Kolb Learning Styles of Dancers Who Do and Don't Use Dance Notation Compared to Other Fields

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Abstract:

This statistical study of 272 dancers, ages 18–96, using Kolb Learning Styles Inventory 4.0, identifies dominant learning cycles, learning styles, and learning style flexibility of the dance participants, and subgroups of notation users, and then compares these results to existing results from other disciplines. The research reveals the depth and breadth of learning cycles and styles among the dancers (notation users and non-notation users) and provides implications suggested by comparing to other disciplines. The results provide insight into the value of shifting approaches to teaching by using motif notation or structured dance notation, some of which closely match disciplines that are seemingly quite different from dance. Motif notation results hint that motif notation pushes students to be much more flexible in their learning styles. This distinction represents motif notation users' abilities to switch to a 'back up' learning style, when their dominant learning style seems not to fulfill every learning task. Structured notation users results point to ability to focus deeply into analysis. The results of this study point to two considerations for the dance classroom. Engaging in motif notation may be an ideal tool to stimulate flexibility for lifelong learning and structured notation encourages analytical skill building.

Keywords: dance notation | labanotation | learning styles | dance education | pedagogy | motif notation

Article:

During various choreographic projects and dance pedagogy courses, I noticed how my students, colleagues, and I had quite different stories to tell regarding how we experienced learning with dance notation. A colleague in the field of education remarked, 'While anecdotal stories will reveal a great deal, it might be useful to study the experiential learning styles of your dancers as well.' In this paper, I explore the experiential learning styles of 272 dancers, half who use dance notation and half who do not. After examining the results among those dancers, I compared the results to more than 10,000 participants from other studies. Statistical analysis was used to compare and contrast within the dance group and across disciplines. This study explores the learning styles of

dancers by using the Kolb Learning Styles Inventory 4.0 (KLSI 4.0), a tool in which participants respond to questions about learning experiences to frame how their preferences with learning are situated among Kolb learning cycles and learning styles. The findings of this study may be useful toward discussing the learning styles of dancers in academia, to imagine how the field of dance might better understand their learning styles and expand upon the learning styles explored across curricula. The outcomes also may be useful for educators and administrators to acknowledge how diversity of learning styles across a curriculum can enhance the learning capacity of the students – a focus long esteemed by liberal arts institutions toward developing the whole learner.

Since the advent of the concept of learning styles in the 1970s, much debate has occurred over whether teachers should match a student's learning activities to their preferred learning style. Research and debate suggest that people typically choose careers that require their preferred learning styles. However, expanding upon the palette of learning styles is the way to increase breadth and depth of learning. In this study, my focus is on how dancers perceive their own learning styles. A discussion of what results might imply will follow.

