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Styles of Thinking as a Basis of Differentiated Instruction

We consider how to differentiate instruction using a theory of thinking styles as a basis for differentiation. The article opens with a consideration of why styles are important. Then it considers some general characteristics of styles, presents the theory of mental self-government, considers issues of measurement, and presents data supporting the theory. Next, it discusses application of the theory in the classroom. Finally, it draws conclusions.

CHILDREN LEARN WELL IN DIFFERENT WAYS, and seem to profit most when instruction is differentiated in some manner to accommodate these differences. Why do some children learn so well from lectures, when others learn better by reading the same material? Why do some children learn better from independent projects, and others from structured assignments? Questions such as

these can be elucidated through the concept of styles of thinking. Understanding thinking styles helps teachers differentiate instruction to maximize the learning outcomes of all learners (Sternberg, 1997; Sternberg & Grigorenko, 1997). Indeed, learning approaches are related to thinking styles (Zhang, 2000; Zhang & Sternberg, in press). Styles can apply at any level from elementary school (Sternberg & Grigorenko, 1995) through the university level (Cilliers & Sternberg, 2001).

A style of thought is a preference for using abilities in certain ways. It is not an ability itself, but the way one likes to utilize abilities. Thus, when we speak of individual differences in thinking styles, we are speaking only of differences, not of better and worse. Our use of the term *thinking style* is distinct from the use of the term *learning style* that is sometimes found in the literature. Learning styles are generally viewed as dealing with preferred ways of learning material (e.g., orally, visually, kinesthetically), whereas the styles of which we speak deal with preferred ways of thinking about material. Thinking styles, as well as more generalized cognitive styles, can affect learning, but are not directly styles of learning. Styles of thought are important in education from several points of view. First, if abilities, as currently measured, account for only small pro-

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portions of individual differences in school performance, then one must ask what other kinds of constructs might account for what is not predicted (Gardner, 1993; Sternberg, 1985). Thinking styles, we argue, provide one such construct.

Second, sometimes the pattern of styles that leads to success in a course in a given discipline is not the pattern of styles that leads to success later in a job in that discipline. As a result, teachers may give the best grades to students who will not be particularly successful in a given field, and derail other students who might be very successful but will never have the chance to prove it because of low grades.

Third, abilities take into account skills, but not preferences. Preferences matter for school and job success. Someone may have creative ability, but not enjoy generating ideas that challenge prevailing points of view (Sternberg & Lubart, 1995). Or someone else might not be very creative, but enjoys coming up with ideas that, despite the individual's efforts, are not very novel or good.

Motivation for Research on Styles

What kinds of findings have motivated research on styles? There are several, some statistical, some anecdotal.

First, statistically, it is known that traditional tests of aptitudes account for some, but certainly not all, of the variation in school performance (Sternberg, 2000). Attempts to modify the ability tests have resulted in some increases (Sternberg, The Rainbow Project Collaborators, & University of Michigan Business School Project Collaborators, 2004), but there is still a lot of unexplained variation. Investigators have looked at styles as a possible way to account for additional variation, and have had some success (Biggs, 1988; Entwistle, 1981).

Second, there is a large literature on styles that is, quite frankly, of variable quality. But at least some of this literature suggests that styles can be helpful in understanding educational phenomena (Sternberg, 1997; Zhang & Sternberg, in press).

Third, many in education have experienced first-hand the effects of styles in their educational

careers. The senior author, for example, found that his performance in an introductory course, taught in one style (executive, closely adhering to instructions on what to learn and how to learn it), was worse than his performance in other courses taught in another style (legislative, allowing more freedom as to what to learn and how to learn it).

Some General Characteristics of Styles

Before proceeding, we outline some general characteristics of styles of thought (Sternberg, 1997):

- *Styles are preferences, not abilities.* There is a difference between how creative a student is (ability) and how much the student likes to be creative (style).
- *Styles are not “good” or “bad,” but rather matters of fit between learner and teacher or learner and material.* What one teacher considers a good style, another may consider bad, and vice versa.
- *Styles can vary across tasks and situations.* People vary their styles, at least somewhat, to fit what they are doing. They do not have one fixed style.
- *People differ in strengths of stylistic preferences.* Some people strongly prefer certain styles; others have only weak preferences.
- *People differ in stylistic flexibility.* Some people easily can switch among styles; others cannot.
- *Styles are socialized.* Styles are learned through interactions with the environment.
- *Styles can vary across the life span—they are not fixed.* People may change their styles over the years.
- *Styles are measurable.* We measure styles using various questionnaires described in the following.
- *Styles are modifiable.* People are not “stuck” with certain styles unless they want to be.
- *What is valued in one time and place may not be valued in another.* The very style that leads to success in one school or one job may lead to failure in another.

