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Learning Styles and Adaptive Flexibility
Testing Experiential Learning Theory

Abstract *This research used three instruments derived from experiential learning theory—the Learning Style Inventory, the Adaptive Style Inventory and the Learning Skills Profile—to test hypotheses about differences between balanced and specialized learning styles in a sample of 198 part-time and full-time MBA students. Learning styles that balanced experiencing and conceptualizing showed greater adaptive flexibility in responding to experiencing and conceptualizing learning contexts. The learning style specializing in experiencing showed higher levels of skill development in interpersonal skills and lower levels of skill development in analytic skills; while the reverse was true for the learning style specializing in conceptualizing. Similar tests for the acting/reflecting specialized and balanced learning styles showed no consistent results. Analysis of male and female subsamples produced results supporting these general conclusions. The study adds further construct validity for the hypothesis that adaptive flexibility in learning style is predictive of highly integrated and complex levels of adult development.* ***Key Words:*** *adaptive flexibility; Adaptive Style Inventory; experiential learning theory; forced choice method; ipsative measures; Learning Skills Profile; Learning Style Inventory; learning styles*

Experiential learning theory (ELT) defines learning as 'the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience' (Kolb, 1984: 41). The learning model portrays two dialectically related modes of grasping experience—concrete experience (CE) and abstract conceptualization (AC)—and two dialectically related modes of transforming experience—reflective observation (RO) and active experimentation (AE). Individual learning styles are determined by an individual's preferred way of resolving these two dialectics, favoring one

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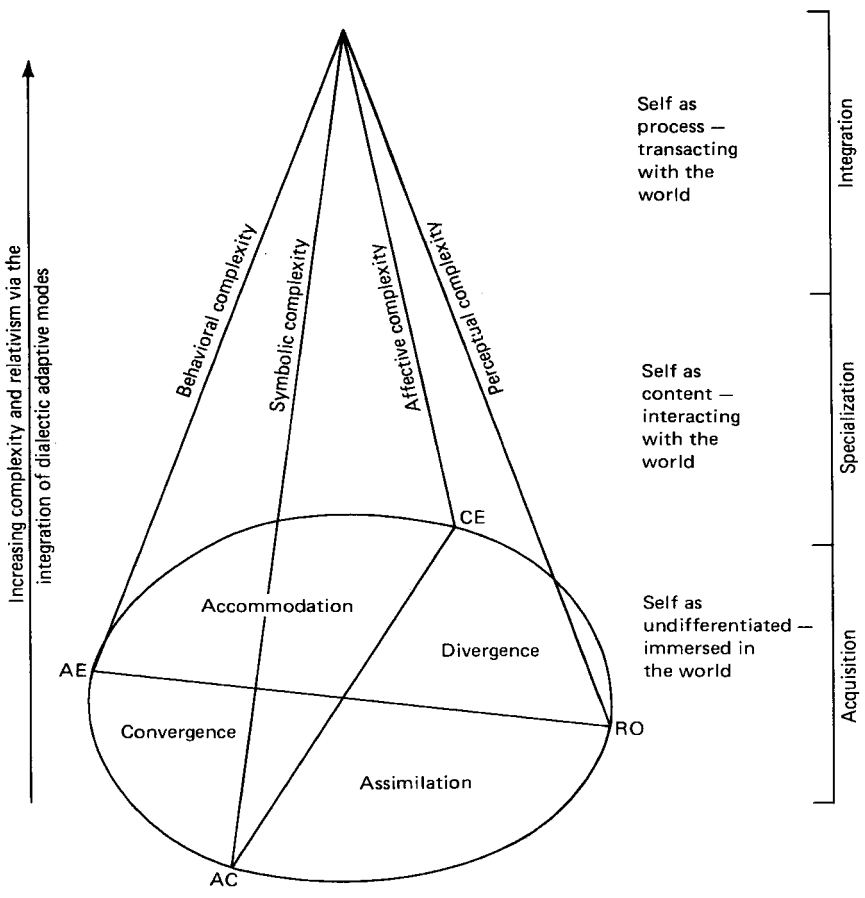
mode over the other. The experiential learning theory suggests that, as such, these learning styles represent specialized and limited ways of learning. Following Jung's theory that adult development moves from a specialized way of adapting toward a holistic integrated way, development in learning sophistication is seen as a move from specialization to integration. Integrated learning is a process involving a creative tension among the four learning modes that is responsive to contextual demands. This is portrayed as an idealized learning cycle or spiral where the learner 'touches all the bases'—experiencing, reflecting, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned. The theory argues that this development in learning sophistication and creative adaptation results from the integration of the dual dialectics of conceptualizing/experiencing and acting/reflecting as shown in Figure 1.

Jung discovered the universal mandala symbol in many cultures and religions throughout time representing this holistic, dynamic adaptive process. Mandala

Figure 1 The experiential learning theory of development



Source Kolb (1984: 141). Reproduced with kind permission

means circle, an eternal process where endings become beginnings again and again. 'The mandala form is that of a flower, cross, or wheel with a distinct tendency toward quadripartite structures' (Jung, 1931: 100). It often represents dual polarities, the integration of which fuels the endless circular process of knowing. 'Psychologically this circulation would be a "turning in a circle around oneself": whereby all sides of the personality become involved. They cause the poles of light and darkness to rotate' (p. 104). In their theories of experiential learning Jean Piaget, William James and Paulo Freire express similar but distinctive views about the integration of these dialectics.

Piaget combines these two dialectics in the idea that an act of intellectual adaptation requires a balance or equilibrium between assimilation and accommodation. Intelligence is thus the result of the dialectic integration of internal cognitive organization, reflective abstraction, and external adaptation, active involvement in experience. He says:

> . . . organization is inseparable from adaptation: they are two complementary processes of a single mechanism, the first being the internal aspect of the cycle of which adaptation constitutes the external aspect . . . The 'accord of thought with things' and 'the accord of thought with itself' express this dual functional invariant of adaptation and organization. These two aspects of thought are indissociable: it is by adapting to things that thought organizes itself and it is by organizing itself that it structures things. (1952: 7–8)

Another view is articulated by William James in his philosophy of radical empiricism. James posed radical empiricism as a new theory of reality and mind which resolved the conflicts between 19th-century rationalism and empiricism, the philosophies of idealism and materialism. For James, everything begins and ends in the continuous flux and flow of experience. His philosophy of radical empiricism was based on two co-equal and dialectically related ways of knowing the world—'knowledge of acquaintance', based on direct perception, and 'knowledge about', based on mediating conception. In radical empiricism, direct perception has primacy since all concepts derive their validity from connection to sense experience. Concepts, however, have priority in controlling human action because they often enable us to predict the future and achieve our desires. James (1977) draws attention to the importance of this co-equal relationship when he says:

> We thus see clearly what is gained and what is lost when percepts are translated into concepts. Perception is solely of the here and now; conception is of the like and unlike, of the future, and of the past, and of the far away. But this map of what surrounds the present, like all maps, is only a surface; its features are but abstract signs and symbols of things that in themself are concrete bits of sensible experience. We have but to weigh extent against content, thickness against spread, and we see that for some purposes the one, for other purposes the other, has the higher value. Who can decide off-hand which is absolutely better to live and to understand life? We must do both alternately, and a man can no more limit himself to either than a pair of scissors can cut with a single one of its blades. (p. 243)

