



## Seminar Series for Middle Managers: Catering for Learner Diversity under the New Academic Structure

### Part 2: Catering for Learner Diversity through Case Study of Design & Applied Technology (DAT)

- ◆ Observed phenomenon of learning diversity in the context of DAT
- ◆ Using case study as a strategy to cater for learning diversity
- ◆ Example of case study in DAT



## Catering for Learner Diversity through Case Study of DAT

### Programme ( 10.12.2010 )

9:30 – 10:00	Observed phenomenon of learning diversity in school	Mr Raymond CHAN CDI, EDB
10:00 – 12:00	Using case study as a strategy to cater for learning diversity	Mr Raymond WAN Institute of Professional Education And Knowledge
12:00 – 12:30	Q&A with conclusion	
12:30 – 13:30	Lunch	
13:30 – 16:30	Example of case study in DAT	Ms Cathy YUEN HK Institute of Vocational Education



## Learning Traits (學習特性) that trigger Learning Diversity

- ◆ **Intellectual Aptitude (智力能向):**  
*i.e. analytical, creative, practical...*
- ◆ **Cognitive Style (認知風格):**  
*i.e. visualizer or verbalizer...*
- ◆ **Learning Style (學習風格):**  
*i.e. cognitive impulsive or cognitive reflective...*
- ◆ **Learner's Prerequisite (前備知識):**  
*i.e. achievement...*



《個別學習差異：理念與實踐》趙志成 2009



## Observed Phenomenon and Strategies Curriculum/ Curriculum Planning

### Observed Phenomenon

- ◆ Schools are generally lack of whole-school planning and support on learner diversity
- ◆ Insufficient time to teach (most teachers have little role to play in curriculum planning at the school level)

### Suggested Strategies

- ◆ Teachers can customise the resources developed by EDB to provide suitable learning tasks for less able students
- ◆ Some topics in the curriculum are more conceptual while others are more practical in nature. Schools are advised to arrange flexible grouping in which more students can be grouped together in lessons using a direct lecturing approach, while smaller groups are used for tutorials and practical work
- ◆ Bridging programmes for network schools for sharing



## Observed Phenomenon and Strategies Teaching strategies (1)

### Observed Phenomenon

- ◆ Not adjusted teaching strategies / pace / content according to students' learning diversity

### Suggested Strategies

- ◆ It is advisable for teachers to adopt a wide repertoire of approaches, such as:
  - **Direct instruction** – e.g. short 'hands-on' practical task to cover essential learning elements
  - **Enquiry activities** – e.g. case study to engage students in developing insights into innovation and in developing skills in research and communication
  - **Interactive activities** – e.g. longer and more open-ended design projects which allow students to apply their technological capability by drawing on their accumulated experience, and also to co-construct knowledge with teacher and peer as partners



## Observed Phenomenon and Strategies Teaching strategies (2)

### Observed Phenomenon

- ◆ Not adjusted teaching strategies / pace / content according to students' learning diversity (con't)

### Suggested Strategies

- ◆ Cooperative teaching and lesson preparation to enhance the teaching force
- ◆ To fulfill the potential of gifted DAT students, extended activities should be provided to allow the gifted students to investigate topics of their interest in depth outside the classroom.

### Observed Phenomenon and Strategies

#### Teacher competency and diversity

Observed Phenomenon	Suggested Strategies
<ul style="list-style-type: none"> <li>Overlooking the importance of appropriate and selective use of resources in effective curriculum planning</li> </ul>	<ul style="list-style-type: none"> <li>Networking &amp; learning circle for sharing</li> <li>Schools can make reference to the outcomes and explanatory notes as prescribed in the DAT Curriculum and Assessment Guide to have an idea of the depth and breadth expected in learning the DAT curriculum</li> <li>For assessment purpose, the sample papers, samples of students' work at various levels of attainment, and the grade/level descriptors developed by the HKEAA may be used to illustrate the levels of attainment to be expected</li> </ul>

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### Observed Phenomenon and Strategies