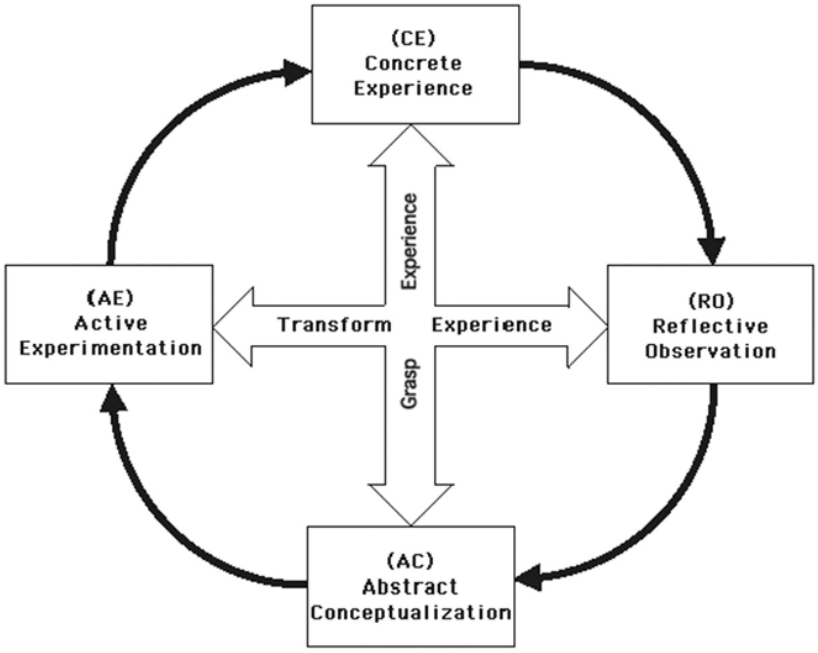
Literature Review

David Kolb, creator of the Kolb Learning Styles Inventory, states, 'Learning is the process whereby knowledge is created through the transformation of experience' (Kolb Citation1984, 38). Most dancers would think that this statement is obvious; however, for the first half of the 20th century, the rationalist and cognitive scholars tended to emphasize acquisition, manipulation, and recall of abstract concepts as learning, and, in addition, the behavior learning theorists tended to deny the role of consciousness and subjective experience in learning (Kolb Citation2015, xvii). Kolb attributes his understanding of learning to the work of William James, Kurt Lewin, John Dewey, Jean Piaget, Lev Vygotsky, Carl Jung, Carl Rogers, Paulo Freire, and Mary Parker Follett – the Foundational Scholars of Experiential Learning. The Experiential Learning Scholars, including Kolb, consider conscious, intentional, and subjective experiences in their understanding of the learning process. Hence, Kolb sees the cycle learning of 'experience, perception, cognition, and behavior' as a way to structure learning experiences (Kolb Citation2015, 31). I am interested in how dancers prefer to construct knowledge, and, more specifically, how dancers, who use codified forms of written dance notation, such as Labanotation and Motif Notation, prefer to construct knowledge. Dance notation is the symbolic representation of human movement, using methods such as graphic symbols, figures, and path mapping. While more than fifty dance notation systems exist, the most commonly used are Labanotation; Motif Notation, a subset of Labanotation used for teaching and creative purposes; Eshkol-Wachman; and Benesh (Hutchinson Citation1989). Some dancers are drawn to working with these notation tools when creating, learning, or performing dances. I believe preferred the KLSI 4.0 may reveal how dancers perceive their learning preferences, so I conducted a large study of dancers and also conducted statistical analysis of results of how dancers' who do and don't use dance notation compare to other disciplines. If results reveal various groups of dancers have different learning preferences, this information may support pedagogical practices in dance education when notation is part of the learning experience.

The Kolb model includes four learning modes of the Experiential Learning Cycle. While all four modes are involved in learning, individuals are thought to have preferences. The modes are Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). Experiential learning theory is described as a dynamic view of

learning based on a learning cycle driven by the level on a continuum of the two intersecting dialectics of action-reflection and experience-abstraction. The continuum of grasping experience refers to the process of taking in information. See the arrow from CE to AC in Figure 1. The continuum of transforming experience represents how individuals interpret and act on that information. See the arrow from AE to RO. This idealized model of learning, depicted in Figure 1, represents the learning cycle or spiral where learners touch on all four processes recursively (Kolb Citation2015, 50–1). See Figure 1.

Figure 1. The Experiential Learning Cycle (Kolb, 2015, 51).



The Experiential Learning Cycle uses a dynamic view of learning using two intersecting dialectics of (1) action and reflection (grasping experience, depicted by the arrow pointing from Concrete Experience to Abstract Conceptualization), and (2) experience and abstraction (transforming experience, depicted by the arrow pointing from Active Experimentation to Reflective Observation) that occurs in a recursive process based on situations and what is being learned (Kolb Citation2015, 51). While this model appears highly structured, Kolb believes learning is much more like a spiral (Kolb Citation2015, 52–62) that is built on six propositions: (1) learning is best conceived as a process, not in terms of outcomes; (2) all learning is re-learning or rather a constructivist model in which learners construct their knowledge based on experiences and learning from new experiences; (3) learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world; (4) learning is a holistic process of adaptation to the world; (5) learning results from synergistic transactions between the person and the environment; and (6) learning is the process of creating knowledge (Kolb and Kolb Citation2015, 6–7).