While Paulo Freire recognizes the conceptualizing/experiencing dialectic in stressing the importance of naming one's own experience in dialogue with others, he and other critical theorists give primary emphasis to *praxis*, the transformative

dialectic between reflection and action—reflection informed by action and action informed by reflection. He writes powerfully about the dynamics of this dialectic:

> As we attempt to analyze dialogue as a human phenomenon . . . Within the word we find two dimensions, reflection and action, in such radical interaction that if one is sacrificed—even in part—the other immediately suffers . . . When a word is deprived of its dimension of action, reflection automatically suffers as well; and the word is changed into idle chatter, into verbalism, into an alienated and alienating 'blah' . . . On the other hand, if action is emphasized exclusively, to the detriment of reflection, the word is converted into activism. The latter action for action's sake negates the true praxis and makes dialogue impossible. (1992: 75–8)

Drawing on the works of Piaget, James and Freire, ELT suggests that adaptive flexibility is related to the degree that one integrates the dual dialectics of the learning process—conceptualizing/experiencing and acting/reflecting. Over the past three decades three instruments have been developed within the field of ELT to assess individual learning preferences, adaptive flexibility and learning skills. In the following two sections we describe the three ELT instruments and comment on their psychometric characteristics by discussing published reliability and validity data.

Operationalizing Experiential Learning Theory

Three instruments have been developed to assess the constructs of experiential learning theory—the Learning Style Inventory (Kolb, 1984, 1999a), the Adaptive Style Inventory (Kolb, 1984; Boyatzis and Kolb, 1993) and the Learning Skills Profile (Boyatzis and Kolb, 1991, 1995, 1997). They have been designed to be theoretically commensurate while methodologically diverse in order to reduce spurious common method variance among them.

The Learning Style Inventory (LSI)

The LSI uses a forced-choice ranking method to scale an individual's preferred modes of learning, AC, CE, AE, and RO. Individuals are asked to complete 12 sentences that describe learning. Each sentence (e.g. 'I learn best from') has four endings (e.g. AC = 'rational theories', CE = 'personal relationships', AE = 'a chance to try out and practice', and RO = 'observation'). Individuals rank the endings for each sentence according to what best describes the way they learn (i.e. '4 = most like you', '1 = least like you'). Four scores, AC, CE, AE, and RO, measure an individual's preference for the four modes, and two dimensional scores indicate an individual's relative preference for one pole or the other of the two dialectics, conceptualizing/experiencing (AC – CE) and acting/reflecting (AE – RO).

In this article we introduce new scores that measure the degree to which an individual is balanced in their preference for AC versus CE, and AE versus RO. The balanced learning profile on the two ELT dimensions is computed as the absolute value of the two dimensional scores (AC – CE and AE – RO) adjusted for population variation. The assumption is that the more balanced a person is in

their dialectic preference, the more they will experience a creative tension or attraction to both poles opening a wider space for flexible adaptation and development of learning skill. A search of the 1004 studies listed in the *Bibliography of Research on Experiential Learning Theory and the Learning Style Inventory* (Kolb and Kolb, 2000) found only three studies investigating the balanced learning style. Goldman (1972) in a study of MIT seniors found a correlation of .34 ($p < .001$) between a balanced learning style and cumulative grade point average. Weathersby (1977) in a study of adult learners at Goddard College identified a style that balanced the experiencing/conceptualizing dimension. She hypothesized that this style represented a higher level of adult development. Finally, Wolfe (1977) compared the performance of specialized learning style teams with randomly assigned balanced learning style teams on a computerized business game. The balanced teams performed significantly better than the specialized learning style teams.

Debate and criticism in the ELT literature have often focused on the psychometric properties of the LSI. Results of this research have been of great value in revising and improving the LSI during the last 15 years. The first version of the LSI was released in 1976 and received support for its strong face validity and independence of the ELT dimensions of AC – CE and AE – RO (Marshall and Merritt, 1985; Katz, 1986). Although early critique of the instrument focused on the internal consistency of scales and test–retest reliability, a study by Ferrell (1983) showed that LSI version 1 was the most psychometrically sound among four learning instruments of that time. In 1985 version 2 of the LSI was released and improved the internal consistency of the scales (Veres et al., 1987; Sims et al., 1986). Smith and Kolb (1986) reported the following Cronbach alphas for LSI version 2 ($N = 268$): AC = .83, CE = .82, AE = .78, RO = .73, AC – CE = .88, and AE – RO = .81. Critiques of this version focused their attention on the test–retest reliability of the instrument, but a study by Veres et al. (1991) showed that randomizing the order of the LSI version 2 items results in dramatic improvement of test–retest reliability. This finding led to an experimental research LSI version and finally to the latest LSI revision, LSI version 3 (Kolb, 1999a, b).

The LSI has also been criticized for its forced-choice method and ipsative scaling. Forced-choice rating was developed by Sisson (1948) in an effort to overcome the problems associated with the free-choice method: social desirability, leniency, severity, and acquiescent response sets (Saville and Wilson, 1991; Kerlinger, 1986; Nunnally, 1978). Several authors have concluded that the forced-choice method can effectively address these concerns (see Greer and Dunlap, 1997; Saville and Wilson, 1991; Cronbach, 1960). For example, in a study with the LSI, Beutell and Kressel (1984) found that social desirability contributed less than 4 percent of the variance in spite of the fact that the individual items in the instrument had very high social desirability. Another important contribution of the forced-choice method is that it reflects the hierarchal nature of values (Greer and Dunlap, 1997; Thomson et al., 1982) and the dialectical dynamics involved in learning and life in general (Kolb, 1984; Saville and Wilson, 1991).

The forced-choice method can overcome problems of the free-choice method, but it may also create new psychometric difficulties. Forced-choice instruments often (but not always) provide what are called ipsative measures: i.e. measures which force the summed scores for each individual to be the same (Ten Berge,

1999; Dunlap and Cornwell, 1994; Clemans, 1966). Ipsativity poses two significant annoyances. One drawback is that the spurious negative correlations between items interfere with any statistical technique built around interscale/interitem correlations such as factor analysis and discriminant analysis (Cornwell and Dunlap, 1991; Johnson et al., 1988; Hicks, 1970). Another problem is that forced-choice and ipsativity are synonymous in the minds of some writers (e.g. Freedman and Stumpf, 1978, 1980; Certo and Lamb, 1980).

Forced-choice instruments can be designed so as to avoid ipsativity, and ipsative measures can, under certain conditions, be effectively transformed to non-ipsative ones (Ten Berge, 1999; Greer and Dunlap, 1997; Saville and Wilson, 1991; Davison, 1980; Goodman, 1975). In the LSI, the four scale scores (AC, CE, AE, RO) are clearly ipsative, but the two dimensional scores (AC – CE and AE – RO) are not. For example, when $(AC - CE)_n$ or $(AE - RO)_n$ takes a value of +2 (from, say, AC = 4 and CE = 2 or AC = 3 and CE = 1) the other can take a value of +2 or –2. Similarly, when either of them takes the value of +1 (from 4 minus 3, 3 minus 2, or 2 minus 1) the other can take the values of +3, +1, –1, or –3. In other words, when $(AC - CE)_n$ takes a particular value, $(AE - RO)_n$ can take two to four different values and the score on one dimension does not determine the score on the other.