#### Students' abilities and learning attitude (1)

Observed Phenomenon	Suggested Strategies
<ul style="list-style-type: none"> <li>Weak foundation in JS and insufficient prior knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Provide graded assignment to handle learner diversity</li> <li>Arrange cooperative learning tasks, i.e. group discussion, group projects</li> </ul>
<ul style="list-style-type: none"> <li>Boys and girls have different interest and ability in technology</li> </ul>	<ul style="list-style-type: none"> <li>Equal opportunities should be given for all students to gain essential learning experiences from activities inside and outside the classroom</li> <li>Teachers are encouraged to set assignments which appeal to the interests of both male and female students</li> </ul>

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### Observed Phenomenon and Strategies

#### Students' abilities and learning attitude (2)

Observed Phenomenon	Suggested Strategies
<ul style="list-style-type: none"> <li>Low ability students feel difficult to express views in written mode but verbal presentation is OK</li> </ul>	<ul style="list-style-type: none"> <li>Keywords and essential vocabulary should be provided before hand</li> <li>Both verbal and written mode should be allowed in their assigned tasks</li> </ul>
<ul style="list-style-type: none"> <li>Students at both ends of ability learn at the same pace. Curriculum not duly adjusted to suit the abilities of students.</li> </ul>	<ul style="list-style-type: none"> <li>Teachers may set less demanding tasks encompassing smaller steps in learning, to assist the students to complete the tasks successfully</li> <li>Gifted students can be provided with design project and other assignments that are more challenging than the regular ones</li> <li>Teachers may invite senior students to serve as mentors to gifted students to encourage them to undertake extra learning experiences</li> </ul>

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### Observed Phenomenon and Strategies

#### Students' abilities and learning attitude (3)

Observed Phenomenon	Suggested Strategies
<ul style="list-style-type: none"> <li>Students with different interest, background and ability may have different learning needs</li> </ul>	<ul style="list-style-type: none"> <li>Teachers may arrange group work in design projects so that students with different personal characteristics, such as 'thinkers' and 'doers' as well as abilities can work and learn together to support each other in completing the tasks through collaboration</li> <li>Peer learning and pair work to help the weaker students</li> </ul>

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### Observed Phenomenon and Strategies

#### Students' abilities and learning attitude (4)

Observed Phenomenon	Suggested Strategies
<ul style="list-style-type: none"> <li>Low language and organizing abilities, weak thinking and analytical skills</li> <li>Low ability students have low learning motive (particularly those who were forced to study a certain subject)</li> </ul>	<ul style="list-style-type: none"> <li>To ease students' learning difficulty in reading and writing, teachers can introduce different case studies about real-world design or technological problems through graphical presentations and discussions</li> <li>Teachers can also make use of the case studies to illustrate the key concepts and the principles behind to help students develop their understanding through authentic and real-world context</li> <li>Students' learning can be further reinforced through the practical project works</li> </ul>

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### Common Strategies to Cater for Learner Diversity

- Streaming
- Small class size
- Cooperative learning
- Individualized programmed learning
- Graded exercised
- Multiple tasks
- Co-teaching
- Enhanced "participating learning" through IT, drama
- Additional tutorial after class
- Graded test/assessment
- Enriched learning environment

Dr Chiu Chi Shing, 2009  
設計與應用科技  
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## Reflection on Strategies (1)

- ◆ Whether the strategies are holistic, focused or just targeted to specific group of students?
- ◆ Whether the strategies could extend/ reinforce students' motivation, or actually enhance their learning ability?
- ◆ Whether the strategies could improve students' intellectual aptitude through classroom teaching/exercise or just supporting measures for the weaker students?

Dr Chiu Chi Shing, 2009

設計與應用科技  
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## Reflection on Strategies (2)

- ◆ Whether the strategies are asking teachers to fulfil students' need or asking students to follow teachers' request?
- ◆ Whether the strategies could improve overall learning atmosphere or just adjusting the measurement indicator to reduce learning diversity?
- ◆ Whether the strategies are consuming resources on ineffective L&T activities or trying out alternative L&T modes and ideas?

