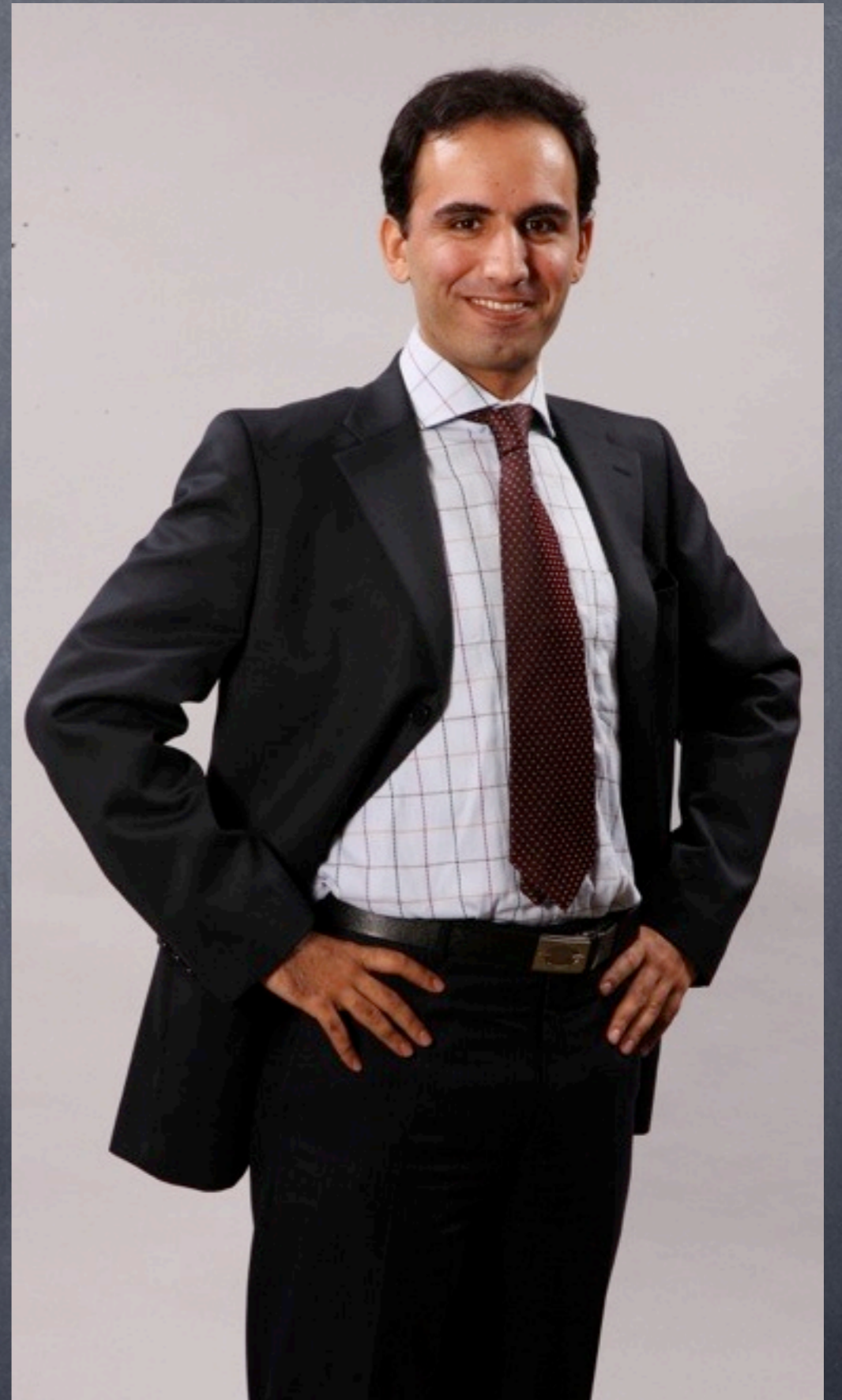
Analysis of System Dynamics Inputs

(Seborg chapter 5)