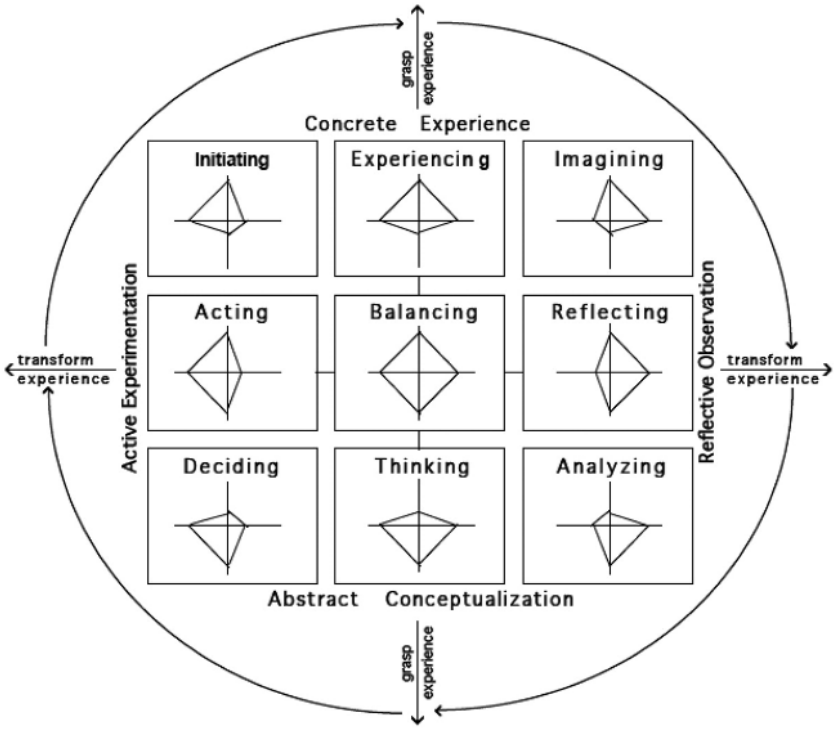
The Kolb Learning Styles Inventory (KLSI) was created to fulfill two purposes. The first was to provide participants with a tool that would support their meta-cognitive awareness of their learning process and to provide a framework for understanding their experiences in different learning situations. The second purpose was to provide a tool for researchers who are investigating experiential learning theory (Kolb and Kolb Citation2005, 8).

Research appears to support existence of these learning styles described by Kolb (Abdulwahed and Nagy Citation2009; JilardiDamavandi et al. Citation2011; Massey, Kim, and Mitchell Citation2011). In previous studies by Julie Sharp (Citation2006) and by Heiland (Citation2009), both hypothesized that students will likely gain easier engagement with learning if instructors match learning activities to students' primary learning styles; however, more learning might be gained if students are asked to stretch into less preferred styles (Sharp Citation2006, 96).

Iterations of the KLSI

The KLSI is a self-assessment exercise designed for predictive validity of converging and discriminating predictions made by the theory using an ipsativeFootnote1 measure for four main Learning Style variables (Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE)) and a forced-choice measure of the preference for AC or CE and AE and RO (Kolb and Kolb Citation2005, 8, 12). The KLSI uses three design parameters. The test requires users to resolve tensions between abstract-concrete and active-reflective situations in a rank order situation, and the questions are geared to model experiential learning theory. Data from previous studies showed that the original four learning styles (Accommodating, Assimilating, Converging, and Diverging) could be refined to include learning styles in between each of the main four learning styles, thus reducing confusion for participants whose outcomes showed results between two types. So four new learning cycles were added, and one in the center representing a holistic learning cycle for those whose data presented many of the learning styles. This comes to a total of nine learning styles, shown in Figure 2.

Figure 2. The nine learning styles depicted within the learning cycle amidst the dialectics of grasping and transforming experience (Kolb Citation 2015, 51, 144).