Dr Chiu Chi Shing, 2009

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- Presentation by EDB ended here -

Followed by

## Using Case Study as a Strategy to Cater for Learning Diversity

by Mr Raymond WAN

Institute of Professional Education And Knowledge (PEAK)

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## Case Study in NSS DAT Curriculum

By Raymond Wan, PEAK



learning activity helps to fill the gap

Teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes.

(Biggs, 1999)



learning activity helps to fill the gap

Stretching the most able

Scaffold all students to achieve their full potential

Remedial help for the least able

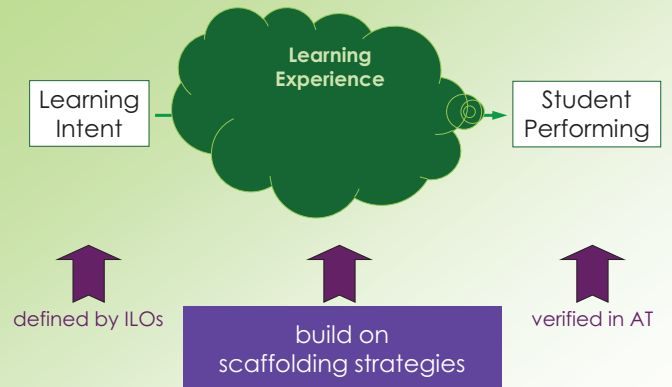


## Key challenges in teaching the SS Curriculum

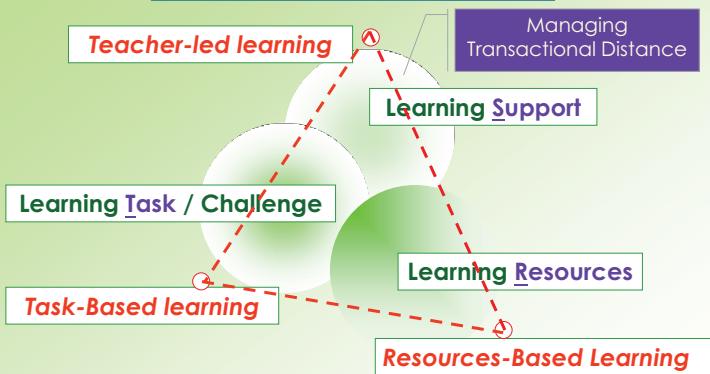
"...to put the curriculum aims with regard to **content knowledge**, **generic skills** and **values** into everyday classroom practice to enable students to apply what they have learnt **in new and unfamiliar contexts** effectively ..."

EDB (2009). Senior Secondary Curriculum Guide - The Future is Now : from Vision to Realisation.  
URL: [http://cd1.edb.hkedcity.net/cd/cns/sscg\\_web/html/english/index.html](http://cd1.edb.hkedcity.net/cd/cns/sscg_web/html/english/index.html)