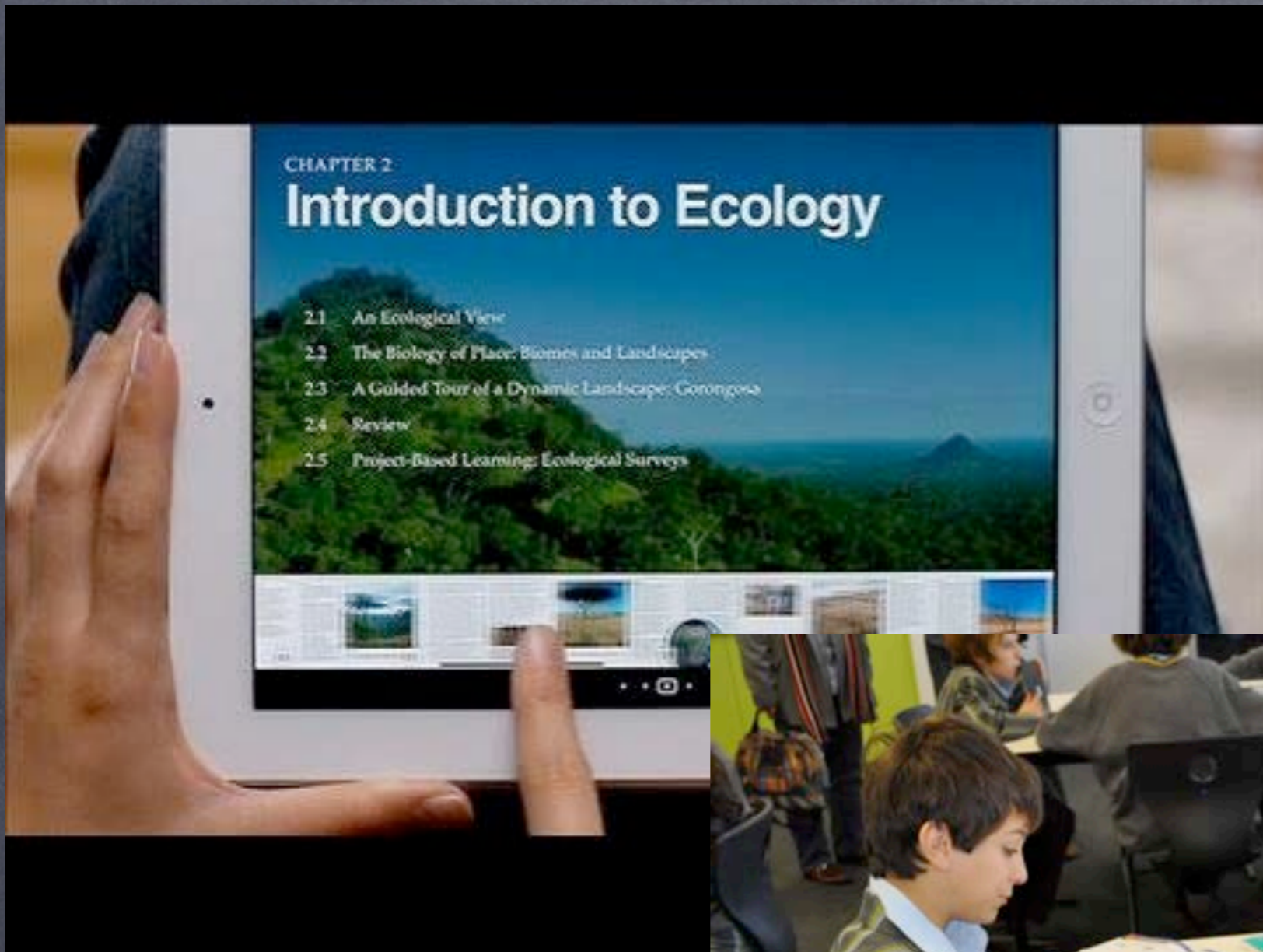
By
Marwan M. Shamel

