



Exploring Culturally Responsive Differentiation Instruction Strategies In School-University Diversity Management Collaboration

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Abstract

Catering for learner diversity is one key agenda in educational reform around the world, with Differentiation Instruction (DI) being widely cited as an effective pedagogical approach. In the Asian context, teachers' understanding and practices of DI remain under-researched. This paper reports the first stage findings of a large-scale collaborative project among university researchers, teacher educators and schools. The research aims to validate and elaborate Tomlinson's DI model (2001) by examining the DI practices in Hong Kong classrooms. An inventory of DI strategies was built and teachers' DI practices were analysed to reveal interesting patterns of different types of DI strategies. These findings shed lights on the need for culturally responsive DI practices and yield significant implications for teacher education.



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Introduction

Catering for learner diversity is one of the key issues in educational reform around the world. Differentiation Instruction (DI) has been widely cited to be an effective approach which addresses the diverse needs of learners in classrooms. However, although DI has been implemented both in the US and other countries for decades, challenges are reported in the actual implementation of the approach. In the Asian context, teachers' practices of DI and their application of DI strategies remain under-researched. In Hong Kong, for example, although the curriculum guide (Education Bureau, 2014) has recommended schools to develop school-based curriculum development based on Tomlinson (2001)'s DI approach, teachers are unprepared and often lack the confidence to apply DI in their classrooms which consist of learners with different learning needs (Wan, 2017). This is consistent with research findings in the literature that teachers need professional training and support in DI (Ruys, Defruyt, Rots, & Aelterman, 2013). Teachers' understanding of the DI strategies and their application in the classroom has been highlighted as crucial in DI teacher education (Dack, 2018, 2019; Ruys, et al., 2013; Wan, 2016, 2017).

This paper reports the first stage research findings of a large-scale longitudinal project representing collaboration between university researchers, educational professionals as well as stakeholders of different participating schools. The research aims to validate and elaborate Tomlinson's DI model (2001) by examining the DI practices in Hong Kong classrooms and conceptualizing the DI strategies adopted based on Tomlinson's model. The resulting inventory



of DI strategies sheds important lights on culturally responsive DI practices and DI teacher education.

Theoretical framework

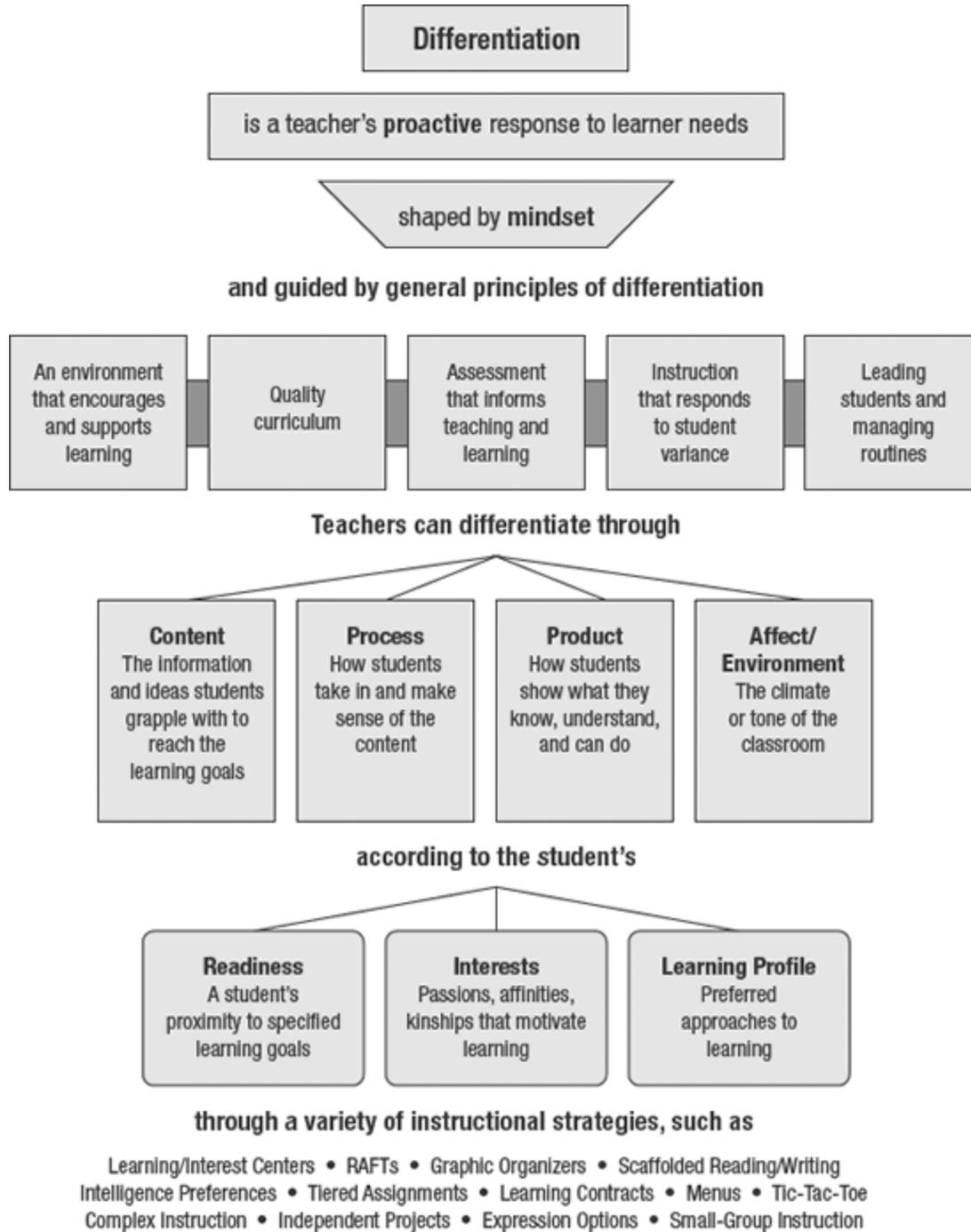
DI is a philosophical approach to teaching and learning that values individual students and caters for the diverse needs of students (Tomlinson, 2001). In DI, teachers respond to student needs proactively and make differentiation according to students' readiness, interests and learning profiles. According to Tomlinson and Moon (2013), teachers can differentiate through four core aspects: content, process, product and affect/environment. *Content* is what a student needs to learn; *Process* refers to how the student will "make sense" and "own" the content; *Product* is how the student will show what he/she has learned; and affect/environment refers to the climate and physical arrangements encompassing teaching and learning in the classroom. Figure 1 illustrates Tomlinson's framework of key elements of effective DI.