19



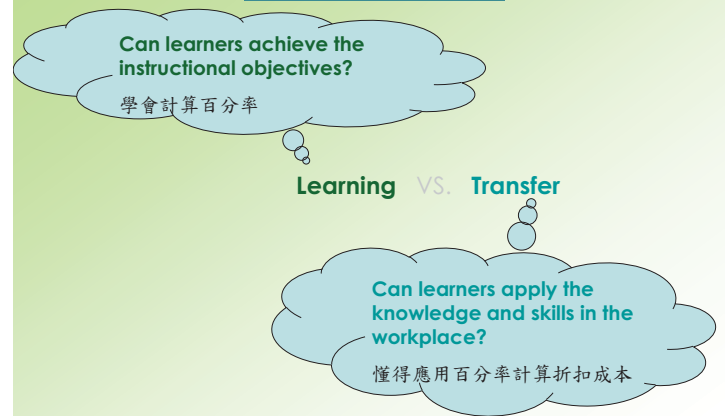
## Learning Activity Design Model



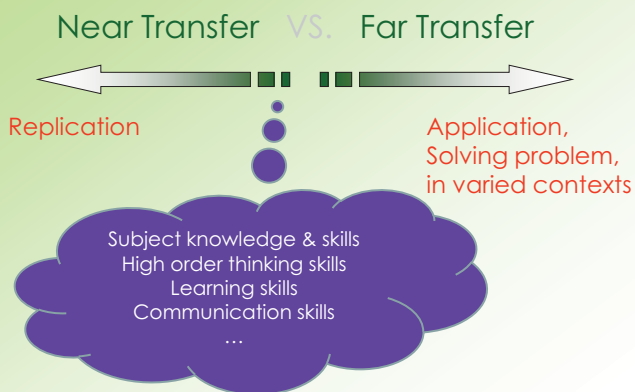
Oliver, R. & Herrington, J. (2001). "Teaching and Learning Online a Beginner's Guide to e-Learning and e-Teaching in Higher Education".

21

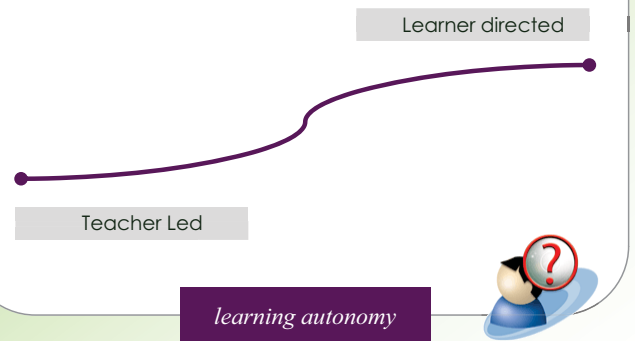
## Knowledge Transfer



## Knowledge Transfer



Teaching with case ...



24

## Teaching with case ...

- ✓ Information research / Literature review
- ✓ Small group discussion
- ✓ Knowledge forum
- ✓ Debate
- ✓ Feasibility study report
- ✓ Design task
- ✓ Inquiry based task
- ✓ Role play
- ✓ ... ..

*scaffolding with TLA design*

25

## Building a learning community among students and teachers

- Adopted active arrangements for teachers and students to work together
- Bridged with each other (i.e. teachers and students) in learning activities
- Collaborated (i.e. in the co-construction of new knowledge)
- Diversity (engaged in dialogue with one another, relating to each other as critical friends).

*scaffolding with TLA design*

26

## Teaching with case ...

More challenging tasks in various contexts

Less demanding tasks encompassing smaller chunks in learning

*achieve through pedagogical approach*

27

## Reflect on teaching with case method ... ... how students' needs are met

Case studies can give rise to:

### 1. Contextual learning –

A case study provides a context for studying a **real-world design or technological problem** that the students and teachers can work through together.

28

## Reflect on teaching with case method ... ... how students' needs are met

Case studies can give rise to:

### 2. Interactive learning –

*In case studies students are required to*

- **discuss and explore** various facets of each case.
- **define problems and issues**,
- **propose solutions and courses of action**, and
- **define their views** among their peers.

*Students are therefore given the opportunity to*

- learn and develop **key skills**;
- enhance their learning through **group work** or **online discussion**;
- develop **skills in gathering information**; and
- **learn to analyze** information **critically**.

29

## Reflect on teaching with case method ... ... how students' needs are met

Case studies can give rise to:

### 3. Multi-faceted learning –

*Students are engaged in various activities such as:*

- **reading** relevant articles to stimulate and maintain interest;
- **searching for** and **gathering** relevant information;
- **reviewing** ethical and social aspects of the topic; and
- **reflecting or engaging** in dialogue with other students.

30

Reflect on teaching with case method ...  
... how students' needs are met

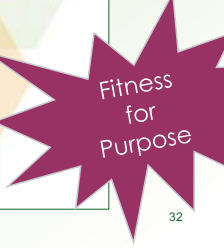
“... to put their learning into an authentic context, and so provide an additional resource that can add a new dimension to learning about technology and design.”