Many alternative theories of styles have been proposed, and a number of those are reviewed in Grigorenko and Sternberg (1997), and Sternberg and Zhang (2001). Lack of space prevents a detailed review here. Among the theories that have been proposed are those of Gregorc (1985), Holland (1973), Jung (1923), and Myers and McCaulley (1988).

The Theory of Mental Self-Government

The theory presented here, that of mental self-government (Grigorenko & Sternberg, 1995; Sternberg & Zhang, 2001), holds that styles can be understood in terms of constructs from human notions of government. On this view, the kinds of governments in the world are not merely coincidental, but rather are external reflections of ways people can organize or govern themselves. According to this theory, people can be understood in terms of the functions, forms, levels, scopes, and leanings of government. The theory of styles applies to education, but also to other domains of personal and professional life.

Functions

There are three functions of government in the theory: legislative, executive, and judicial.

Legislative. The legislative student has a predilection for tasks, projects, and situations that require creation, formulation, planning of ideas, strategies, etc. This kind of student likes to decide what to do and how to do it, rather than to be told. Three examples of assignments that would appeal to legislatively oriented children would be writing a creative story in an English lesson, inventing a new mathematical operation in a mathematics lesson, and writing an anticipated “future history”—predicted description of events to come—in a history class.

Executive. The executive student has a predilection for tasks, projects, and situations that provide structure, procedures, or rules to work with, and can serve as guidelines to measure progress.

The executive student often prefers to be told what to do, and will then give it his or her best shot at doing it well. Three examples of assignments that would appeal to primarily executively oriented children would be memorizing capitals of states in the United States in a geography class, learning number facts in an arithmetic class, and learning the names of rocks in an earth science class.

Traditional teaching generally rewards the executive type. Good students are often seen as those who do what they are told, and do it well. Legislative students may have the same abilities, but the abilities may not manifest themselves, and such students may actually be viewed as “pains in the neck.” The student with an executive orientation will take naturally to memorizing given material, taking multiple-choice or short-answer tests, and doing assignments in ways that teachers expect. Legislative students would probably rather do work on projects than take exams. They may therefore be penalized by conventional instruction and assessments, because of their preference for a creative way of thinking.

Judicial. The judicial student has a predilection for tasks, projects, and situations that require evaluation, analysis, comparison–contrast, and judgment of existing ideas, strategies, projects, etc. The judicial person tends to like evaluative essays, commenting on other people’s ideas, and assessing others’ strengths and weaknesses. Three examples of assignments that would appeal to judicially oriented students would be analyzing how different nations have different conceptions of democracy for a government class, evaluating the validity of a theory on the extinction of dinosaurs in a biology class, and comparing and contrasting two characters from a novel in a literature class.

Forms

There are four different forms of mental self-government in the theory: monarchic, hierarchic, oligarchic, and anarchic.

Monarchic. The monarchic pupil has a predilection for tasks, projects, and situations that allow focusing fully on one thing or aspect at a time,

and staying with that thing until it is complete. Examples of monarchically oriented students would be one who devotes very large chunks of time to using the Internet, one who loves mathematics to the exclusion of all other subjects, or one who is dedicated to tennis and spends as much time as possible playing it. A monarchic teacher might be one who has a preferred way of doing things, and who does not much like to do things in other ways.

Hierarchic. The hierarchic pupil has a predilection for tasks, projects, and situations that allow creation of a hierarchy of goals to fulfill. These students will often make lists, and sometimes even lists of lists. Examples of hierarchically oriented students would be one who allocates time for homework assignments that are due sooner rather than later, another student who allocates time on a test to the sections the teacher has said will count more toward the grade, and one who carefully allocates time to practice different pieces for an piano audition in terms of how likely she thinks it is that she will be asked to play them. A hierarchic teacher might be one who carefully sets priorities and then sticks to them.