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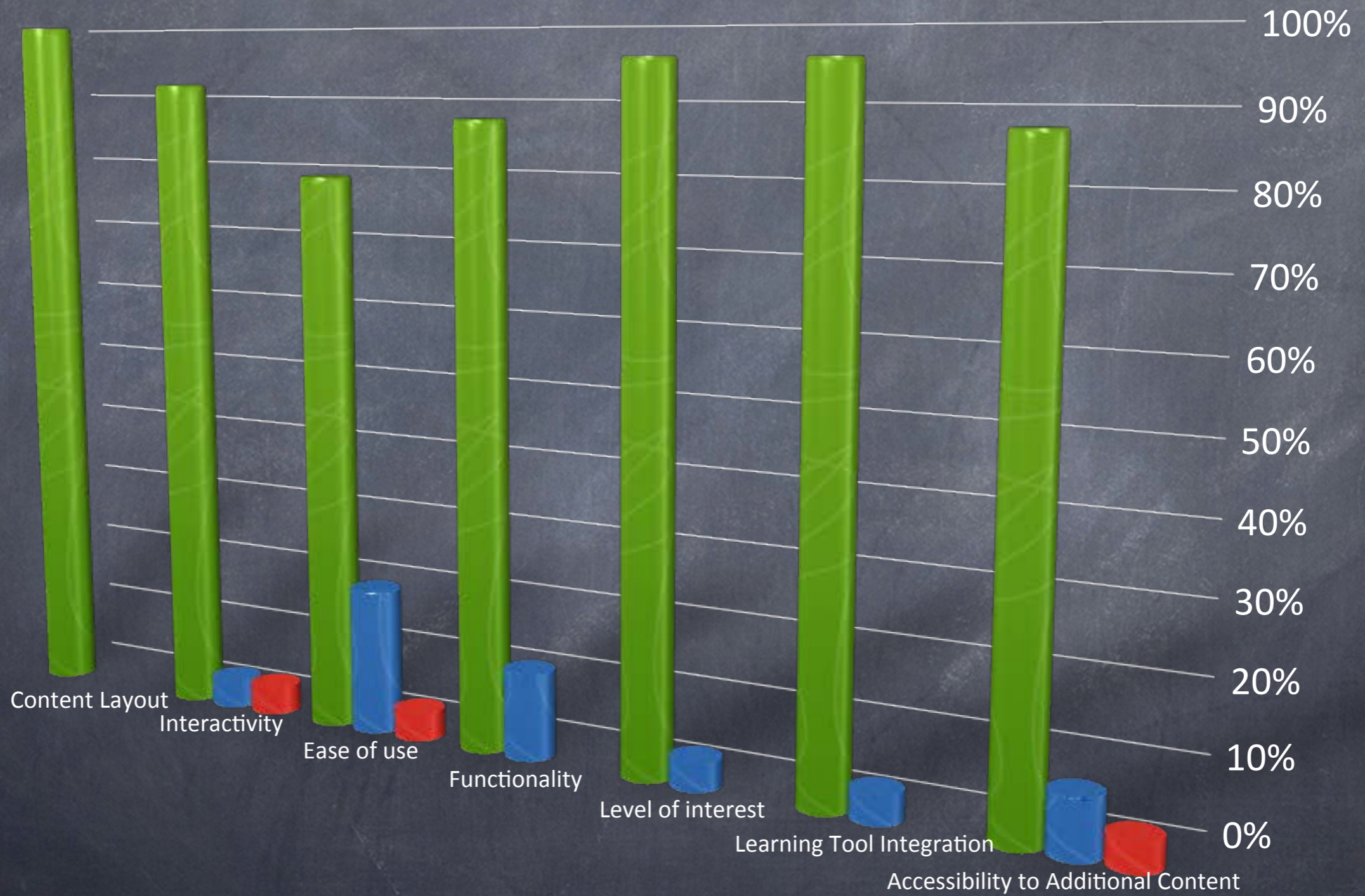