Further, it is possible to test mathematically whether the mean intercorrelation between AC – CE and AE – RO is an artificial or a real one. If two or more variables are ipsative, the asymptotic expected value (i.e. mean) of the intercorrelations will be equal to $-1/(m - 1)$ where m is the number of the variables (Clemans, 1966; Greer and Dunlap, 1997; Cornwell and Dunlap, 1991; Johnson et al., 1988). Therefore, if AC – CE and AE – RO were ipsative, their mean intercorrelation would be –1.0. But the observed empirical relation between the two variables is always much smaller. For example, Freedman and Stumpf (1978) reported a mean intercorrelation of .13 for a sample of 1591 graduate students; Boyatzis and Mainemelis (2000) reported an intercorrelation of –.19 for a sample of 1296 graduate students; and Kolb (1999b) reported a mean intercorrelation of –.09 for the ethically diverse LSI normative sample of 1446 individuals. These results show that the AC – CE and AE – RO scores are not ipsative. It should also be noted that learning styles in the LSI are determined on the basis of the two non-ipsative dimensional scores and not the four ipsative scale scores.

The Adaptive Style Inventory (ASI)

The ASI uses a 48-item, paired comparison method to rank learning preferences for the four learning modes in eight personalized learning contexts. Individuals are asked to think of personal examples for each of eight situations which describe four learning contexts (two situations per context): valuing (e.g. 'When I consider my feelings'), thinking (e.g. 'When systematically analyzing something'), deciding (e.g. 'When deciding between two alternatives'), and acting (e.g. 'When I start to do something new'). For each of the eight situations individuals are provided with six paired sentences, which compare each learning mode with the other three. For example, AC = 'I set priorities', CE = 'I rely on my feelings to guide me', AE = 'I try out different ways of doing things' and RO = 'I observe the situation').

Individuals are asked to choose from each pair the sentence that is most like what they would actually do in that situation.

Like the LSI, the ASI assesses preferences for the four scales (AC, CE, AE, RO) and two dimensions (AC – CE and AE – RO), but it also measures adaptive flexibility in learning—the degree to which individuals change their learning style to respond to different learning situations in their life. Boyatzis and Mainemelis (2000) reported the following Cronbach alphas for the ASI scales (N = 936): AC = .67, CE = .72, AE = .57, RO = .47, AC – CE = .78, and AE – RO = .63. The scale reliabilities are lower in the ASI than the LSI because the ASI is designed to measure contextual variability. Earlier studies found that adaptive flexibility as measured by the ASI is positively related to higher levels of ego development on Loevinger's instrument (Kolb and Wolfe, 1981). Individuals with high adaptive flexibility are more self-directed, have richer life structures characterized by many life contexts with many connections between them, and experience less conflict in their lives (Kolb, 1984).

The Learning Skills Profile (LSP)

The LSP is a 72-item, modified Q-sort method to assess levels of skill development in four skill areas that are related to the four learning modes—interpersonal skills (CE), information skills (RO), analytical skills (AC) and behavioral skills (AE). Respondents are asked to sort 72 learning skills cards in seven categories describing their skill level: 1 = I have no skill or ability in this area, 2 = I am now learning this skill or ability, 3 = I can do this with some help or supervision, 4 = I am a competent performer in this area, 5 = I am an outstanding performer in this area, 6 = I am an exceptional performer in this area, and 7 = I am a creator or leader in this area. Each of the 72 cards has a statement describing a specific skill or activity. The statements are scored according the way they have been sorted by the respondent in the seven skill levels described above. The 72 items are clustered into 12 six-item scales, which, in turn, are clustered into the four skill areas. The analytical skills area (Cronbach's alpha = .79, n = 198, in this study's sample) consists of the skills of theory building, quantitative analysis, and use of technology. The interpersonal skills area (alpha = .80) consists of the skills of leadership, relationship, and help. The behavioral skills area (alpha = .77) includes the skills of goal setting, action, and initiative. Finally, the information skills area (alpha = .68) consists of sense-making, information gathering, and information analysis. Several recent studies have used the LSP in program evaluation (Ballou et al., 1999; Boyatzis et al., 1995) and learning needs assessment (Rainey et al., 1993; Smith, 1990).

Validation and Evaluation of Experiential Learning Theory

Because ELT is a holistic theory of learning which identifies learning styles differences among various disciplines, it is not surprising that the related research has been highly interdisciplinary, addressing learning and educational issues in several fields. The recent bibliography of research on ELT (Kolb and Kolb, 2000) includes 1004 studies conducted in the fields of management (207), education

(430), computer studies (104), psychology (101), medicine (72), as well as nursing, accounting, and law. About 55 percent of this research has appeared in refereed journal articles, 20 percent in doctoral dissertations, and 10 percent in books and book chapters (Kolb et al., 2001). Many of these studies have provided empirical validation for the constructs of ELT using the Learning Style Inventory, and more recently, the Adaptive Styles Inventory and Learning Skills Profile.

There have been two recent comprehensive reviews of the ELT/LSI literature, one qualitative and one quantitative. In 1991 Hickox extensively reviewed the theoretical origins of ELT and qualitatively analyzed 81 studies in accounting and business education, helping professions, medical professions, post-secondary education and teacher education. She concluded that overall 61.7 percent of the studies supported ELT, 16.1 percent showed mixed support, and 22.2 percent did not support ELT (Hickox, 1991).

In 1994 Illiff conducted a meta-analysis of 101 quantitative studies culled from 275 dissertations and 624 articles that were qualitative, theoretical, and quantitative studies of ELT and the LSI. Using Hickox's evaluation format he found that 49 studies showed strong support for the LSI, 40 showed mixed support and 12 studies showed no support. About half of the 101 studies reported sufficient data on the LSI scales to compute effect sizes via meta-analysis. Most studies reported correlations he classified as low ($< .5$) and effect sizes fell in the weak (.2) to medium (.5) range for the LSI scales. Illiff (1994) correctly notes that the LSI was not intended to be a predictive psychological test like IQ, GRE or GMAT. Tests designed for predictive validity typically begin with a criterion like academic achievement and work backward in an atheoretical way to identify items or tests with high criterion correlations. Even so, even the most sophisticated of these tests rarely rises above a .5 correlation with the criterion. For example, while Graduate Record Examination subject test scores are better predictors of first-year graduate school grades than either the general test score or undergraduate GPA, the *combination* of these three measures only produces multiple correlations with grades ranging from .4 to .6 in various fields (Anastasi and Urbina, 1997).

The LSI was developed to test the construct validity of experiential learning theory. Construct validation is not focused on an outcome criterion but on the theory or construct that the test measures. Here the emphasis is on the pattern of convergent and discriminant theoretical predictions made by the theory. Failure to confirm predictions calls into question the test and the theory. 'However, even if each of the correlations proved to be quite low, their cumulative effect would be to support the validity of the test and the underlying theory' (Selltiz et al., 1960: 160).

Hypotheses

The commensurability of the LSI, ASI and LSP makes it possible to test empirically some of the predictions of experiential learning theory. In this article we investigate whether individuals with balanced learning styles on the LSI show more sophisticated development in learning (as measured by adaptive flexibility on the ASI) than individuals with specialized learning styles. Also we examine levels of

learning skill development on the LSP and their relationship to integrative and specialized learning styles. Specifically, we test the following hypotheses:

Hypothesis 1a: The more individuals are balanced on the conceptualizing/experiencing dialectic of the LSI, the more they will show adaptive flexibility on this dimension on the ASI.