Oligarchic. The oligarchic pupil has a predilection for tasks, projects, and situations that allow working with competing approaches, with multiple aspects or goals that are equally important. This student likes to do multiple things within a given time frame, but has trouble setting priorities. The oligarchic student adapts well if the competing demands are of roughly equal importance, but has more trouble if the things are of different importance. Examples of oligarchically oriented students are one who cannot decide how much time to spend on different test items so he spends roughly equal time on them, although they do not count the same; one who does homework haphazardly without regard to when assignments are due and finds herself finishing some assignments well ahead of schedule and others well behind schedule; and one who fails to set priorities for her personal versus her school life and has trouble keeping up in school because she spends so much time going out with fellow students. An oligarchic

teacher might be one who does not easily allocate class time so that the most important things receive the most coverage.

Anarchic. The anarchic student has a predilection for tasks, projects, and situations that lend themselves to great flexibility of approaches, and to trying anything when, where, and how he or she pleases. This type of student tends to be asystematic or even antisystematic. The anarchic pupil may have good potential for creativity, because the individual draws ideas from so many places, but the pupil usually needs to discipline him- or herself. Teachers can assist anarchic students by helping them be organized and channel their creativity constructively. Examples of anarchically oriented students are one who does not keep track of assignments and rarely gets them in on time, one who cannot get organized to study for tests, and one who is potentially very creative but fails to learn the material beyond what is needed to have new ideas. An anarchic teacher might be one who is very disorganized in his teaching style, but who nevertheless is very creative and sparks creative ideas in his students.

Levels

There are two levels of mental self-government: local and global.

Local. The student with a local style has a predilection for tasks, projects, and situations that require engagement with specific, concrete details. Students with this style tend to enjoy tasks that require them to keep track of details and to focus on concrete specifics of a situation. Examples of students with a local orientation are the one who learns many details when studying for tests but does not understand how they interrelate to each other, one who writes papers that show a great knowledge of facts but have no clear organizing superstructure, and one who, when giving talks, concentrates on specifics without any overview of the topic. A local teacher tends to be very detail-oriented in lecturing.

Global. The global pupil has a predilection for tasks, projects, and situations that require engagement with large, global, abstract ideas. This person likes to deal with big ideas, but sometimes can lose touch with the details. Examples of globally oriented students are one who, when writing papers, makes many global assertions but fails to support them with specific evidence; one who does very well in comprehending main ideas of passages but poorly in comprehending details; and one who, in playing music, shows very good musicality and interpretation but makes many mistakes in intonation. A global teacher tends to be very general in her teaching and to concentrate on the big picture rather than the details.

Scopes

There are two scopes of mental self-government: internal and external.

Internal. The internal student has a predilection for tasks, projects, and situations that allow him or her to work independently of others. This individual is typically introverted and often uncomfortable in groups. Examples of internally oriented students are one who likes to study for tests only by himself; another who routinely turns down invitations to go to student parties because she feels uncomfortable interacting with others; and one who, in groups, does not speak out because she is reluctant to interact with the others. An internal teacher may eschew team teaching and prefer to teach on his own.

External. The external student has a predilection for tasks, projects, and situations that require activities that allow working with others in a group or interacting with others at different stages of progress. Indeed, this student might not enjoy working or even being alone. Notice, then, that methods of teaching that lead some students to feel quite comfortable can lead other students to feel very uncomfortable. Examples of externally oriented students are one who strongly prefers working in groups to working individually; one who hates to spend time by himself and constantly

needs to be with others; and one who is effective studying with others but not by herself. An external teacher would probably welcome team teaching or other opportunities to collaborate with fellow teachers.

Leanings

There are two leanings of mental self-government: liberal and conservative.

Liberal. The student with a liberal style has a predilection for tasks, projects, and situations that involve unfamiliarity, going beyond existing rules or procedures, and maximization of change. Sometimes the individual may prefer change simply for the sake of change, even when it is not ideal. Students with a liberal style like new challenges and thrive on ambiguity. Examples of liberally oriented students are one who resents having to do things in traditional ways, almost without regard to what the things are; one who is constantly seeking alternative and nonobvious ways of solving physics problems; and one who loves writing poetry that is unusual in both style and content. A liberal teacher likes to teach in new ways and to try new teaching techniques.

Conservative. The conservative pupil has a predilection for tasks, projects, and situations that require adherence to and observance of existing rules and procedures. This individual likes to minimize change and avoid ambiguity. Examples of conservative students are one who frequently asks the teacher exactly what is expected of him, one who takes his lead from other students as to how to do assignments, and one who feels very anxious when expected to do a project in an art class using new media for creating artistic works. A conservative teacher likes to teach in traditional ways and may be hesitant to try new ways of teaching.