[Figure 1 here]

As shown in Figure 1, centering on the four core aspects, teachers can make differentiation through a variety of instructional strategies (e.g., graphic organizers, learning contracts, small-group instruction). Tomlinson (2017) also shared 18 key DI strategies which are believed to be crucial for teachers to successfully meet the challenge of designing and managing DI for learners. Thus, it is believed that the DI framework, together with its instructional strategies, "will help teachers meet each child where they are when they enter class and move them forward as far as possible on their educational path" (Levy, 2008, p. 162).



Figure 1. Key elements of effective differentiation instruction (Tomlinson & Moon, 2013, p. 2)





Given that DI strategies are important for successful teaching and learning in classrooms of diversified learners, DI teacher education is essential. Research on DI teacher education has emphasized the integration of theory and practice and the coherence between coursework and field practices. Congruent teaching, which provides both modelling of desired educational practice and meta-commentary of pedagogical choices and their relation to the corresponding theories, has been recommended by researchers of DI teacher education (Dack, 2018, 2019; Ruys et al., 2013; Wan, 2017). It is also suggested that DI teacher education should be based on the collaboration between university teacher educators and teachers in schools focusing on shared understanding of the conceptual and practical tools of differentiation (Dack, 2019).

Grounded in Tomlinson's DI strategies as well as previous research findings, the ultimate goal of this large-scale project is to examine the potential effect of school-university collaboration on schools' diversity management policies and teachers' DI practices. This paper, reporting the first stage research findings of the project, seeks to explore teachers' application of DI strategies in Hong Kong classrooms, and validate and elaborate Tomlinson's model (2001). It addresses the following research questions:

- 1. What DI strategies are adopted in classrooms of diverse learners in the Hong Kong secondary school?*
- 2. To what extent can the inventory of DI strategies developed based on the Hong Kong context validate the strategies in Tomlinson's DI model?*



Method and Data sources

This paper aims to elaborate Tomlinson's (2001, 2013, 2017) DI framework with classroom observation data and to discuss the extent of the application of DI strategies in Chinese classrooms. The observational data reported in this paper came from the first stage of a three-year longitudinal project on DI implementation and the development of a diversity management model in the Asian context. The data were collected from one of the case schools, a co-educational government-funded secondary school in Hong Kong. Most students of this school were motivated to learn but lacked academic support from their families. Most classes were of mixed ability, comprising a large group of lower intermediate students and a small group of average ability and more capable students. There were also some students with special education needs in each class. To cater for learner diversity, the school principal encouraged his teachers to implement DI strategies to enhance the learning readiness and interests of less capable students and to encourage collaboration between students of varied abilities.