Hypothesis 1b: The more individuals are balanced on the acting/reflecting dialectic of the LSI, the more they will show adaptive flexibility on this dimension on the ASI.

Hypothesis 2a: The more individuals are specialized in their preference for conceptualizing or experiencing on the LSI, the less they will show adaptive flexibility on this dimension on the ASI.

Hypothesis 2b: The more individuals are specialized in their preference for acting or reflecting on the LSI, the less they will show adaptive flexibility on this dimension on the ASI.

Hypothesis 3a: The more individuals are balanced on the conceptualizing/experiencing dialectic of the LSI, the greater will be their level of learning skill development in analytical and interpersonal skills on the LSP.

Hypothesis 3b: The more individuals are balanced on the acting/reflecting dialectic of the LSI, the greater will be their level of learning skill development in behavioral and information skills on the LSP.

Hypothesis 4a: The more individuals have high adaptive flexibility on the conceptualizing/experiencing dialectic of the ASI, the greater will be their level of learning skill development in analytical and interpersonal skills on the LSP.

Hypothesis 4b: The more individuals have high adaptive flexibility on the acting/reflecting dialectic of the ASI, the greater will be their level of learning skill development in behavioral and information skills on the LSP.

Hypothesis 5a: The more individuals are specialized in their preference for conceptualizing on the LSI, the greater will be their level of learning skill development in analytical skills on the LSP.

Hypothesis 5b: The more individuals are specialized in their preference for experiencing on the LSI, the greater will be their level of learning skill development in interpersonal skills on the LSP.

Hypothesis 5c: The more individuals are specialized in their preference for acting on the LSI, the greater will be their level of learning skill development in behavioral skills on the LSP.

Hypothesis 5d: The more individuals are specialized in their preference for reflecting on the LSI, the greater will be their level of learning skill development in information skills on the LSP.

Method

Sample

As part of a projected 50-year longitudinal study of managerial careers and lifelong competency development now in its 10th year, a sample of 314 MBA students

completed a battery of learning instruments during a required course called 'Managerial Assessment and Development' (Boyatzis, 1994; Boyatzis et al., 1995, 1996, in press). From the initial sample of 314 students 116 cases were dropped from the analysis either because of missing data (89) or potential threats of sample bias (27 who were non-native English speakers). The final sample of 198 was composed of students who entered the full-time or part-time program in 1990 (12), 1991 (48), 1992 (62), 1993 (61), and 1994 (15). The average age of the final sample was 27.02 (SD = 3.64); 71 percent were full-time students and 29 percent part-time; 63 percent were male and 37 percent female. At the conclusion of the required course, all students were asked for permission to use their data in various research studies. An average of 89 percent of the students gave their permission in each of these samples.

Measures

Data were collected with the Learning Style Inventory version 2, Adaptive Style Inventory, and Learning Skills Profile, described earlier. Eight variables were calculated from the LSI: raw scores for each of the learning modes (CE, RO, AC, AE); two measures of specialization in one of the dialectical modes of the two dimensions in ELT (AC – CE, AE – RO); and, to assess a balanced profile, the absolute value of these two dialectical scores was adjusted for population variation. For example, individuals scoring equally in AC and CE can be said to be balanced on this dimension. Their absolute AC – CE score reflects an inverse score of this balance; that is, a low score indicates a balanced profile, whereas a high score indicates a learning style specializing in either end of the dialectical dimension. The absolute AC – CE score was adjusted to center it around the 50th percentile (ABS [AC – (CE + 4)]) of the LSI normative comparison group (Kolb, 1999a, b), resulting in a score with a range of 0 to 33, mean of 11.04, and a standard deviation of 7.39 (skewness = .58, kurtosis = –.20). Similarly, the formula for the balanced profile in the AE/RO dimension is ABS [AE – (RO + 6)], resulting in a score with a range of 0 to 33, mean of 10.90, and a standard deviation of 6.83 (skewness = .41, kurtosis = –.39).

Eight variables were calculated from the ASI: Four mode scores (CE, RO, AC, AE), two specialization scores (AC – CE and AE – RO), and two adaptive flexibility measures, one for each dialectical dimension. The formulae for the adaptive flexibility measures and the relevant univariate statistics are explained in Appendix A. These two measures are absolute values of the subtraction of the flexibility on AC minus the flexibility on CE, and flexibility on AE minus flexibility on RO respectively. The AC/CE adaptive flexibility score ranges from 0 to 8, with a mean of 3.56 and a standard deviation of 2.24 (skewness and kurtosis are less than 1). The AE/RO adaptive flexibility score ranges from 0 to 8, with a mean of 2.19 and a standard deviation of 1.79 (skewness and kurtosis are less than 1).

Six variables were calculated from the LSP. Four were obtained from the sum of the scale scores of the three scales constituting each 'quadrant' of skills. As described earlier, one quadrant assesses CE skills (the interpersonal quadrant of leadership, relationship, and helping skills), another quadrant assesses RO skills (the information quadrant of sense making, information gathering, and information analysis skills), and another quadrant assesses AC skills (the analytical

quadrant of theory, quantitative, and technology skills). The last quadrant assesses AE skills (the behavioral quadrant of goal setting, action, and initiative skills). The last two measures were computed as the dialectical dimensions difference scores (AC – CE and AE – RO).

Analyses

Commensurability tests As stated earlier, the LSI, ASI and LSP were designed to be theoretically commensurate while methodologically diverse. Prior to conducting the hypotheses tests, we examined the commensurability of the three instruments by testing the correlations between the six commensurate scores. We found that the scores from each of the three instruments for each of the four learning modes (CE, RO, AC, and AE) and the two dialectical dimensions (AC – CE and AE – RO) were significantly correlated, as shown in Appendix B. The LSI and ASI correlations for the four modes and two dimensions ranged from .37 to .53 (power $>$ 99% at alpha = .05, one-tailed). The LSI and LSP showed significant correlations for four of the six relationships ranging from .23 to .57 (power $>$ 94%). The two exceptions were RO and AE. The ASI and LSP showed significant correlations for five of the six relationships, ranging from .15 to .39 (power $>$ 68%). Again, the exception was RO. Overall, 15 of the total 18 correlations among the LSI, ASI and LSP scores were significant.

Demographic differences tests The mean LSI scores for program type (i.e. full-time, part-time), gender and age are presented in Appendix C (Table C.1). The sample overall has an AC and AE bias, and there are no significant differences between full-time and part-time students, or between age groups. There is one significant difference in terms of gender. Men have a significantly stronger preference than women for conceptualizing (t = –4.18, $p < .001$, power $>$ 98% at alpha = .05, two-tailed) and the conceptualizing end of the AC/CE dimension (t = –3.63, $p <$ .001, power $>$ 95%).

In terms of the ASI, there are no significant differences between full-time and part-time students, or between age groups (Table C.2). There are important differences between male and female students with the latter adapting significantly more toward experiencing than males (t = 2.72, $p < .01$, power $>$ 77%) and the men adapting more toward the conceptualizing end of the AC – CE dimension (t = –2.71, $p < .01$, power $>$ 77%). Women are also more adaptively flexible than men on the conceptualizing/experiencing dimension (t = –2.60, $p < .01$, power $>$ 73%).