We have used several converging operations to measure thinking styles. These are described elsewhere (Grigorenko & Sternberg, 1992; Sternberg, Wagner, & Zhang, 2003).

Styles in the Classroom

We have conducted several studies investigating styles in elementary and secondary school classrooms, as well as in university classrooms (Sternberg, 1994; Sternberg & Grigorenko, 1995; Zhang & Sternberg, 2002). It is possible to describe here only a few of the studies we have done.

In a first study with 85 teachers (57 women, 28 men) in four schools of varying types (private and public, and socioeconomically diverse), we found several interesting effects with respect to grade taught, age of teachers, subject area taught, and ideology. Teachers are more legislative and less executive at the lower grades than at the upper grades. These findings might suggest either that more legislative individuals are attracted toward teaching at the lower grade levels, or teachers at the lower grade levels become more legislative (or teachers at the upper grade levels become more executive). The demands on teachers in the United States are consistent with this pattern of findings: Teachers in the upper grades are forced to follow a more rigidly prescribed curriculum than are teachers in the lower grades.

We also found older teachers to be more executive, local, and conservative than are younger teachers. Again, there are two interpretations of these findings, either or both of which might be correct. One interpretation is that teachers become more executive, local, and conservative with age; the other interpretation is that the difference is due to a cohort effect.

Further, we found that science teachers tended to be more local than were teachers of the humanities, and the latter tended to be more liberal than the former. These results, again, are roughly consistent with our experience. With respect to science, the results unfortunately suggest that science teachers may concentrate substantially more on the local details of science than on the “big picture” of scientific research.

Finally, we did an analysis of the relation of school ideology to teachers’ styles. We had a rater who was not familiar with the individual teachers in the schools rate each school for its own profile of styles on the basis of catalogues,

faculty and student handbooks, statements of goals and purposes, and curricula. We also evaluated teachers’ styles, and then did contrasts looking at the match between teachers and schools. For six of seven planned contrasts, we found significant effects. In other words, teachers tend to match the stylistic ideology of their schools. Either teachers tend to gravitate toward schools that fit them ideologically, or they tend to become like the place they are in, suggesting again the importance of socialization in the formation of styles, even at the adult level.

In a second study of 124 students between the ages of 12 and 16 distributed among 4 schools, we found some interesting demographic effects. Socioeconomic level related negatively to the judicial, local, conservative, and oligarchic styles. These results are consistent with a notion of greater authoritarianism in the styles of individuals of lower socioeconomic class and lower education levels (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). We also found that later-born siblings tend to be more legislative than do earlier-born siblings, consistent with the past finding that first-borns tend to be more accepting of societal dictates than are later-borns (Simonton, 1988). Finally, we found a significant degree of match between students’ and teachers’ styles. Whereas for the teachers, similarity of styles to the profile of their schools could be interpreted in terms of choice of school, such an explanation is implausible in the case of students, who rarely get to choose their school. The results suggest socialization of styles.

In a third study, we went back to one of the original questions that motivated this work: Do students do better in classrooms where their styles match rather than mismatch the styles of their teachers? We assessed students’ and teachers’ styles, and found that, indeed, students performed better and were more positively evaluated by teachers when their styles matched. The students performed better when they were more like their teachers stylistically, independent of actual level of achievement.

Styles thus seem to be important in school settings. In the next section, we discuss how they can be utilized directly in instruction and assessment.

Styles of Thinking in Instruction and Assessment

For those who teach and assess students at any level—young children, adolescents, or adults—the theory of mental self-government implies modes of rendering teaching more effective through style-differentiated instruction. The key principle is that for students to benefit the most from instruction and assessment, at least some part of the instruction and assessment should match their styles of thinking. We would not advocate a perfect match all the time: Students need to learn, as does everyone, that the world does not always provide people with a perfect match to their preferred ways of doing things. Flexibility is as important for students as it is for teachers. But if we want students to show what they truly can do, a match of instruction and assessment to styles is key.

The following is a list of the various methods of instruction and the styles that are most compatible with these methods. If a teacher wants to reach and truly interact with a student, he or she needs the flexibility to teach to different styles of thinking, which means varying teaching styles to suit different styles of thought on the part of students.

