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eLearning Forum Asia 2012

24-27 April 2012 @ Peking University, China

Next Generation Learning

Visions • Innovations • Possibilities

Adapting Teaching Strategies to Align with Student Learning Styles – the SMALT approach

Presented
by:

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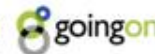
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BACKGROUND



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Singapore's Education System



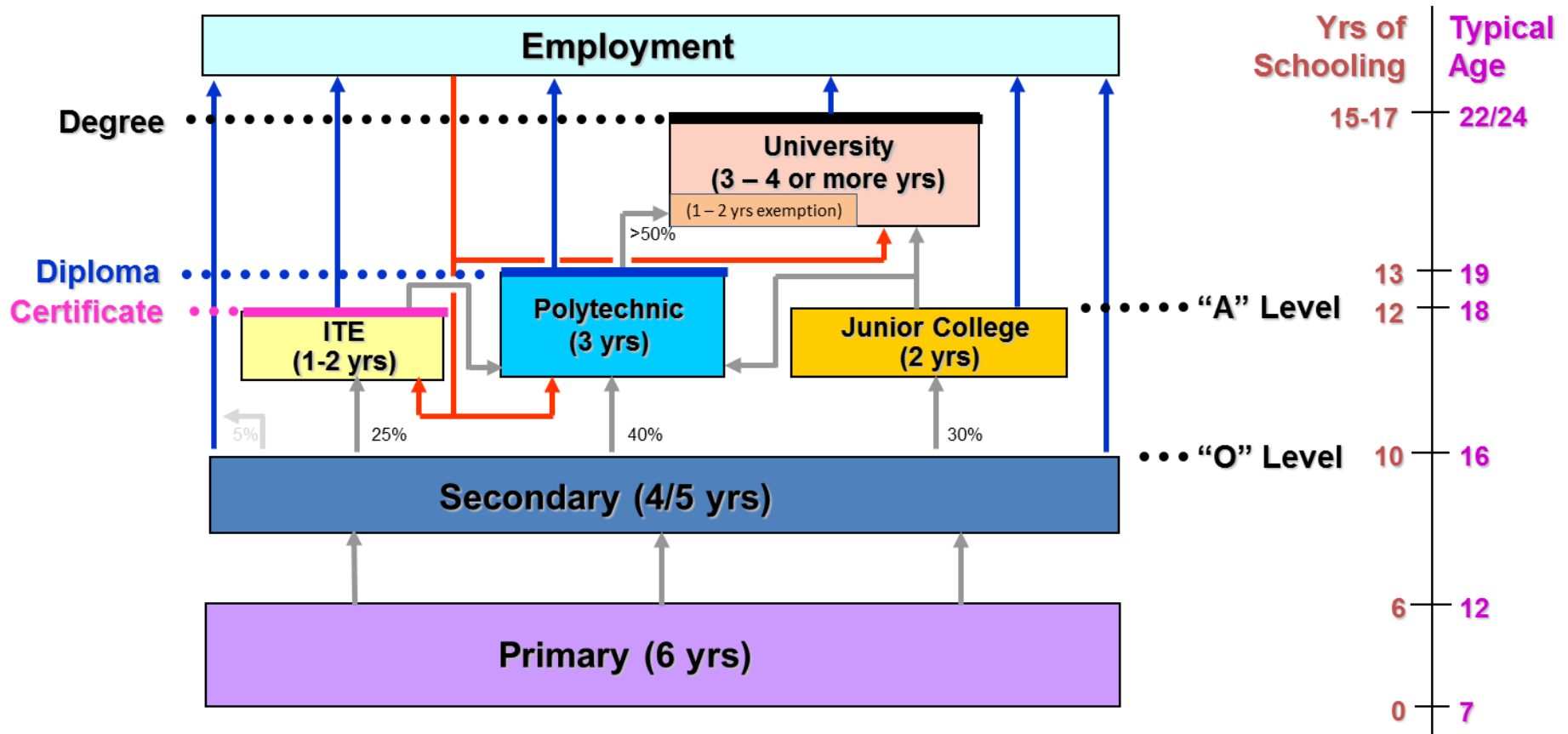
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OUR VISION

A Premier
Polytechnic of
Global Distinction



OUR MISSION

We provide quality education and training to prepare students and adult learners for work and life, equipping them to be life-long learners and to contribute to the technological, economic and social development of Singapore.

