Thinking styles in student learning and development

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For the past seven decades, scholars have been investigating the roles of intellectual styles in human learning and development (Morgan, 1997). Intellectual styles, a general term for different constructs with or without the root word “style”, such as cognitive style, learning style, conceptual tempo, and thinking style, refer to people’s preferred ways of processing information (Zhang and Sternberg, 2006). Although various intellectual styles are conceptually different (Sternberg and Zhang, 2001b), they are similar in a fundamental way: all of them are different from abilities. An ability refers to what one can do, whereas a style refers to how one prefers to use the abilities that one has. Major theorization and research on styles has been summarized in several recent publications (e.g. Jonassen and Grabowski, 1993; Riding and Cheema, 1991; Sternberg and Zhang, 2001a; Zhang and Sternberg, 2006, 2009a).

This chapter examines the role of thinking styles as defined in Sternberg’s theory of mental self-government in student learning and development. It is divided into four parts. First, the theory and the research tools used to operationalize the theory are introduced. Second, research evidence supporting the importance of thinking styles in learning is presented. The third part introduces research evidence demonstrating the value of thinking styles in student development. Finally, some conclusions are drawn and implications of findings on the role of thinking styles in student learning and development for education are discussed.

The theory of mental self-government and its research tools

Using “government” metaphorically, Sternberg (1988) contended that just as there are different ways of governing a society, there are different ways in which people use their abilities. These different preferences for using abilities are construed as thinking styles. The theory describes 13 thinking styles. The main characteristics of each of the 13 thinking styles are highlighted in the Appendix (see the end of the chapter).

Based on empirical evidence, Zhang (2002a) reconceptualized the 13 styles into three types. Type I styles are more creativity-generating, require higher levels of cognitive complexity, and include the legislative, judicial, hierarchical, global, and liberal styles. Type II styles denote a norm-conforming tendency, require lower levels of cognitive complexity, and include the executive, local, monarchic, and conservative thinking styles. Type III styles may manifest the characteristics of either Type I or Type II styles, depending on the stylistic demands of the specific task, and include the anarchic, oligarchic, internal, and external styles.
Although various research methods (e.g., questionnaire survey, interview, and experiment) have been used to study thinking styles, self-report inventories, especially the Thinking Styles Inventory (TSI, Sternberg and Wagner, 1992) and its revised versions, TSI-R (Sternberg, Wagner and Zhang, 2003) and TSI-R2 (Sternberg, Wagner, and Zhang, 2007), have been responsible for generating the bulk of the literature on thinking styles. Research using these inventories has supported the validity of Sternberg’s original theory, as well as its reconceptualization (e.g. Fjell and Walhovd, 2004; Hommerding, 2003; Zhang, 2005), and has shown that thinking styles play an important role within the education arena. This chapter focuses on elaborating research that has demonstrated the value of thinking styles in student learning and development.

Thinking styles in student learning

Broadly speaking, the critical role of thinking styles has been evidenced in two aspects of student learning: learning processes and learning outcomes. Learning processes are represented by such constructs as Biggs’s (1992) learning approaches, Atkinson’s (1964) achievement motivation, and Schraw and Dennison’s (1994) metacognitive processes, while learning outcomes are best represented by students’ academic achievement.

- Learning Approaches and Thinking Styles. According to Biggs (1992): learners commonly use three approaches to learning: surface, which involves a reproduction of what is taught in order to meet the minimum requirements; deep, which involves a real understanding of what is learned; and achieving, which involves maximizing one’s grades. The relationship between learning approaches and thinking styles is an important area of study, because, whereas the two constructs have been individually shown to be critical to student learning, nothing was known about how the two constructs were related to each other until the studies described here were published.