“Students must be actively engaged in the reflection process to enhance their technological capability. Case studies offer students the potential to explore and hypothesize about the initial problem from which a design emerges.”

Source: "Design and Applied Technology Curriculum and Assessment Guide", by the Curriculum Development Council and the Hong Kong Examinations and Assessment Authority, 2007 31

Reflect on teaching with case method ...  
... how students' needs are met

Classroom activity systems across the three main views of L&T



EDB (2009). Senior Secondary Curriculum Guide - The Future is Now : from Vision to Realisation. URL: [http://cd1.edb.hkedcity.net/cd/cns/scg\\_web/html/english/index.html](http://cd1.edb.hkedcity.net/cd/cns/scg_web/html/english/index.html) 32

Can learners apply the knowledge and skills in the real world?

Kirkpatrick, 1975

We build instruction to impact what people can do in the real world, not what they can do during instruction.

Shank, 2004



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35

Teaching with Cases



The process of understanding and solving new problems has three parts:



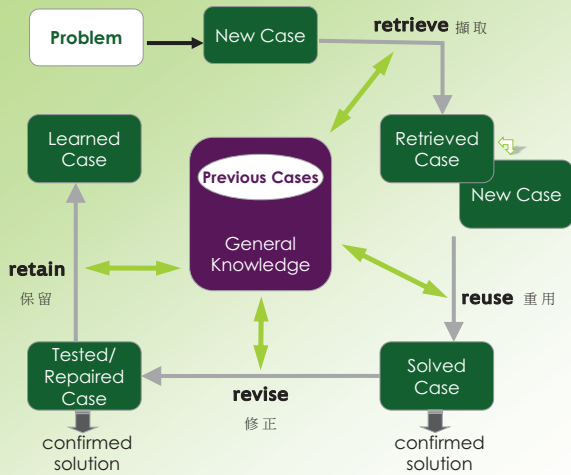
37

The process of understanding and solving new problems has three parts:

- (a) **recalling** old experiences,
- (b) **interpreting** (comparing and contrasting) the new situation in terms of the old experience based on the lessons that we learned from the old experience, or
- (c) **adapting** the old solution to meet the new situation.



38



Source: Jonassen and Hernandez-Sereno (2002). Case-based reasoning and instructional design: Using stories to support problem solving. Educational Technology Research and Development, Vol 50 No. 2, 2002, pp. 65-77.

39

## What a Case is (1/4)

A case is a **descriptive** research document, *often* presented in **narrative form**, that is based on a **real-life** situation or event and .

A case should be **problem-oriented**.

(Merseth & Katherine, 1994)



Source:

Merseth & Katherine (1994). ERIC Clearinghouse on Teaching and Teacher Education, Washington DC.  
URL: <http://www.ericdigests.org/1997-2/case.htm>

Laurence E. Lynn, Jr. (1999). Teaching and learning with cases: a Guidebook, N.Y.: Chatham House Publishers.

40

## What a Case is (2/4)

Cases need not be restricted to narrative descriptions of major events ... they can be **any piece of shared reality**, of various formats, that compels learners to come to terms with "**multi-layered problems** seen from **multiple perspectives**."

(Golich et. al. , 2000)



Source: Golich et. al. (2000). ABCs of Case Teaching, Georgetown University

41

## What a Case is (3/4)

Essential elements of cases:

- (a) they are **problems or scenarios** drawn from **real life**,
- (b) they **rely on careful research and study**, and
- (c) they have specific **relevance to professions** \*

(\* related to specific subject matter, in our curriculum) .



Source: Merseth & Katherine (1994). ERIC Clearinghouse on Teaching and Teacher Education, Washington DC.  
URL: <http://www.ericdigests.org/1997-2/case.htm>

42

## What a Case is (3/4)

Essential elements of cases:

- (a) they are **problems** from **real life**,
- (b) they are **open-ended** and
- (c) they are **descriptive** of **real situations**

... include original data, information and insights ...  
... no "correct way" of thinking about or analyzing a situation ...  
... contains no "right answer" to the question raised by the case ...