We harness our resources, expertise, creativity and innovation to support the development of business and industry and to complement Singapore's globalization efforts.

Established in April 1992.

An innovative and progressive educational institution offering diploma and advanced/specialist diploma programs in multiple disciplines spanning 7 Schools with a total student enrolment of **16,090** & over 1,300 staff [of which 70% are Academic Faculty members]

Engineering 4970

Business Management 3230

Health Sciences 2780

Information Technology 2130

Chemical & Life Sciences 1350

Interactive & Media Design 1120

Design 510





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6. Electronics, Computer & Communications Engineering
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8. Mechatronics Engineering
9. Multimedia & Infocomm Technology
10. Nanotechnology & Materials Science
11. Telematics & Media Technology



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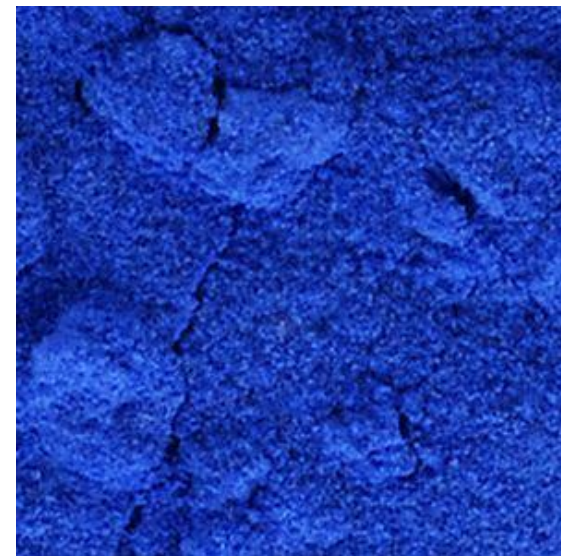
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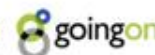
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Awarded a research grant by the Singapore
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SMALT – SMART ADVISOR FOR LEARNING & TEACHING



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Motivation



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Students tend to learn in different ways and use different resources

Lesson delivery generally does not take into account diverse learning styles due to real-world resource constraints

- research shows student learns best when the teaching strategies match his learning styles
- students need to adapt learning styles that is most optimal for a given instructional outcome

Research Questions



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For Teachers:

- How do we extend the current models of Learning Styles to include the behaviours of the Net-Gen-ers?
- How do we provide means to determine Group Learning Styles and hence suggest Teaching Strategies, that are aligned to the learning styles and instructional goals, to ensure maximum learning benefits for all in a class?
- How do we provide suggestions to create appropriate learning content/media/path for learners, based on their learning styles, to enhance their learning processes?

For Students:

- How do we promote agility in learning styles in order for students to learn in the most optimal way for each instructional goal?