Finally, Table C.3 in Appendix C presents the mean LSP scores for program type, gender and age. There are no significant differences for the age groups. Male students have significantly more developed analytical skills than female students when they enter the program (t = –5.30, $p < .001$, power $>$ 99%) while women specialize more on interpersonal skills (t = –4.82, $p_- < .001$, power $>$ 99%). Full-time students enter the program with significantly more developed interpersonal skills (t = –2.95, $p < .01$, power $>$ 81%) than part-time students.

Across the three instruments we find significant differences between male and female preferences for the conceptualizing/experiencing dimension, and a lack of significant differences in terms of program type and age groups. Because gender

differences were consistent across the three instruments, we conducted statistical tests not only for the full sample but for the male and female sub-samples separately as well.

Hypotheses tests The hypotheses of the study were tested using regression analyses. We tested each regression model three times, one test on the full sample and two on the male and female sub-samples. ASI adaptive flexibility in AC – CE was the dependent variable in testing for hypotheses 1a and 2a, and ASI adaptive flexibility in AE – RO was the dependent variable in testing for hypotheses 1b and 2b. The analytical and interpersonal quadrants of the LSP were the dependent variables in testing for hypotheses 3a and 4a, and the behavioral and information quadrants in testing for hypotheses 4a and 4b. The dependent variables in testing for hypotheses 5a, 5b, 5c, and 5d were, respectively, the analytical, interpersonal, behavioral, and information LSP skill quadrants.

We entered the LSI balanced profile scores in AC – CE and AE – RO as the independent variables in the regression analyses for hypotheses 1a, 1b, 3a, and 3b. The LSI dimensional AC – CE and AE – RO scores were the independent variables in testing for hypotheses 2a, 2b, 5a, 5b, 5c, and 5d. Finally, the ASI adaptive flexibility AC – CE and AE – RO scores were entered as the independent variables to test for hypotheses 4a and 4b.

Results

A balanced learning profile on the conceptualizing/experiencing dialectic of the LSI was positively related with adaptive flexibility on this dimension, as shown in Table 1; the relation was stronger for the female sub-sample. Hypothesis 1a was therefore supported. A balanced learning profile on the acting/reflecting dialectic of the LSI did not show any significant relation with adaptive flexibility on the same dimension in the ASI in either sub-sample. Hypothesis 1b was therefore rejected. The results showed also an unexpected significant negative relation in the male sub-sample between the balanced learning profile in the AE – CE dimension and adaptive flexibility in the AE – RO dimension.

In the male sub-sample, specialization in a preference for conceptualizing on the LSI was negatively related with adaptive flexibility on this dialectical dimension. This indicates that males with a specialization in conceptualizing are less flexible on this dimension according to the ASI. This pattern does not appear in the female sub-sample where there are no significant regression results. Therefore, hypothesis 2a is supported for one mode or end of this dimension in the male sub-sample and rejected for the other end, as well as for the female sub-sample. Specialization in a preference for acting or reflecting on the LSI was not related with adaptive flexibility on this dialectical dimension, as shown in Table 2. Therefore, hypothesis 2b was rejected.

A balanced learning profile on the conceptualizing/experiencing dimension of the LSI showed significantly less developed learning skills in the analytical quadrant in the male sub-sample, and in the information quadrant in the female sub-sample. There were no significant regression results with regard to the interpersonal quadrant, as shown in Table 3. Hypothesis 3a was therefore rejected.

Table 1 Regression analyses: adaptive flexibility predicted by balanced learning profile

	Adaptive flexibility in the ASI dimensions of:							
	Conceptualizing/experiencing				Acting/reflecting			
Balanced learning profile in:	β	R^2	F	d.f.	β	R^2	F	d.f.
Full sample (N = 198)								
Conceptualizing/experiencing	.25***				.04			
Acting/reflecting	–.09	.08	8.08***	2, 195	.10	.01	1.12	2, 195
Male sub-sample (n = 124)								
Conceptualizing/experiencing	.17*				.00			
Acting/reflecting	–.20*	.08	5.09**	2, 121	.13	.02	1.10	2, 121
Female sub-sample (n = 74)								
Conceptualizing/experiencing	.34***				.08			
Acting/reflecting	.08	.12	4.93***	2, 71	.02	.01	.23	2, 71

Notes Due to inverse scoring in the computation of adaptive flexibility, the lower the score the more adaptively flexible the individual. The same is true for the balanced learning profile where the lower the score the more balanced the profile. Thus a positive β between the balanced learning profile and adaptive flexibility indicates a positive relation between them.

* $p < .05$; ** $p < .01$, *** $p < .001$

Table 2 Regression analyses: adaptive flexibility predicted by specialized learning styles

	Adaptive flexibility in the ASI dimensions of:							
	Conceptualizing/experiencing				Acting/reflecting			
Learning style specializing in:	β	R^2	F	d.f.	β	R^2	F	d.f.
Full sample (N = 198)								
Conceptualizing/experiencing	.25***				.06			
Acting/reflecting	.05	.06	6.20***	2, 195	.01	.00	.33	2, 195
Male sub-sample (n = 124)								
Conceptualizing/experiencing	.29**				.06			
Acting/reflecting	.07	.08	5.14**	2, 121	.01	.00	.19	2, 121
Female sub-sample (n = 74)								
Conceptualizing/experiencing	.09				–.04			
Acting/reflecting	–.01	.01	.33	2, 71	–.05	.00	.10	2, 71

Notes Due to inverse scoring in the computation of adaptive flexibility, the lower the score the more adaptively flexible the individual. Thus a positive β between the balanced learning profile and learning specialization indicates a negative relation between them.
* $p < .05$; ** $p < .01$, *** $p < .001$

A balanced learning profile on the acting/reflecting dimension of the LSI did not show greater learning skills in either relevant quadrant (the behavioral or Information quadrants of learning skills). Therefore, hypothesis 3b too was rejected.

Adaptive flexibility on the conceptualizing/experiencing dimension did not show any significant relation with the learning skills in the analytical and interpersonal quadrants. Adaptive flexibility on the acting/reflecting dimension did not show any associations with the learning skills in the behavioral and information quadrants. Therefore, hypotheses 4a and 4b were rejected.

Specialization in conceptualizing on the LSI showed positive relation to greater learning skills in the analytic quadrant for both the male and female sub-samples, as shown in Table 4. The relation was stronger for the female sample. Specialization in experiencing on the LSI showed positive association to greater learning skills in the interpersonal quadrant for both sub-samples. Therefore, hypotheses 5a and 5b were supported.

Specialization in acting on the LSI showed a positive association to the learning skills in the behavioral quadrant in the female sub-sample only. Hypothesis 5c was therefore supported for the female sub-sample and rejected for the male sub-sample. Specialization in reflecting on the LSI did not show a relation to greater learning skills in the information quadrant as shown in Table 4. Hypothesis 5d was thus rejected.

Discussion

Summary of Results

The primary prediction from experiential learning theory was that individuals who integrate the dual dialectics of the learning model of conceptualizing and experiencing as well as acting and reflecting will be more flexible on those dimensions. It was confirmed for the AC/CE dimension for both sub-samples but not for the AE/RO dimension.

Results from the corollary prediction that specialized learning styles might respond less flexibly to different learning contexts showed unpredicted findings. Flexibility on the AE/RO dimension is unrelated to degree of specialization in any of the learning styles in both sub-samples, whereas flexibility on the AC/CE dimension is unrelated to degree of specialization in any of the learning styles in the female sub-sample. However, in the male sub-sample, specialization in the conceptualizing learning style was related to being less flexible on the AC/CE dimension of ASI adaptive flexibility.