- Lecture with executive/hierarchical
- Thought-based questioning with judicial/legislative
- Cooperative learning with external
- Problem solving of given problems with executive
- Projects with legislative
- Small-group recitation with external/ executive
- Small-group discussion with external/ judicial
- Reading with internal/hierarchical
- Reading for details with local/executive
- Reading for main ideas with global/ executive
- Reading for analysis with judicial
- Memorization with executive/local/ conservative

Table 1 shows various methods of assessment and the styles with which they are most compatible. Note that different methods of assessment tend to benefit different styles of thought. For example, multiple-choice testing is very much oriented toward executive and local thinkers, and projects tend to be oriented more toward legislative and judicial thinkers as well as global ones. Note also the importance not only of the method of assessment used, but also the way the assessment

Table 1
Thinking Styles and Forms of Assessment

| <i>Form of Assessment</i> | <i>Main Skills</i> | <i>Most Compatible Style(s)</i> |
|------------------------------|---------------------------------|---------------------------------|
| Short answer/multiple choice | Memory | Executive/local |
| | Analysis | Judicial/local |
| | Time allocation | Hierarchical |
| | Working by self | Internal |
| Essay | Memory | Executive/local |
| | Macroanalysis | Judicial/global |
| | Microanalysis | Judicial/local |
| | Creativity | Legislative |
| | Organization | Hierarchical |
| | Time allocation | Hierarchical |
| | Acceptance of teacher viewpoint | Conservative |
| Project/portfolio | Working by self | Internal |
| | Analysis | Judicial |
| | Creativity | Legislative |
| | Teamwork | External |
| | Working by self | Internal |
| | Organization | Hierarchical |
| | High commitment | Monarchic |

is scored. An essay can be scored for recall (memory), which benefits executive students; or for analysis, which benefits judicial students; or for creativity, which benefits legislative students. It is not the essay, per se, but how it is evaluated, that determines who benefits.

In Table 2 we show how different prompts in instructional and evaluative assignments can lead students to use different styles. By varying the kinds of prompts they use, teachers can equalize the benefits to all of the students they teach.

There can be synergies between styles and abilities. For example, students with an executive style and high memory abilities, a legislative style and high creative abilities (O’Hara & Sternberg, 2000–2001), or a judicial style and high analytical abilities, will be at an advantage, because the kinds of skills at which they excel match the kinds of ways they like to think (Sternberg & Grigorenko, in press).

Conclusion

Styles matter. They are often confused with abilities, so that students are thought to be incompetent—not because they are lacking in abilities, but because their styles of thinking do not match the styles of the people creating the assessments. Especially in teaching, one needs to take into account students’ styles of thinking if one hopes to reach them. This means differentiating instruction

in a way that helps students, at least some of the time, capitalize on their stylistic preferences.

Teachers need to carefully consider how their practices in educational settings may deprive able people of opportunities, while giving opportunities to those who are less able. For example, extensive use of multiple-choice testing in the United States clearly benefits executive thinkers. Many tests of scholastic and other aptitudes confound measurements of styles with measurements of abilities. But replacing all of those tests with projects and portfolios would simply result in a different group of students being benefitted. Ideally, educators need to teach to and assess a variety of styles. Teaching should be differentiated to help each child capitalize on strengths and compensate for or correct weaknesses.

Acknowledgments

Preparation of this article was supported by Grant REC–9979843 from the National Science Foundation and by a government grant under the Javits Act Program (Grant No. R206R000001) as administered by the Office of Educational Research and Improvement, U. S. Department of Education. Grantees undertaking such projects are encouraged to express freely their professional judgment. This article, therefore, does not necessarily represent the positions or the policies of the

Table 2
Thinking Styles and Instructional/Valuational Assignments

| <i>Style Emphasized</i> | | |
|-------------------------|--------------------------|--------------------|
| <i>Executive</i> | <i>Judicial</i> | <i>Legislative</i> |
| <i>Type of Prompt</i> | | |
| Who said? | Compare and contrast ... | Create ... |
| Summarize ... | Analyze ... | Invent ... |
| Who did? | Evaluate ... | If you were? |
| When did? | In your judgment ... | Imagine ... |
| What did? | Why did? | Design ... |
| How did? | What caused? | How would? |
| Repeat back ... | What is assumed by? | Suppose ... |
| Describe ... | Critique ... | Ideally? |

U.S. government, and no official endorsement should be inferred.

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