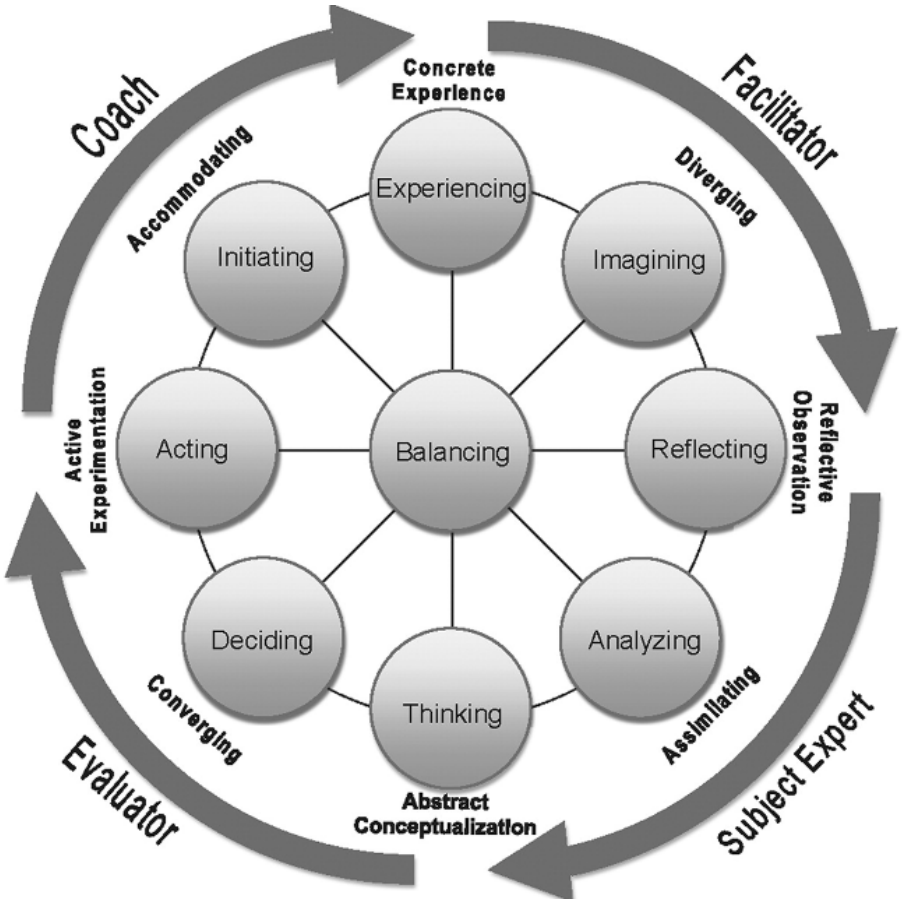


Learners may use one of these learning styles more than others, but learners can use many. The KLSI 4.0, which was used in this study, estimates which of learning styles a person uses predominantly and which tend to be second-most predominant (Kolb & Kolb Citation2015). The nine Learning Styles are described here.

- The **Initiating** style is characterized by the ability to initiate action in order to deal with experiences and situations [, which includes the learning cycles of Concrete Experience and Active Experimentation. The educator role for this learning style is Coach. See Figure 3 for a depiction of how the educator roles relate to the learning cycle and nine learning styles.]
- The **Experiencing** style is characterized by the ability to find meaning from deep involvement in experience [, which includes Concrete Experience. The educator role for this learning style bridges between Coach and Facilitator.]
- The **Imagining** style is characterized by the ability to imagine possibilities by observing and reflecting on experiences [, which includes Concrete Experience and Reflective Observation. The educator role for this learning style is of Facilitator.]
- The **Reflecting** style is characterized by the ability to connect experience and ideas through sustained reflection [, which includes Reflective Observation. The educator role for this learning style combines Facilitator and Subject Expert.]
- The **Analyzing** style is characterized by the ability to integrate and systemize ideas [into concise models] through sustained reflection [, which includes Abstract Conceptualization and Reflective Observations. The educator role for this learning style is Subject Expert.]
- The **Thinking** style is characterized by the capacity for disciplined involvement in abstract and logical reasoning [, which includes Abstract Conceptualization. The educator role for this learning style connects Subject Expert and Evaluator.]
- The **Deciding** style is characterized by the ability to use theories and models to decide on problem solutions and courses of action [, which includes Active Experimentation and Abstract Conceptualization. The educator role for this learning style is Evaluator.]
- The **Acting** style is characterized by a strong motivation for goal directed action that integrates people and tasks [, which includes Active Experimentation. The educator role for this learning style bridges Evaluator and Coach.]
- The **Balancing** style is characterized by the ability to adapt by weighing the pros and cons of acting versus reflecting and experiencing versus thinking [, hence a broad array of many learning styles and teaching educator roles]. (Kolb Citation2015, 145)