A total of 19 forty-minute lessons were observed and videotaped in January 2019. These lessons covered different grade levels (from year 7 to 11; aged 12 to 16 years old) and content subjects (e.g., Chinese, English, Mathematics, Liberal Studies) (see Table 1 for a summary of these lessons).

Table 1. Information about lesson observation

	Year 7	Year 8	Year 9	Year 10	Year 11
Chinese	2	1	2		1
English	1	1		1	
Mathematics	1	1	2		
Liberal Studies			1	1	
Others		1 (Music)	1 (Putonghua)		1 (Geography) 1 (Physics)



To systematically document the implementation of DI strategies, the research team devised a classroom observation scheme based on Tomlinson's framework (the Appendix). The scheme consisted of four major aspects of DI (*environment, content, process, and product*), the instructional strategies under each aspect and the elaboration of each strategy. Upon the observation of the first three classes and the trial of the observation scheme, the three team members discussed whether the strategies should be modified or similar strategies should be merged.

The videotaped lessons then provided the research team with the input to conduct iterative coding of the strategies. The three team members discussed the lesson coding and refine the coding framework frequently, so as to ensure interrater reliability of the analytical process. Such analytical process not only revealed how teachers in the case school employed DI in classrooms, but also generated an inventory of DI strategies, which will be presented in the next section.

Results

The inventory of DI strategies generated from the research team's iterative coding consists of four key components: (i) the four core aspects of Tomlinson's DI framework listed as four main themes for classification of DI strategies; (ii) 26 DI strategies categorised under each aspect (e.g., A1, B1, C1 and D1); (iii) the elaboration of each strategy; and (iv) lesson video clips illustrating each strategy (see Table 2 for the first three components). Among the four core aspects, *content* and *process* occupied relatively larger proportions, consisting of 9 and 10 strategies respectively. These components of the inventory helped to validate the key aspects and corresponding strategies



in Tomlinson's DI framework. They also provided detailed elaboration and explicit exemplification of the strategies through verbal explanation and video demonstration.



Table 2. Inventory of differentiated instruction strategies

Strategy	Elaboration of strategy
A. Differentiated Environment	
A1 Chances for all student participation	Teachers create opportunities to allow all students to participate in classroom activities. For example, teachers would use elicitation techniques skilfully to invite the participation of less able students and to limit the 'over-participation' of more able students in class.
A2 Relaxed and cheerful learning atmosphere	Teachers make use of classroom activities to establish a relaxed and cheerful learning atmosphere so as to increase students' learning motivation. For example, at the beginning of the class, teachers can involve students in physical exercises or competitions to create a relaxed and cheerful learning atmosphere so as to increase the readiness of less able students.
A3 Classroom settings and equipment	The classroom settings and equipment can effectively facilitate the pedagogical process, thus enhancing students' degree of participation. For example, the desks and chairs are rearranged according to the settings of different teaching scenarios to arouse the learning interests of less able students and increase their participation.
B. Differentiated Content	
B1 Diversified learning goals	Teachers can set different learning goals according to the characteristics of learning content, students' abilities and needs.
B2 Informed choice of content	Teachers can make informed choices of teaching content according to core curriculum components, students' level of understanding and interests.
B3 Adjustable learning pace	Teachers can adjust students' learning pace according to their abilities, interests and learning styles.
B4 Adjustable teaching content	Teachers can adjust teaching content according to students' needs. For example, more able students are given more complicated information to read, whereas less able students are given a list of vocabulary as teaching content.
B5 Scenario-based teaching content	Teachers can set the teaching scenario of a lesson around daily life events or social problems so that students of different abilities could have a certain understanding of the topic and their prior knowledge could enhance their learning confidence, learning readiness and level of participation.
B6 Diversified pedagogical materials	Teachers can adopt diversified pedagogical materials (e.g. newspapers, photos, realia, videos, e-learning apps, etc.) to increase teaching and learning effectiveness. For example, photos and realia can be used to aid teacher explanation of complex concepts, thus reducing the cognitive load of less able students.