Research Outcome



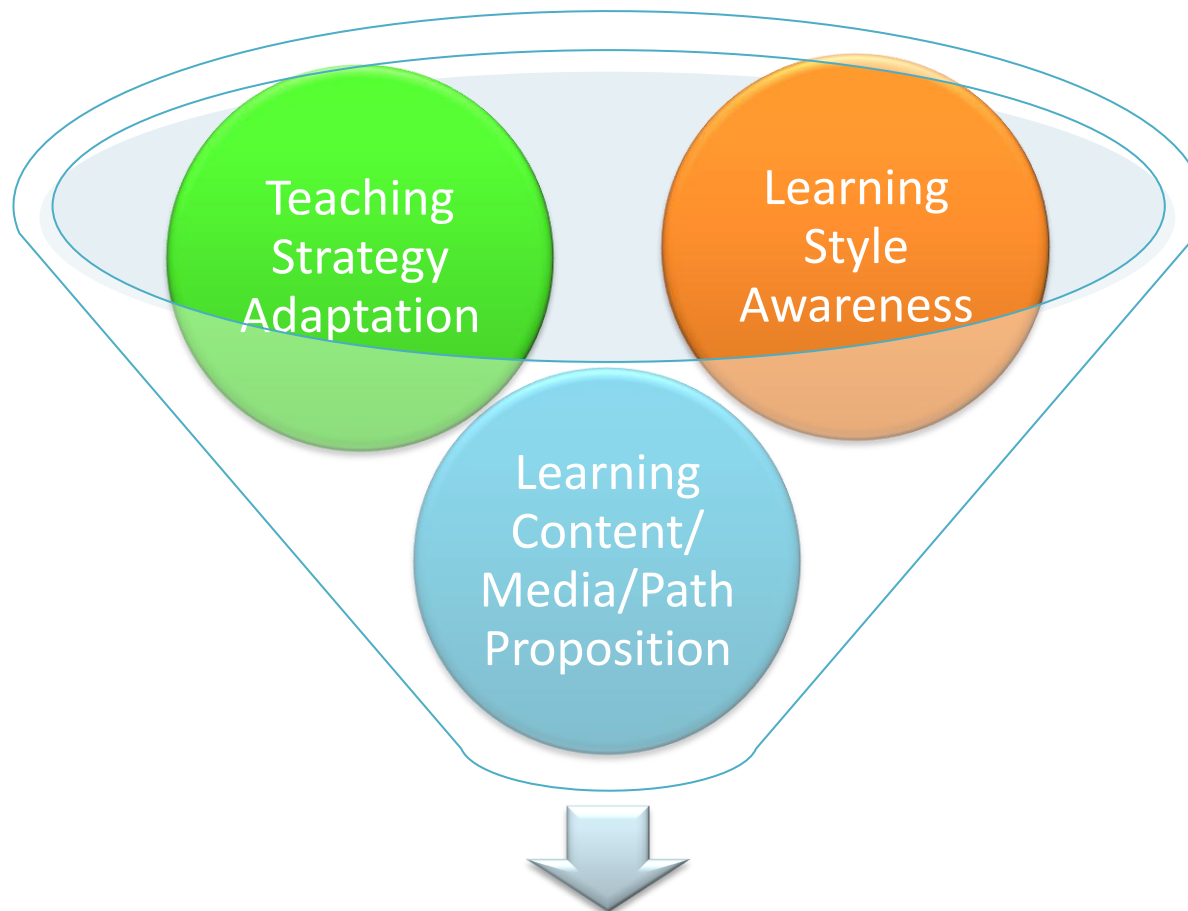
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SMALT – *SM*art Advisor for *L*earning & *T*eaching





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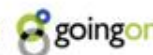
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What it means to them?

SIGNIFICANCE



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Impact



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Students

Dynamic alignment to student's learning efficacy

student learns better when teaching strategies are aligned with his learning style

allows better retention of knowledge and enhance learning interest

Promoting agility of learning styles and 'learning-to-learn' skills

responds to strengths & weakness by aligning teaching strategies, shaping and extending learning styles

customized delivery of learning content/media/path based on instructional goals

Teachers

Awareness of own learning styles & student diversity

Teaching strategies that are aligned with students' learning styles and most optimal for instructional goals