  In a first study, Zhang and Sternberg (2000) administered the Thinking Styles Inventory (Sternberg and Wagner, 1992) and Biggs’s (1987) Study Process Questionnaire to 854 students entering the University of Hong Kong and 215 undergraduate freshmen from two universities in Nanjing, mainland China. As expected, results suggested that, in general, students who indicated a stronger preference for Type I thinking styles tended to report a deep approach to learning, whereas students who scored higher in Type II thinking styles tended to report a surface approach to learning. Zhang (2000a) replicated the above study among two independent samples in the United States of America. The first sample was composed of 67 students taking an introductory psychology course in a Midwest Big Ten university in 1997. The second sample was a different cohort group of students (N = 65) registered in the same course in the same university in 1998. Data from these two samples suggested strikingly similar results to those in Zhang and Sternberg’s (2000) study of Chinese university students.

- Achievement Motivation and Thinking Styles. Fan and Zhang (2009) investigated whether or not thinking styles made a difference in students’ achievement motivation. Two hundred and thirty-eight university students in Shanghai responded to the TSI-R (Sternberg, Wagner and Zhang, 2003) and the Achievement Motives Scale (Gjesme and Nygard, 1970) that is based on Atkinson’s (1964) achievement motivation theory. Results confirmed the prediction that Type I thinking styles would be positively contributory to achievement motivation to approach success – an achievement motivation that is considered to be more adaptive – but negatively to achievement motivation to avoid failure – an achievement motivation deemed to be maladaptive. At the same time, the findings lent partial support to the prediction that Type II thinking styles would be negatively related to achievement motivation to approach success.

- Metacognition and Thinking Styles. Metacognition, a critical individual-difference variable in the learning process, refers to the ability to reflect upon, understand, and control one’s learning (Schraw and
Dennison, 1994). Zhang (2010a) administered the TSI-R2 (Sternberg, Wagner and Zhang, 2007), the Metacognitive Awareness Inventory (Schraw and Dennison, 1994), and the Self-rated Ability Scale (Zhang, 1996) to 424 university students in mainland China. Results suggested that, after students’ self-rated abilities were taken into account, three creativity-generating styles (hierarchical, liberal, and legislative) and the executive style predicted the level of metacognition.

- **Achievement and Thinking Styles.** Research on the role of thinking styles in academic achievement has been carried out at both the school level and the university level in several cultural contexts. Findings are diverse. The earliest research on the contribution of thinking styles to academic achievement was conducted by Sternberg and Grigorenko (1993; also see Grigorenko and Sternberg, 1997) with two groups of gifted students participating in the Yale Summer School Program. The authors found that the Type I, judicial and legislative thinking styles, positively predicted students’ success in a variety of academic tasks, whereas the Type II, executive thinking style, tended to contribute negatively to students’ success in these tasks. However, in a study of American university students, Zhang (2002b) found that the Type II, conservative style, positively predicted students’ grade point averages, whereas the Type I, global and liberal styles, did so negatively. The inconsistent findings may be due to various factors, most notably, students’ different educational levels and the different types of achievement scores used in the different studies. Moreover, different schools also may value different styles. For example, Sternberg and Grigorenko (1993) found correlations that differed in sign between styles and academic achievement across different schools: More progressive schools attached more importance to Type I styles, while more conservative schools put stronger emphasis on Type II styles.

In Hong Kong, several studies (Cheung, 2002; Sun, 2000; Zhang, 2001a, 2001b, 2004; Zhang and Sternberg, 1998) were carried out in both secondary school and university settings. Results from almost all studies in Hong Kong (with Sun’s 2000 and Zhang’s 2001b studies being the exceptions) suggested that, in general, the Type II thinking styles, which require conformity (conservative style) and respect for authority (executive style), and the Type I style, which requires a sense of order (hierarchical style), tended to be negatively predictive of academic achievement. Furthermore, a preference for working individually (internal style) was positively correlated with academic achievement, while a preference for working in groups (external style) was negatively associated with higher academic achievement scores. In a classroom that emphasizes creative thinking and cooperative learning, however, the opposite pattern of results might have been shown.