B7 Various forms to display content	Teachers can adopt various forms (e.g. photos, graphs, outlines, mind maps) to display teaching content to enable those students who are less responsive to written descriptions in textbooks to absorb the content more easily.
B8 Use of examples to illustrate content	Teachers can use examples that reflect students' interests or experiences when presenting teaching content to enhance students' motivation and attention.
B9 Reinforcement, application and extension of concepts	After students have grasped basic concepts covered in class, teachers would provide students with other opportunities (e.g. homework, discussion of other cases) to apply and extend their learning to other scenarios so as to reinforce their understanding of concepts.
C. Differentiated Process	
C1 Diversified instructional methods	Depending on the complexity and nature of learning content, teachers may employ diversified instructional methods such as elicitation, explanation, group discussions, games and independent learning tasks to engage learners of different abilities and meet their needs.
C2 Multi-sensory pedagogical designs	Depending on the learning styles of students of different abilities, teachers may adopt multi-sensory pedagogical designs to facilitate learning. For example, the use of sounds and visual representations allows the students who are less responsive to words to grasp concepts more easily.
C3 Use of information technology	Teachers could use information technology (e.g. apps) to stimulate student thinking about abstract concepts and to initiate discussion with students of varied abilities.
C4 Ability grouping	To serve different instructional purposes, teachers could group students according to their academic abilities. Heterogeneous grouping enables less able students to obtain cognitive scaffolding support from the more able group mates, and the more able ones can deepen their learning through clarifying concepts to others. Homogeneous grouping gives students of similar ability an opportunity to explore unknown concepts together and to obtain emotional support from each other.
C5 Diversified learning paths	Teachers can encourage students to make sense of an idea in their preferred way of learning, for example, exploring what they learn analytically, practically, creatively, visually, verbally or kinesthetically and deciding to work independently versus in small group.
C6 Contingent scaffolding	Teachers can offer students contingent scaffolding and timely academic support according to students' abilities and needs. For example, for students with average abilities, teachers would provide explanation during group activities.
C7 Tiered learning tasks / worksheets	Depending on students' abilities, needs and interests, teachers can design different versions of worksheets and tasks so that students in different ability groups can achieve sense of achievement during task completion, thus increasing their readiness for the next stage of learning.



C8 Different learning modes	Depending on instructional needs, teachers can adopt large class, small group and individualised modes of teaching to manage learner diversity. For example, large class teaching mode is useful in disseminating knowledge. Small group activities are effective in promoting peer interaction among students of varied abilities.
C9 Provision of feedback	Upon completing group activities, teachers provide individual students with feedback in the whole-class setting so as to encourage less able students, reinforce the learning of average ability students and extend learning of more able ones.
C10 Reinforcing summary	At the end of a lesson, teachers would summarise the key concepts covered in class to reinforce student understanding of concepts and highlight revision points for students of varied abilities.
D. Differentiated Product	
D1 Divergent thinking for knowledge exploration	During class, teachers ask students open or referential questions to identify students' learning needs and offer immediate input to support the learning of less able students and to extend the learning of more able ones.
D2 Diversified methods for learning product display	To address the needs of students with diverse capabilities, teachers can design tasks that allow students to display their learning products in paragraph writing, drawings, presentations, posters, etc.
D3 Peer evaluation of student work	Teachers invite other students to comment on their peers' work to sharpen students' judgement and reflective thinking skills.
D4 Use of appropriate assessment methods	Teachers adopt formative assessment methods to assess the learning progress and abilities of students of varied capabilities, with the aims of tracing students' learning trajectory and readjusting subsequent lesson planning to extend the learning potentials of various students.



The occurrence of DI strategies in the observed lessons in the case school was summarized in Table 3. A total of 296 instances of DI strategies were documented, and they could be categorized into 25 out of the 26 strategies in the inventory. Among the four aspects, over half of the strategies observed belonged to *process*, and over a quarter (28%) were related to *content*. Several strategies were commonly employed by teachers of different subjects. For example, in terms of DI *content*, the teachers would design lessons around daily-life scenarios (B5) and adopt pictures, graphs, videos and other forms of materials (B7) to engage less motivated students and to illustrate complicated concepts with lively teaching aids. In terms of DI *progress*, the teachers would use ability grouping (C4) to enable collaborative learning between learners of similar and different abilities and tiered learning tasks or worksheets (C7) to enhance the sense of achievement of learners of varied capabilities. The strategies of contingent scaffolding (C6) and provision of teacher feedback (C9) were also frequently observed, which may imply teachers' good understanding of students' needs and provision of timely support for their students. In contrast, some strategies related to DI *content*, such as "B3 Adjustable learning pace" (N=0) and "B4 Adjustable teaching content" (N=1), and those related to *environment* and *assessment* (e.g., "D4 Use of appropriate assessment methods") were less frequently observed in this case school. One possible reason is that changes in learning pace require the observations of the same class on consecutive days. Also, the teaching content in Hong Kong secondary schools was often confined to the syllabus of the high-stakes public examination. As a result, the teachers may face the dilemma of simplifying learning content and teaching to the exam, and they may not wish to adopt other assessment methods, which are different from the high-stakes examination.