Customized delivery of learning content/media/path



What is it and how we are building it

SYSTEM ARCHITECTURE & APPROACH

System Architecture



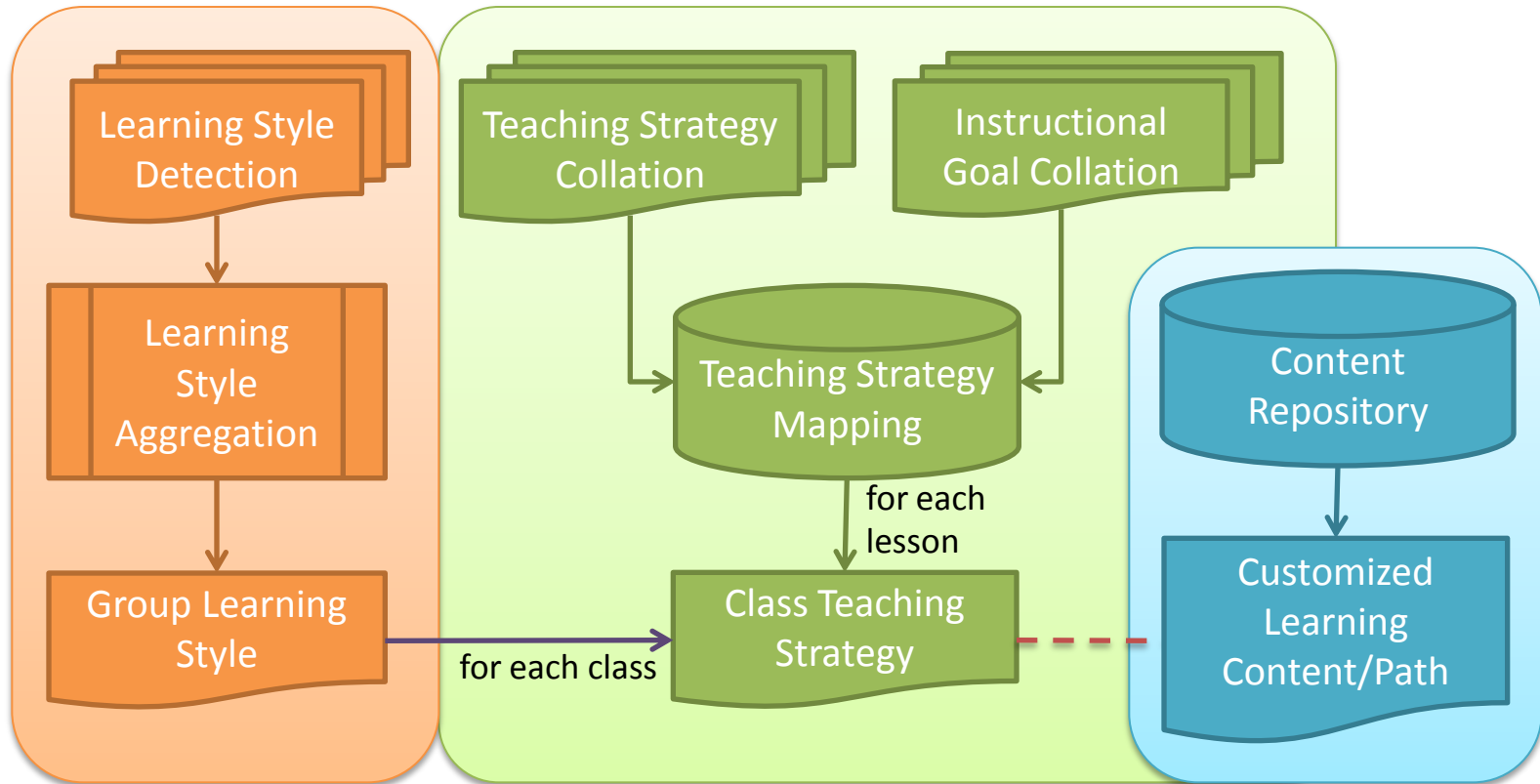
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Project Approach



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Learning
Style
Detection &
Analysis

- Extend to incorporate emerging styles of learning due to new media
- Establish implicit ways of detection
- Develop algorithm for determining Group Learning Styles

Teaching
Strategy
Alignment &
Recommend
ation

- Research into Teaching Strategies
- Research into Intelligent Searching & Mapping Algorithms
- Develop system to recommend aligned teaching strategies

Learning
Content/
Media/Path
Proposition

- Develop framework for content-to-strategy alignment and customized learning path
- Develop system to suggest learning content/media/path based on recommended teaching strategies and instructional goals

SMALT System



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A software system for teachers that

- determines the Group Learning Style,
- recommends aligned Teaching Strategies, and
- promotes learning style agility in learners by recommending customized delivery of learning content/media/path





First step towards providing adaptation is
selecting a good taxonomy of learning styles
Second step is suggesting a method for
identifying the learning style of the student

RESEARCH

Felder-Silverman LSM



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Sensitive vs Intuitive

- Sensitive:
 - like to learn facts and concrete learning
 - like to solve problems with standard approaches
 - more patient with details
 - more realistic and sensible
 - more practical and like to relate the learned material to the real world.
- Intuitive:
 - prefer to learn abstract learning material, such as theories and their underlying meanings
 - able to discover possibilities and relationships
 - more innovative and creative

Visual vs Verbal

- Visual:
 - remember best and prefer to learn from visual representations, such as pictures, diagrams and flow charts
- Verbal:
 - get more out of textual representations, such as written and spoken explanations.

Active vs Reflective

- Active:
 - learn best by working actively with the learning material, by applying the material, and by trying things out
 - more interested in communication with others and prefer to learning by working in groups where they can discuss about the learned material
- Reflective:
 - prefer to think about and reflect on the material.
 - prefer to work alone or maybe in a small group together with one good friend.