Sun’s (2000) study lent partial support to the above general findings by identifying a positive relationship between students’ achievement in the Chinese language and the local (Type II) and hierarchical (Type I) styles among a group of higher-ability students. However, within a lower-ability group, a positive relationship was found between achievement in the Chinese language and the liberal (Type I) thinking style. Furthermore, one of the Hong Kong studies involved investigating the contribution of thinking styles to academic achievement among university students from mainland China (Zhang, 2001b). Results showed that, as among American school students, the executive (Type II) thinking style was a negative contributory factor in students’ academic achievement.

Studies of academic achievement among Filipino university students (Bernardo, Zhang and Callueng, 2002) and among university students in Spain (Cano-Garcia and Hughes, 2000) obtained results that were consistent with those in the majority of Hong Kong studies and with those in the American university sample.

In Israel, Nachmias and Shany (2002) examined the relationships between students’ performance in virtual courses and thinking styles among eighth and ninth graders. As in the majority of studies, this study suggested that the internal style positively contributed to achievement. At the same time, the study also found that the liberal (Type I) style contributed to better performance.
Finally, in a more recent study, Kyriakides (2005) investigated the predictive power of thinking styles for academic achievement among a large sample of Cypriot primary school students (1,721 students from 32 schools). Results suggested that a Type I style (liberal) and a Type II style (executive) positively predicted students’ achievement in both mathematics and the Greek language. At the same time, the global (Type I) style also positively contributed to achievement in the Greek language.

As illustrated above, the specific ways in which thinking styles contribute to students’ academic achievement are not always consistent. They are highly contingent upon culture, school level, and academic subject matter. Nonetheless, existing studies strongly suggest that thinking styles play an important role in academic achievement—a major indicator of learning outcomes—as they do in learning processes.

Thinking styles in student development

Apart from having been shown to be an important factor in learning processes and learning outcomes, thinking styles have been shown to be essential in student development. These developmental aspects include, but are not limited to, cognitive development, emotional development, identity development, career interest development, psychosocial development, personality development, and mental health.

- **Cognitive Development and Thinking Styles.** Zhang (2002a) examined the relationship of thinking styles to cognitive development as measured by the Zhang Cognitive Development Inventory (Zhang, 1997), which is based on Perry’s (1970, 1981) theory of ethical and intellectual development. Research participants in Zhang’s (2002a) study were 82 university students in Hong Kong. It was found that, in general, students who reasoned at higher levels of cognitive development tended to use a wider range of thinking styles, whereas students who reasoned at lower levels of cognitive development tended to be confined to a narrow range of thinking styles, in particular, to Type II styles—styles that denote a norm-favoring tendency.

- **Emotional Development and Thinking Styles.** Zhang (2008a) also examined the relationships of thinking styles to emotional development as assessed by the Iowa Managing Emotions Inventory (IMEI, Hood and Jackson, 1997), based on the five types of emotions proposed by Chickering (1969; see also Chickering and Reisser, 1993): happiness, attraction, anger, depression, and frustration. Participants in Zhang’s (2008a) study were 93 (23 male and 76 female) second-year students in Hong Kong. Results showed that Type I thinking styles were related to Hong Kong university students’ ability to deal with negative emotions (e.g. depression, frustration, and anger) and to the enhancement of positive emotions (e.g. attraction and happiness).

- **Identity Development and Thinking Styles.** In Zhang’s (2008b) study, the Erwin Identity Scale–III (Erwin, 1987) was used to measure three aspects of identity: confidence, sexual identity, and conceptions about body and appearance. Participants were 187 university students in mainland China. Results indicated that Type I styles positively contributed to the development of students’ confidence and conceptions about body and appearance, whereas Type II styles did so negatively, as predicted. However, findings related to the dimension of sexual identity were equivocal in that both Type I and Type II styles positively predicted the development of sexual identity. The inconsistent findings on sexual identity suggest that the development of sexual identity and the development of the other two dimensions of identity may follow very different trajectories. Nonetheless, it is undeniable that thinking styles play an important role in identity development.

