



An experimental comparison of the flexibility in the use of thinking styles in traditional and hypermedia learning environments

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ABSTRACT

The objective of the instructional experiment was to examine if the use of thinking styles is flexible in traditional and hypermedia learning environments, and if a hypermedia learning environment possesses obvious advantages than a traditional environment in adapting to students with different thinking styles. The participant university students from Shanghai, P.R. China took the General Psychology course taught by one psychology teacher. One hundred and seven science students and one hundred and thirty-one social science students were assigned into traditional and hypermedia instructional groups, respectively. The results indicated that the use of the hierarchical, executive, conservative, and monarchic styles was increased, while the use of the local style was decreased due to the traditional instructional environment. The use of the judicial and liberal styles was increased, while the use of the legislative style was weakened due to the hypermedia environment. Moreover, significant effects of discipline differences in the use of particular thinking styles were found in the traditional instructional environment. Specifically, within the context of traditional learning environments, the use of the hierarchical style increased among the science students, while the use of the local style decreased among the social science students. The study did not support the view that a hypermedia learning environment is clearly better than a traditional environment in accommodating students with different thinking styles. Implications for learning and teaching are discussed.

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1. Introduction

In the past several decades, the term “intellectual styles” is used in a general way to encompass the meanings of all major style constructs postulated, such as cognitive style, learning style, and thinking style (Zhang, Sternberg, & Rayner, 2012). Specifically, for instance, cognitive styles refer to people’s consistent, characteristic, preferred modes of organizing and processing information (Cormo & Snow, 1986); learning styles mainly address the characteristic ways one approaches learning tasks (Renzulli & Dai, 2001); and thinking styles defined preferred ways of using abilities (Sternberg, 1997).

It has been largely demonstrated that intellectual style in terms of these different style labels is a valuable construct in learning to describe the marked differences in performance shown by people as they think, learn, teach, or process information and carry out various tasks (Messick, 1994; Riding & Cheema, 1991; Zhang & Sternberg, 2005). However, some authors (e.g., Rayner & Riding, 1997; Sternberg & Grigorenko, 1997; Zhang & Sternberg, 2005, 2009) criticized some theories of intellectual styles (e.g., Witkin’s theory) for being built upon limited research evidence, and argued none of the studies

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was experimental and thus had a focus on examining the stability (versus flexibility) of intellectual styles of individuals over time.

Most of extant studies were conducted in traditional learning environments (Kogan & Saarni, 1990; Rayner & Riding, 1997; Sternberg & Grigorenko, 1997; Witkin & Goodenough, 1981), and largely supported that various intellectual styles are flexible and modifiable (Balkis & Isiker, 2005; Zhang & Sternberg, 2006). Generally, the flexibility of the use in intellectual styles refers to the increased or decreased use of particular styles over time. However, few studies (e.g., Broad, Matthews, & McDonald, 2004) in the literature have examined flexibility of the use of intellectual styles in various e-learning contexts such as hypermedia learning that is increasingly playing an important role in education since the 1990s (Clark & Mayer, 2003; Kao, Lei, & Sun, 2008; Liu, Magjuka, & Lee, 2008).

Actually, e-learning contexts including hypermedia condition provided distinguished features from traditional learning environments, for instance, both linear and nonlinear learning materials, and greater learner control (Akbulut & Cardak, 2012). Consequently, some authors argued that a hypermedia system can offer a multiple-style learning environment and possesses many different characteristics in comparison with a traditional learning environment (Azevedo & Cromley, 2004; Barhouni & Moghrabi, 2011). With the increasing application and popularization of e-learning, especially the hypermedia system, in the process of teaching and learning, the development of students' styles might have some new characteristics (Eyuboglu & Orhan, 2011). Thus, advances in technology have outpaced our understanding of the influences of the use of intellectual styles on students' learning in e-learning environments (Shapiro & Niederhauser, 2004). We have little knowledge about the use of styles and how students' styles develop in such environments. It is therefore important to test the application of current theories of educational psychology and technology by conducting empirical studies that compare intellectual styles in hypermedia and traditional instructional environments, and to investigate the likelihood and extent of malleability in the use of intellectual styles in different learning environments through experimental studies (Bishop-Clark, 1995; Sternberg & Grigorenko, 1997).

1.1. The use of flexibility in intellectual styles

As one of the major controversial issues in the field of intellectual styles, style flexibility or change is almost going along with the coming of the style construct (Sternberg, 1997). Some studies provided statistical evidence that different intellectual styles vary in the light of both personological and situational characteristics. On the one hand, many studies have found that peoples' styles differ in virtue of ones' personal characteristics, such as age, gender, and cognitive development level (Fer, 2007; Zhang & Fan, 2011). For instance, Kogan and Block (1991) found that children's cognitive development level was related to their field dependent/independent styles; furthermore, sex difference existed as well. A study among Turkish students found that the male students tended to adopt judicial and external styles more frequently than the female students, while the female students tended to use the executive style more frequently (Balkis & Isiker, 2005).

On the other hand, family environments, such as parenting style and attitudes and socio-economic level, are very important for individuals' intellectual styles. The study by Kogan and Block (1991) supported the argument that parental socialization significantly influenced a child's intellectual styles. Sternberg and Grigorenko (1995) reported that SES was negatively connected to the judicial, local, conservative, and oligarchic styles. Zhang (2003) found that students' intellectual styles are related not only to their personal factors such as sex, grade, and self-rated abilities, but also to their parents' styles.

In addition, different school experiences and cultures distinctively contribute to the flexibility in the use of intellectual styles (Barmeyer, 2004; Saracho, 1983). For example, in order to get positive evaluation, or teachers' attention, students are inclined to match their teachers in styles (Sternberg & Grigorenko, 1995). Balkis and Isiker (2005) found that students from social science departments were inclined to employ the conservative style more often than students studying in natural sciences. With cross-cultural samples (from France, Germany, and Quebec of Canada), Barmeyer (2004) investigated the effects of national culture, and found that German students preferred assimilating and converging styles than the Quebecois students, and that the students from France and Quebec were closer in other preferred styles together than their German counterparts.

1.2. The present study

As a typical theory of intellectual styles, Sternberg's (1997) mental self-government theory (MSG) has been well supported in the literature since 1990s. A number of studies underpinned the trichotomy of thinking style in the MSG (Zhang & Fan, 2011; Zhang & Sternberg, 2005). Type I styles include the legislative, judicial, hierarchical, global, and liberal styles and are thought to be more creativity-generating and complex. Type II styles consist of the executive, conservative, monarchic, and local styles and are perceived to be more norm-favoring and simplistic. Type III styles include the internal, external, oligarchic, and anarchic styles. The use of Type III styles is more dependent on specific contexts or tasks, and is suggested to be value-neutral.

In traditional learning situations, many studies (e.g., Kaufman, 2001; Sternberg & Grigorenko, 1995; Zhang, 1999) found that styles are in part socialized. However, those related studies cannot be analogized to e-learning such as hypermedia-based learning. Therefore, this experimental study specifically aimed at determining whether or not flexibility in the use of thinking styles based on the MSG is significant in both traditional and hypermedia instructional environments. It would be very valuable for illustrating the nature of intellectual styles, and for understanding the relationships between students'

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