These nine learning styles represent the two related dialectics that have always been at the bedrock of the KLSI.

Figure 3. The nine learning styles, the two intersecting dialectics of the learning cycle (Kolb Citation2015, 147), and educator roles (Kolb Citation2015, 305) combined.



Educational Specialization

Academic disciplines have a wide range of forms of knowledge, theories, tools, knowledge structures, and criteria for excellence. Participants are drawn to disciplines for reasons of inherent engagement with the cultural and intellectual practices related to a discipline, yet the discipline further shapes the learning process through a continuing process of socialization and norming of the field. The student's developmental process is a product of the interactions in that socialization process. Hence, the student chooses a discipline that suits her or him, but the student's approaches to learning that discipline are shaped over time to be homogenous to that discipline (Kolb 60). The KLSI shows that student's learning styles differ significantly by academic discipline; however, environmental demands have shown differences between populations within the same discipline (Kolb 61). It is important to note that recent research shows that the KLSI can predict success of a person within the field of medicine, for example, based on whether or not a person's primary learning styles match those most needed to function in the discipline (Borracci & Arribalzaga); however, there is considerable variation of learning styles needed within various disciplines (Kolb 61). Because the culture of education can shape the way students learn, results of the KLSI may

even differ between students working toward the same degree, in the same discipline, from different universities (Kolb 62).

Research Questions

My primary research questions are RQ1: Which learning cycles are most represented among dancers who do and don't use notation? RQ2: Which learning styles are most represented among dancers who do and don't use notation. SQ2.1: How do the learning styles of dancers who don't use notation, who use structured notation, and who use motif notation compare to each other? RQ3: How do the results compare to disciplines outside of dance? Because studies have shown that culture and practice influence the preferred learning styles, I hypothesize that H1: the learning styles of dancers in the two categories who do use notation will be different from those who do not.

Method

Comparing Learning Cycles and Learning Styles of the Arts to Other Disciplines

Because no studies of dancers have yet been conducted, I examined existing data from disciplines most related to dance to gain an understanding of how the arts disciplines relate to other fields. Table 1 shows a sample of the results of learning styles among KLSI studies for twelve educational disciplines, with the top four learning styles for each shaded (Kolb and Kolb Citation2013, 186–187). Because Performing Arts and Dance are not represented, and Fine and Applied Art seems to be the closest discipline to that of Dance as an art, I placed Fine and Applied Art at the top. The subsequent categories are listed with decreasing similarity to the Fine and Applied Arts. The Learning Styles of Communications, Education, Humanities, Business, Languages, Law, and Medicine are statistically similar to Fine and Applied Arts, while Computer Science, Science and Mathematics, Physical Education, and Engineering are statistically significantly different. A chi-square test for independence with a Yates' correction revealed statistical significance for categories 9–12, $\chi 2(8) = 20.39$, $p < .05$.

Table 2 shows a sample of Learning Style Flexibility scores for various disciplines of study who have taken the KLSI, supplied here to invoke curiosity and to provide data for future comparisons to results of dance data. The average Learning Flexibility score among 10,423 participants is .73. See Table 2. A new component, the Learning Style Flexibility Index, was introduced into the KLSI 4.0 to measure adaptive flexibility, a measure of how a person adapts and shifts between learning styles, which is dependent on demands of learning situations. For example, learning styles are known to shift for some users across different types of activities, settings, or circumstances, while others will habitually stay with most comfortable learning styles regardless of circumstantial factors. The shift from learning style to learning style can be made consciously or unconsciously, and the ease in shift from one to the next is indicated by a higher learning style flexibility score in the KLSI 4.0.