Source: Merseth & Katherine (1994). ERIC Clearinghouse on Teaching and Teacher Education, Washington DC.  
URL: <http://www.ericdigests.org/1997-2/case.htm>

43

## Major Types of Cases

- ✓ Decision Forcing Cases
- ✓ Policymaking Cases
- ✓ Problem Defining Cases
- ✓ Concept Application Cases
- ✓ *more ...*



Source: Laurence E. Lynn, Jr. (1999). *Teaching and learning with cases: a Guidebook*, N.Y.: Chatham House Publishers.

44

## Formats for Cases

- ✓ "Finished" cases based on facts
- ✓ "Unfinished" open-ended cases
- ✓ Fictional cases entirely written by the instructor
- ✓ Original documents



45

## "Teaching Note"

"Teaching note" is usually prepared as an aid to facilitators in the classroom use of a case.

Teachers / Facilitators teaching with a case may rely on "Teaching Note" when leading a case discussion.



46

Take a Break

## Teaching & Learning with Case (1/3)

In case study learning,

- ✓ Learners should put themselves in the role of **an actor in the situation**.
- ✓ Facilitators need to **deploy their power** properly.
- ✓ Facilitators and learners **construct knowledge together** in the process.



48

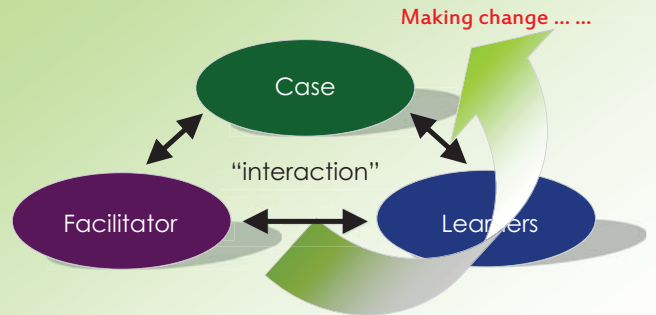


Learners are required to answer the question ...

**“What would I do if I faced the challenge described in the case?”**



### Learning & Teaching with Case (2/3)



### Learning & Teaching with Cases (3/3)



### Suggested Process for DAT (1/2)

It may involve ...

#### Pre-Class Discussion

*(Preparing your students)*

1. Facilitator **presents the case** (a brief summary) **along with the problems** (assignment questions) to be solved by teacher.
2. Facilitator **assigns research tasks** (or any learning activities) within the group to help learners acquiring information from various resources for analyzing the issues and resolving the problem.  
*(incorporate multiple view points and up-lifting group working skills)*



### Suggested Process for DAT (2/2)

#### Class Discussion

*(Participating in class discussion sessions and a variety of tasks or learning activities.)*

3. Ice breaking and followed by **facilitator-led discussion**, in an interactive manner, around the assignment questions,
4. Discuss and activities (in group and/or whole class) **to arrive at a decision** "as to what to do" / the case solutions, and
5. **Debriefing** - Present reports / Conclude findings / Devise action plan / present deliverables.
6. Facilitator-led **summary and conclusion**.

#### Post-Class Discussion



### Suggested Activities for Case Study

- ✓ Information research / Literature review
- ✓ Small group discussion
- ✓ Knowledge forum
- ✓ Debate
- ✓ Feasibility study report
- ✓ Design task
- ✓ Inquiry based task
- ✓ Role play
- ✓ ... ..



## Examples of Case (NSS DAT)

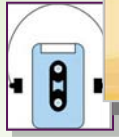
### Case Study I

Theme: materials, structure and mechanisms



### Case study II

Theme: design thinking and innovative Ideas



Source: "Design and Applied Technology Curriculum and Assessment Guide", by the Curriculum Development Council and the Hong Kong Examinations and Assessment Authority, 2007

55

## Reference Book



V. Golich, *et al* (2000).  
"The ABCs of Case Teaching",  
<http://www.usc.edu/programs/cet/private/pdfs/abcs.pdf>

## Q&A Conclusion

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