Table 3. Occurrence of differentiated instruction strategies

Aspect	Number of occurrence
A. Differentiated Environment	(9.8%)*
A1 Chances for all student participation	15
A2 Relaxed and cheerful learning atmosphere	8
A3 Classroom settings and equipment	6
B. Differentiated Content	(28.0%)*
B1 Diversified learning goals	7
B2 Informed choice of content	7
B3 Adjustable learning pace	0
B4 Adjustable teaching content	1
B5 Scenario-based teaching content	17
B6 Diversified pedagogical materials	15
B7 Various forms to display content	10
B8 Use of examples to illustrate content	16
B9 Reinforcement, application and extension of concepts	10
C. Differentiated Process	(50.7%)*
C1 Diversified instructional methods	7
C2 Multi-sensory pedagogical designs	14
C3 Use of information technology	5
C4 Ability grouping	12
C5 Diversified learning paths	23
C6 Contingent scaffolding	16
C7 Tiered learning tasks / worksheets	12
C8 Different learning modes	22
C9 Provision of feedback	19
C10 Reinforcing summary	20
D. Differentiated Product	(11.5%)*
D1 Divergent thinking for knowledge exploration	8
D2 Diversified methods for learning product display	14
D3 Peer evaluation of student work	11
D4 Use of appropriate assessment methods	1
Total:	296

**Percentage of the strategies in each aspect, out of the total number of strategies observed*



Discussion and Significance

This study extends the application of Tomlinson's DI framework to the Asian context. From the research findings, it can be noted that although a majority of the DI strategies in Tomlinson's framework were applicable in Hong Kong classrooms, some strategies were less frequently used or even irrelevant. This shows that the application of DI strategies may be affected by the specific sociocultural practices as well as educational policies in the local context. Hence, culturally responsive DI strategies should be explored and tried out in classrooms of diverse learner needs.

This research also contributes to the development of DI research and DI teacher education. Unlike the study by Wan (2017), the collaborative school in this study was one of the few schools in Hong Kong which had implemented school-based diversity management for a decade, and the teachers were able to adopt different DI strategies. However, the teachers' reflection indicated that they adopted the strategies according to experience without clear conceptualization of the theories underpinning the strategies. Such contingent application of ID strategies seemed to be more of fragmentary experiences than systematic teacher knowledge. In pre-service teacher education, Dack (2018) pointed out that teacher candidates learning about DI through coursework were "unable to identify almost all of the ways in which Tomlinson modeled differentiation" when the instructor's modeling was implicit without meta-commentary (p. 70). This study serves to bridge the gap by proposing an inventory of DI strategies, which was developed based on teachers' authentic DI practices conceptualized by university researchers. The theories underpinning the different strategies were elaborated and exemplified (i.e., as meta-commentary) with corresponding video clips as explicit models. In this sense, the inventory may serve not only as an analytical framework for DI research but also an instrument for teacher education.



It should be noted that the current paper reports some preliminary findings at the first stage of the research, and it is subject to some limitations; for example, besides lesson observations, other data collection methods such as interviews with the teachers and students may provide triangulation of the lesson observation data. A longitudinal design with more school cases will allow the researchers to collect more data to enrich and corroborate the current version of the inventory of DI strategies.

[Word count: 1914 words]



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Appendix. Class Observation Scheme

School:	Teacher:	Observer:	Date:	Starting time: Ending time:
Learning objective(s):				
Learning activity(ies):				

A. Learning Environment	Instructional Strategies & Examples		
A1 Chances for all student participation			
A2 Relaxed and cheerful learning atmosphere			
A3 Classroom settings and equipment			

B. Learning Content	Instructional Strategies & Examples		
B1 Diversified learning goals			
B2 Informed choice of content			
B3 Adjustable learning pace			



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B4	Adjustable teaching content			
B5	Scenario-based teaching content			
B6	Diversified pedagogical materials			
B7	Various forms to display content			
B8	Use of examples to illustrate content			
B9	Reinforcement, application and extension of concepts			

C. Learning Process		Instructional Strategies & Examples		
C1	Diversified instructional methods			
C2	Multi-sensory pedagogical designs			
C3	Use of information technology			
C4	Ability grouping			



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C5	Diversified learning paths			
C6	Contingent scaffolding			
C7	Tiered learning tasks / worksheets			
C8	Different learning modes			
C9	Provision of feedback			
C10	Reinforcing summary			

D. Learning Product		Instructional Strategies & Examples		
D1	Divergent thinking for knowledge exploration			
D2	Diversified methods for learning product display			
D3	Peer evaluation of student work			
D4	Use of appropriate assessment methods			