- **Career Interests and Thinking Styles.** Research efforts have also aimed at identifying the association of thinking styles with the development of career interests as defined in Holland’s (1973, 1994) six types of career interests: realistic, investigative, artistic, social, enterprising, and conventional. In a study of 600 university students in Hong Kong, Zhang (2000b) found that Type I styles and the external style tended to be positively related to the development of social and enterprising career interests, whereas
Type II styles were positively associated with the conventional type of career interest. These findings were replicated with 789 university students in mainland China (Zhang, 2001c). Identical findings were subsequently obtained by Balkis and Isiker (2005) in their study of 367 third-year university students in Turkey.

- **Psychosocial Development and Thinking Styles.** Psychosocial development as defined by Erikson (1968) is another student–developmental dimension against which thinking styles have been tested (Zhang, 2010b; Zhang and He, 2011). Erikson's eight stages of psychosocial development were operationalized thorough the Measures of Psychosocial Development (Hawley, 1988). A first study was conducted by Zhang and He (2011): who investigated the relationship between thinking styles and psychosocial development among 426 university students in Shanghai. Results suggested that Type I styles positively contributed to psychosocial development, whereas Type II styles, especially the monarchic and conservative styles, did so negatively. Moreover, two Type III styles consistently predicted psychosocial development: the external style positively contributed to psychosocial development, whereas the anarchic style did so negatively. These results have since been replicated with an independent sample of 362 university students in mainland China (Nanjing) and with a sample of 117 university students in Hong Kong.

- **Personality Development and Thinking Styles.** Thinking styles have been examined in relation to the development of at least four types of personality: the Big Five personality traits, locus of control, anxiety, and self-esteem. Between 2001 and 2003, several studies (e.g. Zhang and Huang, 2001) examining the relationships between thinking styles and the Big Five personality traits (Costa and McCrae, 1992) in Hong Kong and mainland China consistently indicated that Type I thinking styles were positively related to such adaptive personality traits as openness and conscientiousness, whereas Type II styles were positively related to neuroticism—a personality trait often regarded as undesirable. These findings were subsequently supported by studies conducted in the United States of America, Norway (Fjell and Walhovd, 2004), and Iran (Shokri, Kadivar, Farzad, Sangari, and Ghanaei, 2006).

  Palut (2008) examined the relationship between thinking styles and locus of control as measured by Rotter's Internal–External Locus of Control Scale (Rotter, 1966) among 108 female preschool teacher education students. Results indicated that all five Type I thinking styles were negatively associated with higher levels of externality—a personality trait often shown to be correlated with less adaptive attributes such as school discipline problems and task postponement.

  Zhang (2009) investigated the role of thinking styles in anxiety as measured by Spielberger's (1983) State–Trait Anxiety Inventory. Participants were 378 university students in mainland China. The study showed that, in general, Type I styles and the external style were negatively related to anxiety, whereas the conservative style was positively related to anxiety.

  Students' thinking styles have been tested against their levels of self-esteem. In a first Study, Zhang (2001d) investigated the relationship of thinking styles to self-esteem among 794 university students in Hong Kong using the Self-Esteem Inventory (Adult Form, Coopersmith, 1981). It was found that higher levels of self-esteem were significantly positively related to Type I thinking styles, but moderately negatively related to Type II styles. In a second study of an independent sample of 694 university students in Hong Kong, Zhang and Postiglione (2001) obtained strikingly similar results.

- **Mental Health and Thinking Styles.** Finally, Chen and Zhang (under review) examined the role of thinking styles in mental health as measured by a Chinese version of the Symptom Checklist-90 (Derogatis, Rickels, and Rock, 1976). Participants were 250 university students majoring in management and business at Guangzhou University of Foreign Studies in Guangzhou, P.R. China. It was found that students scoring higher on Type I thinking styles tended to report better mental health, scoring lower on depression and hostility scales as well as lower on the General Symptomatic Index. By contrast, students scoring higher on Type II styles, especially those who scored higher on the local and
monarchic styles, tended to score higher on such scales as phobic anxiety, obsessive-compulsive, and psychoticism.