Demo

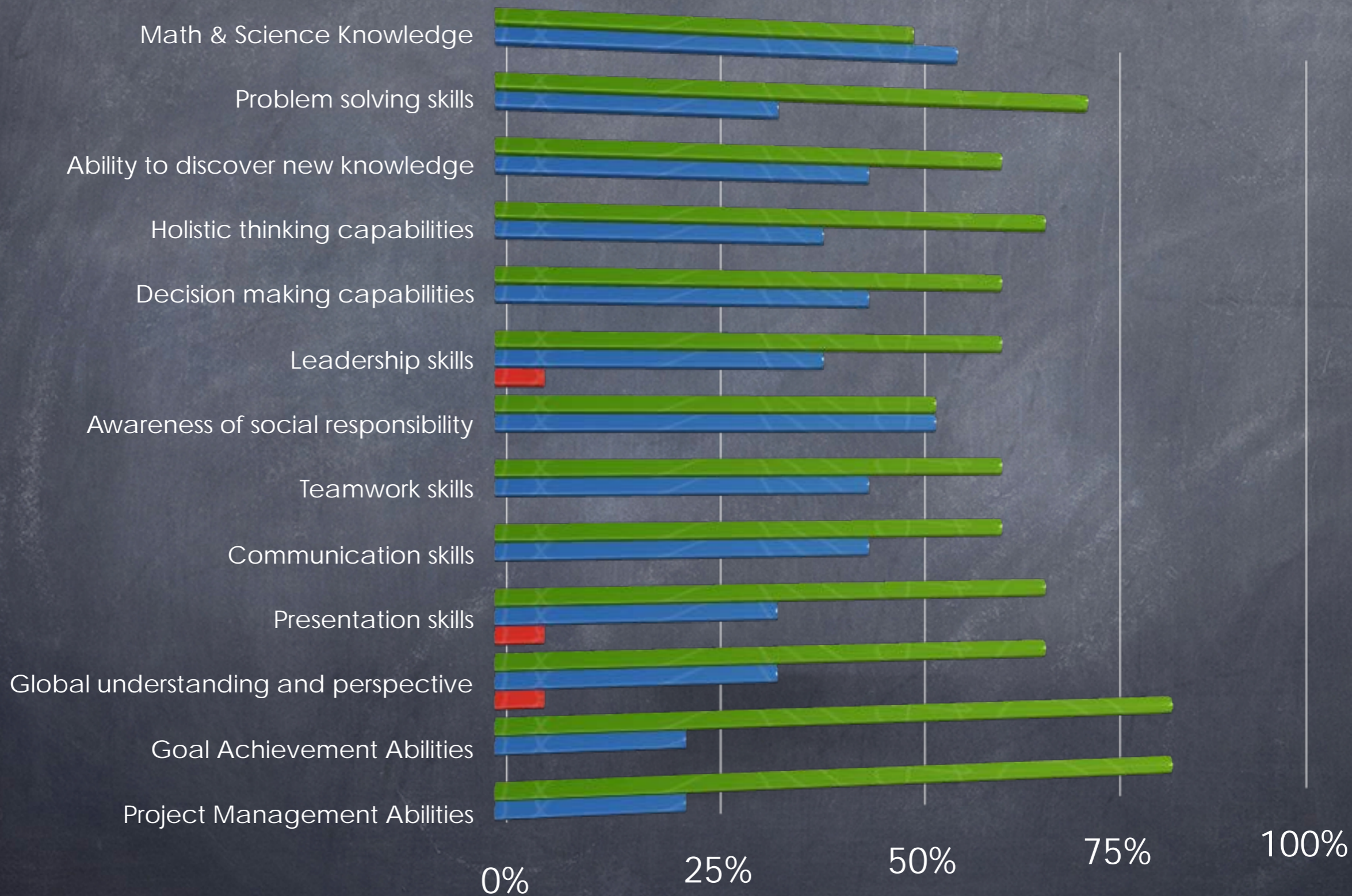
■ % Improvement ■ % Equivalent ■ % Decrease