This Learning Flexibility measurement tool is comprised of eight learning contexts that represent learning situations emphasizing different modes of the learning cycle. For example, 'starting something new' and 'influencing someone' represent AE and CE, and so forth. Current tests of the validity of this tool revealed the following: (1) Learning Style Flexibility decreases with age likely due to increased specialization, (2) women exhibit higher learning flexibility than

Table 1. Sample of learning style types and educational specialization, with decreasing similarity to the fine and applied arts (Kolb and Kolb Citation2013, 186–187).

		Yates' chi-square	Balancing	Acting	Reflecting	Deciding	Analyzing	Thinking	Experiencing	Initiating	Imagining	Total#
1	Fine and Applied Arts		3.6% (5)	5.7% (8)	7.9% (11)	8.6% (12)	8.6% (12)	9.3% (13)	13.6% (19)	20.0% (28)	22.9% (32)	140
2	Communications	1.52	5.9% (13)	7.2% (16)	6.8% (15)	6.8% (15)	8.1% (18)	7.2% (16)	19.8% (44)	20.3% (45)	18.0% (40)	222
3	Education	3.62	9.0% (38)	9.7% (41)	9.2% (39)	5.7% (24)	9.0% (38)	7.6% (39)	16.1% (68)	18.2% (77)	15.4% (65)	422
4	Humanities	6.38	6.5% (12)	13.0% (24)	7.6% (14)	5.4% (10)	14.7% (27)	12.0% (22)	12.5% (23)	13.0% (24)	15.2% (28)	184
5	Business	7.55	9.3% (159)	11.0% (188)	10.5% (179)	8.7% (149)	11.4% (194)	12.1% (206)	11.1% (190)	15.2% (260)	10.7% (183)	1708
6	Languages	7.82	10.2% (10)	7.1% (7)	15.3% (15)	9.2% (9)	9.2% (9)	6.1% (6)	14.3% (14)	9.2% (9)	19.4% (19)	98
7	Law	10.32	7.0% (17)	8.3% (20)	13.6% (33)	8.7% (21)	15.3% (37)	12.8% (31)	13.6% (38)	11.6% (28)	9.1% (22)	242
8	Medicine	10.89	8.9% (81)	11.6% (106)	8.3% (76)	11.3% (103)	14.0% (128)	14.8% (135)	8.1% (74)	12.8% (117)	10.3% (94)	914
9	Computer Science	20.39*	12.1% (7)	5.2% (3)	8.6% (5)	12.1% (7)	17.2% (10)	19.0% (11)	10.3% (6)	8.6% (5)	6.9% (4)	58
10	Science and Mathematics	22.66*	9.2% (74)	11.2% (90)	9.5% (76)	13.9% (111)	18.4% (147)	16.8% (134)	6.8% (54)	8.1% (65)	6.1% (49)	800
11	Physical Education	23.87*	18.4% (7)	7.9% (3)	13.2% (5)	0.0% (0)	5.3% (2)	7.9% (3)	23.7% (9)	13.2% (5)	10.5% (4)	38
12	Engineering	26.61*	11.2% (89)	9.6% (77)	7.3% (58)	17.0% (136)	15.9% (127)	19.2% (153)	5.3% (42)	10.0% (80)	4.5% (36)	798
13	**10,423 participants in 21 disciplines**	**7.17**	**9.3% (972)**	**10.1% (1043)**	**10.0% (1043)**	**9.3% (972)**	**13.0% (1355)**	**11.7% (1219)**	**11.4% (1188)**	**13.5% (1410)**	**11.6% (1206)**	**10,423**

*Yates' p-value < .05.

Table 2. Learning style flexibility scores for a sampling of students and employees (Kolb and Kolb Citation2013, 78).