Contrary to prediction, individuals with the balanced learning style did not show greater learning skill development. Balance on the LSI AE/RO dimension was unrelated to level of learning skill in any area of the LSP. Individuals who were balanced on the LSI AC/CE dimension, surprisingly showed lower levels of skill development in analytic skills for men and information skills for women. Adaptive flexibility in either dimension did not show any significant association to the learning skills for either sub-sample.

Individuals with learning styles specialized in experiencing (CE) show higher levels of interpersonal skill whereas individuals who specialize in conceptualizing

Table 3 Regression analyses: level of skill development predicted by balanced learning profile

	Level of development in LSP skills							
	Analytical		Interpersonal		Behavioral		Information	
Balanced learning profile in:	β	R^2	β	R^2	β	R^2	β	R^2
Full sample (N = 198)								
Conceptualizing/experiencing	.28***		–.02		.10		.20**	
Acting/reflecting	.04		.08		–.01		.00	
F	8.08***		.62		1.06		3.97*	
d.f.	2, 195	.08	2, 195	.01	2, 195	.01	2, 195	.04
Male sub-sample (n = 124)								
Conceptualizing/experiencing	.29**		–.09		.08		.13	
Acting/reflecting	–.06		.12		.03		–.08	
F	5.94**		1.58		.39		1.60	
d.f.	2, 121	.09	2, 121	.03	2, 121	.01	2, 121	.03
Female sub-sample (n = 74)								
Conceptualizing/experiencing	.20		.17		.15		.28*	
Acting/reflecting	.22		–.01		–.06		.11	
F	3.25*		1.04		.97		3.46*	
d.f.	2, 71	.08	2, 71	.03	2, 71	.03	2, 71	.09

Notes A positive β between the balanced learning profile and learning specialization indicates a negative relation between them.
* $p < .05$; ** $p < .01$, *** $p < .001$

Table 4 Regression analyses: level of skill development predicted by specialized learning styles

	Level of development in LSP skills							
	Analytical		Interpersonal		Behavioral		Information	
Learning style specialization:	β	R^2	β	R^2	β	R^2	β	R^2
Full sample (N = 198)								
Conceptualizing/experiencing	.51***		–.30***		.01		.05	
Acting/reflecting	.02		.09		.21**		.04	
F	33.31***		12.24***		4.32*		.33	
d.f.	2, 195	.25	2, 195	.11	2, 195	.04	2, 195	.00
Male sub-sample (n = 124)								
Conceptualizing/experiencing	.34***		–.30**		.10		–.07	
Acting/reflecting	–.12		.07		.10		–.01	
F	11.12***		7.19**		1.65		.30	
d.f.	2, 121	.16	2, 121	.11	2, 121	.03	2, 121	.00
Female sub-sample (n = 74)								
Conceptualizing/experiencing	.62***		–.27		.16		.20	
Acting/reflecting	.14		.14		.36**		.08	
F	20.72***		4,14*		5.47**		1.42	
d.f.	2, 71	.37	2, 71	.10	2, 71	.13	2, 71	.04

Notes * $p < .05$; ** $p < .01$, *** $p < .001$

(AC) showed higher levels of analytic skill on the LSP. These findings are consistent for both sub-samples. Learning styles that are specialized in acting or reflecting show less or no significant relationship to levels of skill development in the corresponding LSP areas. Women who specialize in the acting style, however, show higher levels of skill development in the behavioral quadrant.

The ELT instruments show a high degree of commensurability. The high degree of inter-correlation of the dimensions and dialectics suggest scales and instruments assessing comparable theoretical dimensions. Meanwhile, their differential construct and criterion validation results support the discriminant validity of the scales and measures. In terms of age and gender, as shown in Appendix C (Tables C.1, C.2, and C.3), there is a consistent lack of findings regarding type of program and age, while there are consistent findings regarding gender. As the literature would suggest, women show an increased tendency toward the experiencing end of the dialectic, increased flexibility on this dimension, and greater learning skill development, while men show the opposite tendency toward conceptualizing (White, 1992, 1994; Kolb, 1984).

Interpretation

The above results provide consistent and significant support for the conclusion that individuals with learning styles that balance experiencing and conceptualizing respond more flexibly in adapting to experiencing and conceptualizing learning situations. It can also be concluded that learning style specialization in conceptualizing is related to higher levels of development in analytic skills while specialization in experiencing is related to higher levels of development in interpersonal skills. Thus, on this experiential learning dialectic, balance is related to flexibility and specialization is related to skill development.

Detailed gender differences support these overall results. The finding that female adaptive flexibility is higher than male and that the relationship between balance and flexibility is stronger for women can be explained by the fact that women on the average are more balanced in their learning style than men when compared to the LSI normative sample. The female mean on AC – CE is 4.91 at the 52 percentile of the normative sample and the male mean is 11.31 at the 68 percentile (Kolb, 1999b). This is a result of the much replicated findings that women tend to be more oriented to experiencing while men are oriented toward conceptualizing. Thus, while the total sample tends to be specialized in conceptualizing (mean = 8.91 at the 62 percentile), men are far more specialized in conceptualizing than women. This extreme specialization is negatively related to flexibility for men and unrelated for women who in general are more balanced, with learning preferences that go more deeply into the experiencing realm.

That this sample of MBA students is more abstract than the norm is not surprising since a major variable in student selection is the total GMAT score. In this sample, the GMAT total score is correlated with AC – CE .26 ($p < .001$, $n = 192$, power $> 97\%$). The fact that specializing in conceptualizing is more strongly related to greater levels of analytic skill development for women than for men also supports the idea that learning style specialization is related to skill development.

While the above results show consistent support for the conceptualizing/experiencing dialectic of experiential learning, there is a consistent lack of

findings for the acting/reflecting dimensions. One possible explanation for this may lie in the context of the study–MBA students in a degree program that emphasizes analytic skills. In contrast, Freire's work that emphasizes the acting/reflecting dialectic was developed in the context of oppressed people for whom the learning challenges are in the acting realm. Another possible interpretation of the lack of results on the acting/reflecting dialectic is that this LSI dimension is not as powerful a predictor as the experiencing/conceptualizing dimension. Illiff's (1994) meta-analysis of the LSI would not support this conclusion since he found similar effect sizes for both dimensions (.34 and .32 respectively).

Implications for Research and Practice

One of the major goals in creating the ASI was to develop a quantitative measure of adult development based on the experiential learning theory of development; where it is hypothesized that adaptive flexibility in learning style is related to a highly integrated and complex level of adult development. The finding that ASI adaptive flexibility is related to integrating the experiencing/conceptualizing learning style dialectic adds further construct validation for this idea. This is the first study to examine the relation between balanced learning profiles and adaptive flexibility. Further research to replicate and extend the reliability and construct validity, as well as mathematical analysis of new formulas to assess ASI adaptive flexibility can add to our understanding of experiential learning and adult development. A necessary next research step is to improve the internal consistency of the ASI scales. While the AC, CE and (AC – CE) alphas fall into the acceptable .7 level (see Clark and Watson, 1997; Pedhazur and Schmelkin, 1991), the AE, RO and (AE – RO) alphas are much lower. Since the lower the reliability of a measure the lower its expected correlation with any other measure (Carmines and Zeller, 1989), the low reliabilities of the AE, RO, and (AE – RO) scales offer an alternative explanation as to the lack of support for hypotheses 1b, 2b, and 4b.