Sequential vs Global

- Sequential:
 - learn in small incremental steps and therefore have a linear learning progress
 - follow the logical stepwise paths in finding solutions.
- Global:
 - use holistic thinking process and learn in large leaps
 - absorb learning material almost randomly
 - able to solve complex problem, find connections between different areas, and put things together in novel ways but have difficulties in explaining
 - more interested in overviews and in a broad knowledge

LS Detection System



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Implicit Detection

- based on the direct observation and analysis of learner behaviour, avoiding psychometric flaws
- based on continuous monitoring and analysis of learner behavioral patterns
- possibility of finer grained and more effective adaptation actions

Explicit Detection

- simple to use and diagnose
- could not demonstrate internal consistency
- supplementary amount of work
- can be easily “cheated”
- non-intentional influences
- difficult to motivate the students
- static

LSD System Block Diagram



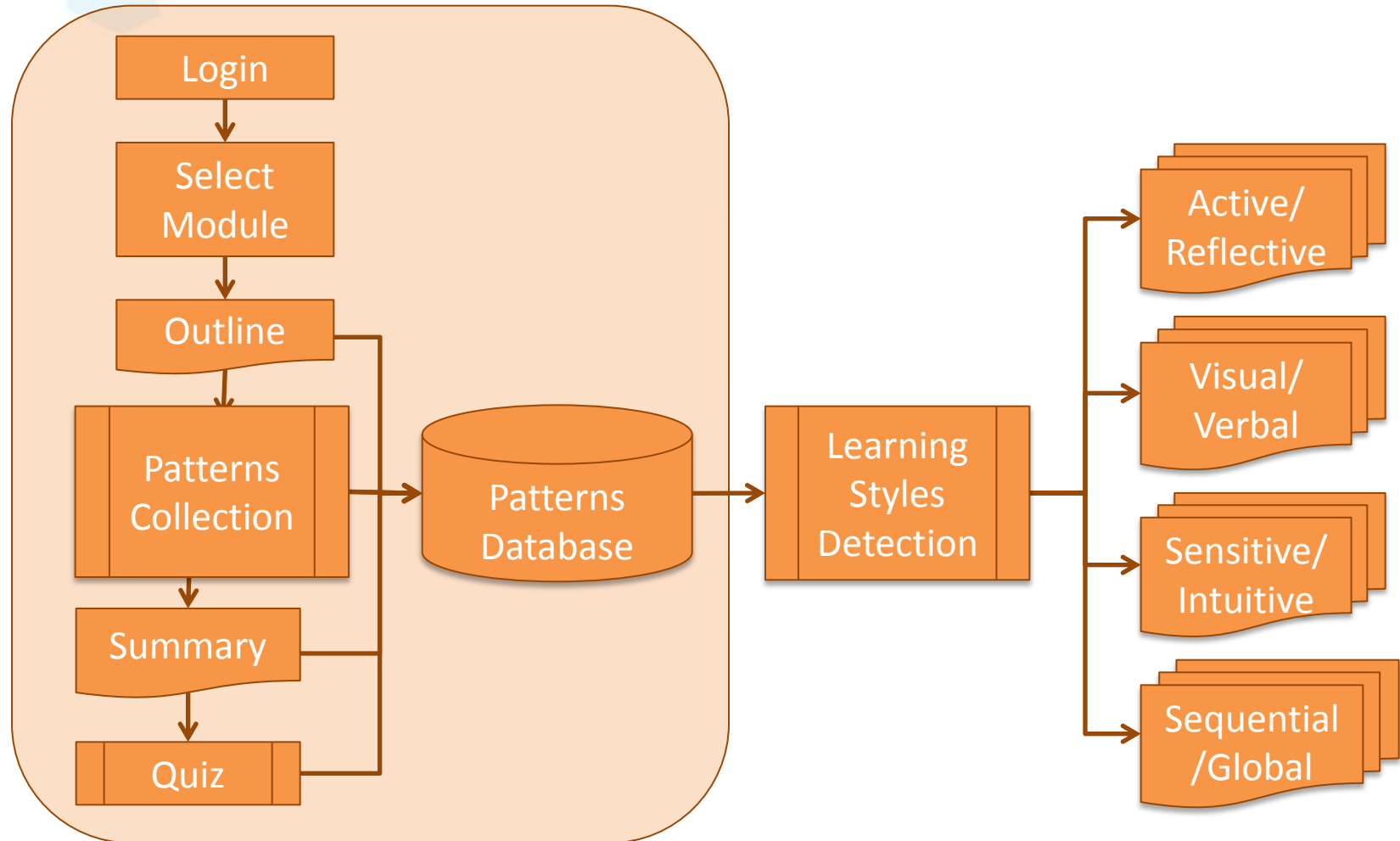
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Behavioural Patterns