	Learning Style Flexibility Mean	Standard Deviation	Minimum	Maximum	Total #
University Undergraduates	.76	.16	.29	.99	500
Law Students	.76	.16	.29	.99	166
Nursing Students	.75	.14	.43	.98	38
University Graduate Students	.73	.16	.12	1.00	1478
Adult Higher-Ed E-Learners	.73	.16	.18	.99	663
Managers	.72	.17	.09	1.00	1724
Medical Students	.72	.17	.18	.99	670
Total Norm Group for All Kolb Studies	.73	.17	.07	1.00	10,423

men, (3) higher levels of education result in lower levels of Learning Style Flexibility, (4) Learning Style Flexibility is lower for individuals in educational specializations that emphasize abstraction, (5) Learning Style Flexibility will be higher for those with accommodative learning (Initiating) (Kolb and Kolb Citation2013, 77–81), and (6) a link exists between Learning Flexibility and integrative development, higher ego development, and perceived self-direction in life (Kolb and Kolb Citation2013, 79). Mainemelis, Boyatzis, and Kolb determined that higher Learning Flexibility is related to a preference for Concrete Experience over Abstract Conceptualization (Citation2002) and for Accommodating over Assimilating learning preferences (Kolb and Kolb, 84). It is important to note that while the term flexibility implies a desirable trait, that this newer measure is less vetted than other components of the KLSI 4.0. After examining existing data, I began the study of dancers.

Participants of the KLSI 4.0 Study of Dancers

This study employed a disproportionate, stratified, random sampling population of dancers. To invite participants, I posted announcements five times over a three-year period on national and international dance list serves calling for dancers to participate in a research study. Two hundred seventy-two dancers, ages 18–98, participated (see Table 3). Because the population of notation users is much smaller than the non-notation users, I gathered as many notation user participants as was possible first (136), followed by equal numbers of non-notation users (136). While participants were included on a first-come basis, they were included in the study based on equal representation across the adult lifespan and among notion users or non-users, 232 were from the United States and 40 were international participants from Australia, Canada, China, Finland, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Mexico, Mongolia, Morocco, Netherlands, Serbia, Singapore, Spain, Sweden, Switzerland, Turkey, and United Kingdom. The notation-user group had a higher proportion of international dancers than the non-notation user group (39 to 1). Thirty-seven (16%) participants were male, with 15 being Notation Users and 22 being Non-Notation Users. Due to the low and unequal numbers of males, results cannot be analyzed statistically across notation sub-groups by gender. The independent variables for participant inclusion were age, notation use or non-notation use, and, more specifically, among notation users, structured notation user or motif notation user. Ethical approval for the study was granted by Loyola Marymount University, Los Angeles, CA.

Table 3. Ages of participants in the Notation Users group and the Non-Notation Users group.

Age Group	Notation Users	Non-Notation Users
18–29	33	33
30–39	27	27
40–49	25	25
50–59	27	27
60–98	23	23
Totals	136	136

Materials

The KLSI 4.0 online tool takes about 20 to 25 minutes to complete and assesses six variables to form the Learning Styles and Learning Flexibility of participants. These variables include four primary scores that measure a mean average of participants' relative emphasis on the four learning cycles of AC, CE, AE, RO (ipsative) and two combination scores of AC-CE and AE-RO dialectics, (not ipsative, but based on prior ipsative responses). Learning Flexibility is assessed using a non-ipsative continuation score in addition to the primary learning cycle dialectic. Version 4.0 (2011) uses a 48-item questionnaire online and is scored by a Kolb survey service provider. It maintains the high scale of reliability of KLSI 3.1 and offers higher internal validity, while maintaining high external validity. A Cronbach's alpha coefficient score of .81 for internal consistency reliability was proved; however, a test-retest study has not been conducted of the KLSI 4.0. A previous iteration, the KLSI 3.1, has been tested twice, with Kappa results of 0.9 (Veres, Sims, and Locklear Citation1991) and Kappa results of 0.54 (Ruble and Stout Citation1991). These two tests of KLSI 3.1 show moderate to excellent test-retest reliability (Kolb and Kolb Citation2013, 52). While the ipsative nature of the scale still limits the statistical analysis (Henson and Hwang Citation2002), the tool has improved a great deal and provides much more validity than earlier versions.