Conclusions and implications

The preceding two sections described empirical work focusing on investigating the role of thinking styles in student learning and development. It has been demonstrated that the role of thinking styles in learning processes such as study approaches, metacognition, and achievement motivation as well as in several student-developmental dimensions has been remarkably consistent. Type I styles (i.e. styles that are creativity-generating) are predictive of learning processes and developmental outcomes that are normally perceived to carry positive values (e.g. deep approach to learning, achievement motivation to approach success, higher levels of cognitive development, openness and conscientiousness personality traits, and so on). Type II styles (i.e. styles that are norm-conforming) on the other hand, are contributory to students’ learning processes and student-developmental outcomes that are commonly considered to carry negative values (e.g. surface approach to learning, achievement motivation to avoid failure, lower levels of cognitive development, neuroticism and psychoticism personality traits, and so forth). The ways in which thinking styles contribute to academic achievement, however, can vary as a function of a range of demographic factors. These include cultural contexts, school and grade levels, and academic subject matter.

It is true that, in some cases, research on particular variables (e.g. metacognition and anxiety) has been conducted merely in one single study, which makes the relevant findings impossible to be generalized. It is also true that all studies reviewed here are correlational and cross-sectional. Even so, for at least three reasons, the results obtained are more likely to reflect true individual differences in student learning and development, than to have been found by a statistical chance. First, the consistent patterns of predictive relationships identified are the convergent results from studies of different variables within and across student learning and development. Second, the data sources are from a wide range of cultural settings and from both schools and universities. Third, the psychometric properties of the inventories employed in the studies are sound. Given these reasons, one could argue that the findings highlighted here make significant contributions to the field of styles and they have practical implications for education.

To begin with, although much knowledge about thinking styles as defined in Sternberg’s theory of mental self-government has been accumulated over the past two decades, there is not a single piece of work that documents this knowledge. The present chapter reviews work that focused on the roles of thinking styles in student learning and development. The general conclusion that thinking styles are critical in student learning and development contributes to the literature on styles and to that on student learning and development. At the same time, this review contributes to our knowledge about the nature of thinking styles. In the styles literature, one of the long-standing controversial issues is whether styles are value-laden or value-free. This review shows that thinking styles are value-laden, with Type I styles being generally more adaptive than Type II styles.

Equally importantly, the research reviewed here has practical implications for education. Although the concept of thinking styles is becoming increasingly known in the education arena, almost all parties (including students, teachers, student development educators, and senior administrators) are left to wonder how they can apply the notion of styles in their efforts to enhance student learning and development. What are the roles of thinking styles in student learning and developmental outcomes? Studies reviewed in this chapter consistently suggest that thinking styles play critical roles not only in learning processes and academic achievement, but also in non-cognitive development. Such findings have implications for students, teachers, student development educators, and school/university senior managers.

- Students. Very often, students are aware of the importance of ability, even that of personality, in learning and development. However, seldom do students realize that their thinking styles also play an


important function in learning and development. An understanding of the notion of thinking styles would be conducive to the development of student self-esteem and motivation for learning. For example, when students achieve unsatisfactory academic scores, instead of attributing their “failure” to their low academic ability, students could perhaps start thinking about other possible reasons, such as a mismatch between their learning styles and teachers’ teaching styles. One important outcome of such a realization could be that students gain confidence in themselves and, thereafter, become more motivated to learn. Beyond the academic domain, an awareness of the notion of styles may have other benefits. For example, an understanding of the diversity of thinking styles may also enable students to develop higher levels of tolerance for individual differences in ways of approaching their learning tasks, and in their values and opinions.

- Teachers. Thinking styles can be changed and teachers are in a powerful position to act as the agents of change. The question is: what kind of thinking styles should teachers develop among their students, and what are some of the strategies that teachers could use to develop students’ thinking styles?

Teachers can be engaged in many activities to allow for a variety of thinking styles among students. For example, teachers could facilitate the use of different thinking styles by diversifying their instructional methods and assessment schemes. This diversification is necessary, because, whereas some students may learn better when teachers’ instructions leave plenty of room for imagination, others may learn more effectively when teachers provide detailed guidelines. Students who appear mediocre when assessed on one type of tasks may excel on another. Effective teachers diversify their instruction and assessment so that students, no matter what their thinking styles are, have the opportunity to learn and grow intellectually in a learning environment that is both accommodating (i.e. that allows students to use their existing styles) and challenging (i.e. that provides students with the opportunities to develop other styles).