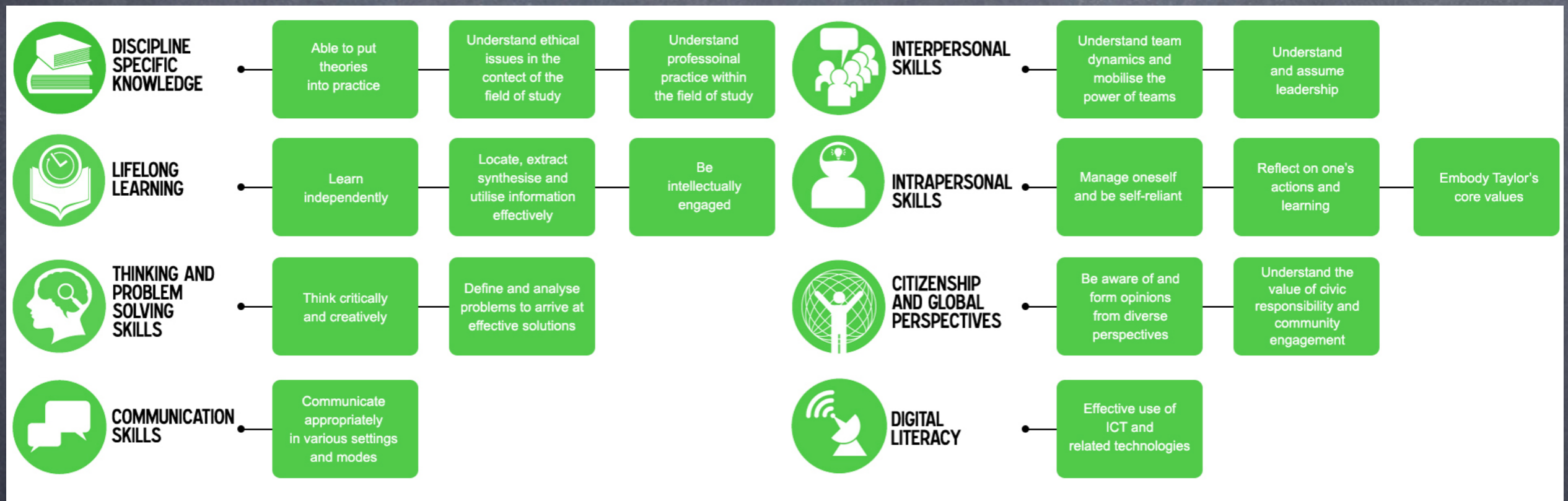


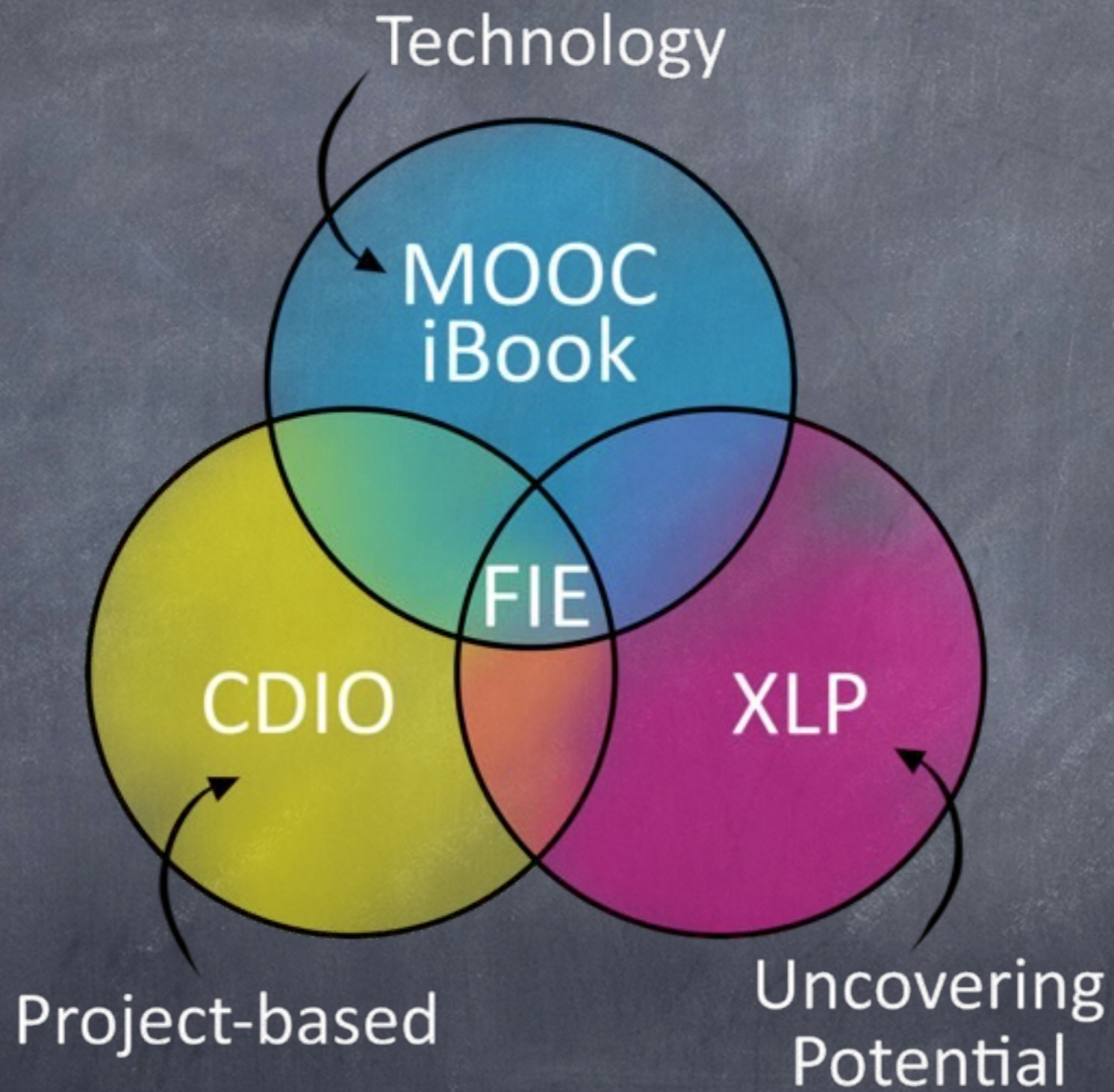
■ % Improvement ■ % Equivalent ■ % Decreased





Taylor's Graduate Capabilities







Thank you!

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