FSLSM Dimensions	Behavioural Patterns
Visual vs Verbal	<ul style="list-style-type: none"> Choice of media type for learning content (text/image/sound/video) Time taken on different content Number of hits for different content Grade for image content
Sequential vs Global	<ul style="list-style-type: none"> Navigation choices (click on course outlines or Next/Previous buttons) Number of times the student goes back to the content page Number of times the next and previous button is clicked Time taken on the content page
Sensitive vs Intuitive	<ul style="list-style-type: none"> Sequence of the content (fundamental, abstract, illustration & concrete) Time taken on test and the content Number of times the student goes back to revise the question of the quiz
Active vs Reflective	<ul style="list-style-type: none"> Time taken for exercise and additional information

Components of Teaching Strategies



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Teaching Strategies

Learning Material

Audio

Graphic

Video

Course hypertext

Lesson objectives

Structured overview

Instruction Method

Presentation

Problem solving

Case study

Question and answer method

Project design method

Apply the concepts in practice

Slide shows

Demonstration

Learning Activity

Games and simulations

Role playing

Discussion forum

Brainstorming

Cooperative learning

Student response system

Student presentation and written papers

Debate

Laboratory approach

Guide discovery

Homework

Interview

Story telling

TS-LS Mapping Matrix



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			Sensitive			Intuitive			Visual			Verbal			Active			Reflective			Sequential			Global		
			F	M	S	F	M	S	F	M	S	F	M	S	F	M	S	F	M	S	F	M	S	F	M	S
Teaching Strategies	Learning Material	Audio		✓				✓			✓			✓							✓				✓	
		Graphic		✓																					✓	
		Video			✓			✓		✓			✓								✓			✓		
		Course hypertext						✓					✓									✓	✓			
		Lesson objectives							✓					✓												✓
		Structured overview																✓								✓
	Instruction Method	Presentation		✓						✓									✓		✓					
		Problem solving			✓											✓										
		Case study				✓												✓						✓		
		Question and answer method		✓								✓						✓			✓					
		Project design method							✓							✓									✓	
		Specific examples of concepts and procedures			✓																					
		Apply the concepts in practice	✓																							
		Slide shows		✓				✓			✓		✓										✓	✓		
	Demonstration			✓						✓																
	Learning Activity	Games and simulations							✓			✓					✓									
		Role playing							✓								✓						✓			
		Discussion forum				✓								✓												
		Brainstorming										✓			✓											
		Cooperative learning											✓				✓									
		Student response system	✓					✓									✓				✓					✓
		Student presentation and written papers		✓						✓													✓			
		Debate		✓													✓									
		Laboratory approach						✓									✓									
		Guide discovery															✓							✓		
		Homework		✓																	✓					
		Interview												✓		✓										
		Story telling												✓												

Future Work



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Learning Style Awareness

Types of Learning Styles

Relationship of Learning Styles vs. New Media

Learning Style Detection

Implicit Learning Style Detection within New Media interaction

Aggregate Group Learning Style



Teaching Strategy Adaptation

Types of Teaching Strategies

Mapping of Teaching Strategies with Instructional Goals

Mapping of Teaching Strategies with Group Learning Styles



Learning Content/Media/Path Proposition

Classification of Learning Content

Mapping of Learning Content to Instructional Goals

Integrating Learning Content with Teaching Strategies

Conclusion



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Improve learning and teaching effectiveness through dynamic alignment of teaching and learning styles



Help realize full learning and teaching potential of students and teachers





Instruction begins when you, the teacher, learn from the learner. Put yourself in his place so that you may understand what he learns and the way he understands it.

(Kierkegaard)



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THANK YOU



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