Likewise, teachers can do much to foster Type I styles. For example, they could do so by modeling creative thinking within and beyond classroom settings, by allowing students to make mistakes and to take risks, and by encouraging creative ideas through assigning learning tasks that elicit creative thinking.

- Student Development Educators. The finding that thinking styles have a special place in student developmental outcomes dictates that student development educators (e.g. university/school counselors, student affairs personnel, and career guidance personnel) take thinking styles into account when they work with students. Like teachers, student development educators could foster students’ Type I styles. They could encourage students to use more complex thinking in their career decision making (or development in any other non-cognitive domains) by challenging students to come up with creative solutions. For example, they could promote creative thinking by modeling open-mindedness in working with students. As another example, they could facilitate programs that aim at cultivating students’ tendency to appreciate different values and traditions. Research has shown that engaging in such activities as finding creative solutions, being open-minded, and appreciating different values and traditions is beneficial to the development of Type I thinking styles (Zhang and Sternberg, 2009b).

- Senior Administrators. In order to meet the diversity in students’ styles, both teachers and student development educators need constantly to expand their repertoire for working with students. Such an expansion would come much more easily if they had the opportunities to learn from one another. Senior school and university managers are in the best position to create situations in which staff members could share their experiences, and thus increase their capacity to deal with students with diverse styles.

To promote diverse styles among students, senior school and university managers must first encourage diverse styles among teachers and student development educators. They can do so by taking into account individual differences among teachers and student development educators. For example, they could demonstrate flexibility in working with teachers by creating a work environment in which
teachers and student development educators have the autonomy to do things in their own preferred ways. Finally, they could also facilitate positive student learning and development by introducing policies that encourage Type I styles among students, teachers, and student development educators.

Appendix

Table 9.1 Thinking styles in the theory of mental self-government

<table>
<thead>
<tr>
<th>Style type</th>
<th>Thinking style</th>
<th>Key characteristics</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Legislative</td>
<td>One prefers to work on tasks that require creative strategies; to choose one’s own activities.</td>
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<tr>
<td></td>
<td>Judicial</td>
<td>One prefers to work on tasks that allow for one’s evaluation; to evaluate and judge the performance of other people.</td>
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<td></td>
<td>Hierarchical</td>
<td>One prefers to distribute attention to several tasks that are prioritized according to one’s valuing of the tasks.</td>
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<td></td>
<td>Global</td>
<td>One prefers to pay more attention to the overall picture of an issue and to abstract ideas.</td>
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<td></td>
<td>Liberal</td>
<td>One prefers to work on tasks that involve novelty and ambiguity.</td>
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<td>III</td>
<td>Executive</td>
<td>One prefers to work on tasks with clear instructions and structures; to implement tasks with established guidelines.</td>
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<td></td>
<td>Monarchic</td>
<td>One prefers to work on tasks that allow complete focus on one thing at a time.</td>
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<td></td>
<td>Local</td>
<td>One prefers to work on tasks that require working with concrete details.</td>
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<td></td>
<td>Conservative</td>
<td>One prefers to work on tasks that allow one to adhere to the existing rules and procedures in performing tasks.</td>
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<td></td>
<td>Oligarchic</td>
<td>One prefers to work on multiple tasks in the service of multiple objectives, without setting priorities.</td>
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<tr>
<td></td>
<td>Anarchic</td>
<td>One prefers to work on tasks that would allow flexibility as to what, where, when, and how one works.</td>
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<td></td>
<td>Internal</td>
<td>One prefers to work on tasks that allow one to work as an independent unit.</td>
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<tr>
<td></td>
<td>External</td>
<td>One prefers to work on tasks that allow for collaborative ventures with other people.</td>
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</table>

References

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