Parallel to improving the psychometric properties of the ASI, scholars should seek to extend the study of integrated learning and adaptive flexibility in other areas of organizational research. A promising research direction is the investigation of the impact of learning preferences and adaptive flexibility on attempted pedagogical innovations in management education. Boyatzis and Mainemelis (2000) recently analyzed the distribution of 1358 learning and adaptive styles of MBA students and found that, although there is a bias toward AC styles, there is also a considerable pluralism of styles among MBA students. For example, while 38 percent of full-time students have a preference for learning by conceptualizing (e.g. lectures, case studies and readings), 21 percent are inflexible in that learning mode, and while 32 percent of the students have a learning preference for acting (e.g. internships) another 30 percent are inflexible in that mode and thus more likely to become bored or uninterested when this method of instruction is being employed. An interesting research question is how newly attempted pedagogies, such as action learning and web-based learning, affect student learning. Boyatzis and Mainemelis (2000) suggest that as long as these pedagogical innovations are unbalanced and emphasize one dominant learning mode—be it acting in action learning or conceptualizing in web-based learning—they are doomed to undermine the learning opportunities of students who are not flexible in that learning

mode. If that were true it would have important implications not only for designing curricula that balance different learning orientations, but also for attempting to help students increase their degree of adaptive flexibility through the course of management education (see also Boyatzis et al., 1995; Lengnick-Hall and Sanders, 1997).

A second promising direction for future research involves the impact of adaptive flexibility on the ability of managers to respond effectively to the rapidly changing requirements of jobs and work environments. A numbers of authors (e.g. Ilgen and Pulakos, 1999; Pulakos et al., 2000; Thatch and Woodman, 1994) have emphasized in recent years that job performance is becoming increasingly dependent on the ability of managers to adapt to uncertain environmental conditions, changing technologies, corporate restructuring, mergers, or culturally diverse markets and work contexts. For example, Pulakos et al. (2000) have recently analyzed 1311 critical incidents from 21 different jobs and survey data from 1715 employees in 24 different jobs, and proposed that adaptive performance in organizations has eight dimensions: handling emergencies or crisis situations; handling work stress; solving problems creatively; dealing with uncertain and unpredictable work situations; learning work tasks, technologies, and procedures; demonstrating interpersonal adaptability; demonstrating cultural adaptability; and demonstrating physically oriented adaptability. The authors also suggest that future research should specify the individual characteristics, skills, and attributes that relate to adaptive performance (2000: 622). The theoretical framework and three commensurate instruments for assessing learning preferences, adaptive flexibility, and skills that we presented in this article may be used to respond to the call of Pulakos et al. (2000) and other authors. For example, drawing on the results of our study, we would hypothesize that managers who specialize in a particular learning style on the LSI (e.g. experiencing) will show higher level of skill development in a commensurate area of skills on the LSP (e.g. interpersonal skills) and will perform better in those jobs whose adaptive requirements match that area of skills (e.g. jobs that require demonstrating interpersonal adaptability). We would also hypothesize that managers who score higher on adaptive flexibility on the ASI will perform better in those jobs whose adaptive requirements are more complex and depend on all eight dimensions of adaptive performance identified by Pulakos et al. (2000).

A third direction for future research is the relation between adaptive flexibility and employee creativity. In today's global and dynamic economy the prosperity of organizations depends upon the ability of their members to disengage from preferred ways of thinking and doing so that they can generate novel and useful ideas and products (Amabile, 1988; Shalley et al., 2000; Sternberg et al., 1997). Although creativity researchers have given attention to the interaction between individual learning styles and the context of work (e.g. Sternberg et al., 1997; Woodman et al., 1993), there has been an ongoing frustration in attempting to explain this interaction through the lens of basically acontextual psychological theories and methods. For example, the long-time favorite divergent thinking tests have largely failed to produce valid predictions about real world creativity (Amabile, 1996; Baer, 1998; Gardner, 1993) and the commonly held idea that individuals with reflective learning styles are more creative than those with active styles (for a review see O'Hara and Sternberg, 1999) does not seem to apply well

in those domains, like management, in which creativity requires not only reflection but also active performance and improvisation (Nemiro, 1997; Sawyer, 1992, 1998). Our thesis is that creative adaptation, as the basis of generating creative ideas and actions, results from integrating the dual dialectics of learning, the processes of diverging and converging, assimilating and accommodating (see Figure 1). We are not alone in this conclusion. Brophy (1998) has recently summarized findings that support the theory that creative problem-solving involves both divergent and convergent processes, Ayman-Noley (1999) has noted that in the Piagetian and neo-Piagetian theories of development creativity is linked to the integration of the dialectical processes of assimilation and accommodation, and many organizational authors have suggested that creativity is a process that integrates dialectical tensions (e.g. Evans, 1992; Hampden-Turner, 1999; Mainemelis, 2000). In this study we have operationalized both integrated learning and adaptive flexibility; future research can now build upon our work to investigate their relation to employee creativity.

Implications for practice must be considered tentative at this point, awaiting replication and further construct validation of the balanced LSI learning profile and adaptive flexibility on the ASI. At a minimum the study gives a suggested answer to the often asked questions, 'What does it mean if I score "in the middle" on the LSI?' or 'What is the difference between balanced and specialized learning styles?' The findings suggest that the balanced learning profile, particularly on the conceptualizing/experiencing dialectic, is more flexible in adapting to different learning contexts, but may be less effective for skill development than a specialized learning style commensurate with specific specialized learning skills. Also, the substantial correlation between LSI scores and ASI total scores suggest that individuals' ASI total scores are similar to their LSI scores. Finally, data from this graduate management program suggest that emphasizing conceptualization and analytic skills in selection and curriculum, while fostering analytic skill development, may inhibit pluralism of student learning styles (see Boyatzis and Mainemelis, 2000; Lengnick-Hall and Sanders, 1997) and the flexibility required in most managerial jobs to balance interpersonal and analytic job demands (see Boyatzis, 1982).

Note

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Appendix A: Adaptive Flexibility Formulae

The formulae for the two adaptive flexibility measures are based on the vectors for each of the eight items of the ASI. There are two possible vectors per dimension for each item. For example, the AC/CE vectors for Item 1 are:

If AC > CE, Vector AC/Item1 = 1, Vector CE/Item1 = 0.
If AC = CE, Vector AC/Item1 = Vector CE/Item1 = 1.
If AC < CE, Vector AC/Item1 = 0, Vector CE/Item1 = 1.

The valence of individuals' preference for each mode is given by summing the vectors of the eight items:

SUM (Vectors AC) = Vector AC/Item1 + . . . + Vector AC/Item8.
SUM (Vectors CE) = Vector CE/Item1 + . . . + Vector CE/Item8.
SUM (Vectors AE) = Vector AE/Item1 + . . . + Vector AE/Item8.
SUM (Vectors CE) = Vector RO/Item1 + . . . + Vector RO/Item8.

The formulae for adaptive flexibility in the two ASI dimensions are the following (note that due to subtraction the scoring is inverse: i.e. the lower the score, the higher the adaptive flexibility):

Adaptive flexibility in AC/CE = ABS [SUM (Vectors AC) – SUM (Vectors CE)]

This score has a minimum value = 0, maximum = 8, mean = 3.56, standard deviation = 2.24, skewness = .24, and kurtosis = –.93.

Adaptive flexibility in AE/RO = ABS [SUM (Vectors AE) – SUM (Vectors RO)]

This score has minimum = 0, maximum = 8, mean = 2.19, SD = 1.79, skewness = .96, kurtosis = .82.

Appendix B

Table B Univariate statistics and Pearson correlations among LSI, ASI, and LSP scores ($N = 198$)

Item	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. LSI AC	33.66	7.72	—																				
2. LSI CE	24.74	6.81	–.45	—																			
3. LSI AE	33.73	7.10	–.44	.01	—																		
4. LSI RO	27.87	7.89	–.20	–.44	–.48	—																	
5. LSI (AC – CE)	8.91	12.36	.87	–.83	–.28	.12	—																
6. LSI (AE – RO)	5.85	12.89	–.12	.27	.84	–.88	–.22	—															
7. LSI ABS (AC – [CE + 4])	11.04	7.39	.33	–.28	–.10	.01	.36	–.06	—														
8. LSI ABS (AE – [RO + 6])	10.90	6.83	–.04	.04	–.04	.05	–.05	–.05	–.08	—													
9. ASI AC	13.86	3.91	.49	–.27	–.23	–.04	.46	–.10	.14	–.07	—												
10. ASI CE	9.87	3.92	–.40	.43	.08	–.05	–.49	.07	–.20	.08	–.62	—											
11. ASI AE	11.77	3.32	–.17	.02	.42	–.23	–.12	.37	–.01	–.07	–.40	–.10	—										
12. ASI RO	12.51	3.07	.07	–.23	–.26	.37	.17	–.37	.08	.07	–.05	–.37	–.44	—									
13. ASI (AC – CE)	3.99	7.05	.50	–.39	–.17	.01	.53	–.10	.19	–.08	.90	–.90	–.17	.18	—								
14. ASI (AE – RO)	–.74	5.41	–.14	.14	.41	–.35	–.17	.44	–.05	–.09	–.22	.15	.86	–.83	–.20	—							
15. ASI Adaptive flexibility AC/CE	3.56	2.24	.20	–.21	–.01	.00	.24	–.01	.26	–.11	.40	–.41	–.11	.13	.45	–.14	—						
16. ASI Adaptive flexibility AE/RO	2.19	1.79	.04	–.06	.00	.02	.06	–.01	.03	.10	–.01	.02	–.04	.01	–.01	–.03	.04	—					
17. LSP Analytical (AC)	67.55	20.14	.54	–.30	–.24	–.05	.50	–.10	.27	.02	.36	–.35	–.01	–.01	.40	.00	.15	.01	—				
18. LSP Interpersonal (CE)	83.73	14.70	–.24	.31	.12	–.15	–.32	.16	–.02	.08	–.12	.15	.05	–.11	–.15	.10	.04	.01	–.11	—			
19. LSP Behavioral (AE)	84.86	13.62	.03	.11	.12	–.23	–.04	.21	.10	–.01	.10	–.07	.18	–.23	.09	.24	.12	.00	.18	.55	—		
20. LSP Information (RO)	78.60	11.44	.15	.09	–.11	–.13	.05	.02	.20	–.02	.13	–.09	.01	–.06	.13	.04	.12	–.03	.33	.53	.64	—	
21. LSP (AC – CE)	–16.2	26.26	.55	–.41	–.25	.04	.57	–.17	.22	–.03	.35	–.35	–.04	.05	.39	–.05	.09	.01	.83	–.65	–.17	–.04	
22. LSP (AE – RO)	6.27	10.79	–.12	.04	.26	–.15	–.10	.23	–.08	.00	–.02	.01	.22	–.23	–.02	.27	.01	.04	–.13	.13	.58	–.25	–.01

Notes Significance (two-tailed): r's ≥ ABS (.14), $p < .05$; r's ≥ ABS (.18), $p < .01$; r's ≥ ABS (.24), $p < .001$

Appendix C

Table C.1 Mean LSI scores for program type, gender, and age

	Program		Gender		Age		
LSI scores	Full-time (n = 140)	Part-time (n = 58)	Male (n = 124)	Female (n = 74)	< 27 (n = 59)	27–32 (n = 103)	> 32 (n = 29)
Conceptualizing (AC)	33.10	35.00	35.35	30.81***	33.90	33.09	34.45
Experiencing (CE)	25.03	24.05	24.05	25.91	24.46	25.21	23.48
Acting (AE)	33.73	33.72	33.53	34.05	33.10	34.70	31.79
Reflecting (RO)	28.14	27.22	27.06	29.23	28.54	27.00	30.28
AC – CE	8.07	10.95	11.31	4.91***	9.44	7.87	10.97
AE – RO	5.59	6.50	6.47	4.82	4.56	7.70	1.52
Balanced learning Profile in AC/CE	10.63	12.02	11.60	10.09	11.37	10.50	12.21
Balanced learning Profile in AE/RO	11.00	10.67	11.06	10.64	10.93	10.46	12.00

Notes Due to inverse scoring in the computation of the balanced learning profile, the lower the score the more balanced the profile.
*** Mean difference is statistically significant at $p < .001$

Table C.2 Mean ASI scores for program type, gender, and age

	Program		Gender		Age		
ASI scores	Full-time (n = 140)	Part-time (n = 58)	Male (n = 124)	Female (n = 74)	< 27 (n = 59)	27–32 (n = 103)	> 32 (n = 29)
Conceptualizing (AC)	13.69	14.29	14.32	13.09	14.27	13.61	13.86
Experiencing (CE)	10.05	9.45	9.30	10.84**	10.10	9.78	9.76
Acting (AE)	11.79	11.72	11.67	11.93	11.41	12.12	11.41
Reflecting (RO)	12.49	12.55	12.71	12.16	12.24	12.50	12.97
AC – CE	3.64	4.84	5.02	2.26**	4.17	3.83	4.10
AE – RO	–.70	–.83	–1.04	–.23	–.83	–.39	–1.55
Adaptive flexibility in AC/CE	3.51	3.67	3.87	3.03**	3.53	3.66	3.62
Adaptive flexibility in AE/RO	2.25	2.03	2.38	1.86	2.39	2.17	1.90

Notes Due to inverse scoring in the computation of the balanced flexibility, the lower the score the more adaptively flexible the individual. ** Mean difference is statistically significant at $p < .01$

Table C.3 Mean LSP scores for program type, gender, and age

	Program		Gender		Age		
LSP skills	Full-time (n = 140)	Part-time (n = 58)	Male (n = 124)	Female (n = 74)	< 27 (n = 59)	27–32 (n = 103)	> 32 (n = 29)
Analytical (AC)	65.45	72.62	73.05	58.34***	69.00	65.79	67.31
Interpersonal (CE)	85.11	80.40	82.65	85.54	84.76	82.43	87.17
Behavioral (AE)	85.61	83.07	84.85	84.88	86.59	83.23	87.69
Information (RO)	78.64	78.50	79.10	77.76	79.29	76.77	82.02
AC – CE	–19.66	–7.78***	–9.60	–27.20***	–15.76	–16.64	–19.86
AE – RO	6.97	4.57	5.76	7.12	7.31	6.47	5.62

Note *** Mean difference is statistically significant at $p < .001$

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