Procedure

Descriptive statistics including frequency, mean, and standard deviation were calculated. Statistical analysis of the data was carried out using chi-square analysis and statistical package for social science (SPSS, version 22) to cross-tabulate learning styles against age, notation or non-notation user, and, more specifically, structured notation or motif notation user and to identify any significant associations between the groups. Statistical significance was set at $p \leq .5$.

Results

The results presented here are reflective of 272 dancers who participated in the study. In no way can any implications be made regarding the Learning Styles of dancers outside this study. The KLSI 4.0 had a response rate of 95% (272 of 286 completed the online tool). Participants were asked whether or not they were notation users, or if they had been notation users in an earlier period of their lives. If they answered yes, participants were asked whether they used structured or shorthand/motif notation. When participants responded with multiple types of notation, they were asked to clarify their primary or most engaging form of notation. If participants were unsure if they had positively engaging experiences when using notation, or if they could not decide between structured or motif notation, their data was not used in the study; 21 participants' data was eliminated for this reason.

KLSI 4.0 results

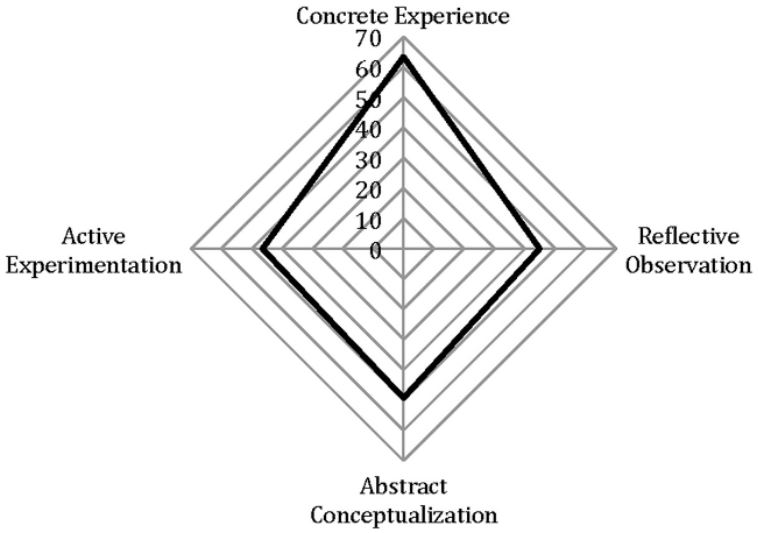
The outcomes of the assessment of the Learning Cycle for All Dancers, (including subgroups of Non-Notation Users, Structured Notation Users, and Motif Notation Users) added together, show that Concrete Experience is the main approach to learning, with more difference occurring between the two poles of the 'grasping experience' dialectic and less difference occurring between the two poles of the 'transforming experience' dialectic. Descriptive statistics can be found in Table 4.

Table 4. Frequencies of learning cycles for All Dancers.

	Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation
N Valid	272	272	272	272
Missing	0	0	0	0
Mean	61.99	52.17	40.25	47.10
Std. Deviation	29.21	30.52	31.48	30.61

See Figure 4 for a chart that depicts the two poles that make up the Kolb Learning Cycle results for All Dancers. The results of these two intersecting dialectics are the basis for the determination of the learning flexibility scores and the nine learning styles, which will be detailed subsequently. As shown in Table 4, the results of All Dancers represent a group of people whose learning styles show they use Concrete Experience considerably more than Abstract Conceptualization. Less of a difference was found between All Dancers' use of Active Experimentation and Reflective Observation.

Figure 4. Learning cycles (percentile) of all dancers in the study, Notation Users and Non-Users combined.



When dancers were divided into subgroups, the differences were more marked. Learning Cycle scores for Concrete Experience differed significantly by group, $F(2, 269) = 8.12$, $p = 0.00$. Tukey's HSD indicated that Structured Notation Users had significantly lower Concrete Experience scores than both other groups. The Structured Notation Users' scores were moderate in all categories except for their Abstract Conceptualization, which was moderately high. Learning Cycle scores

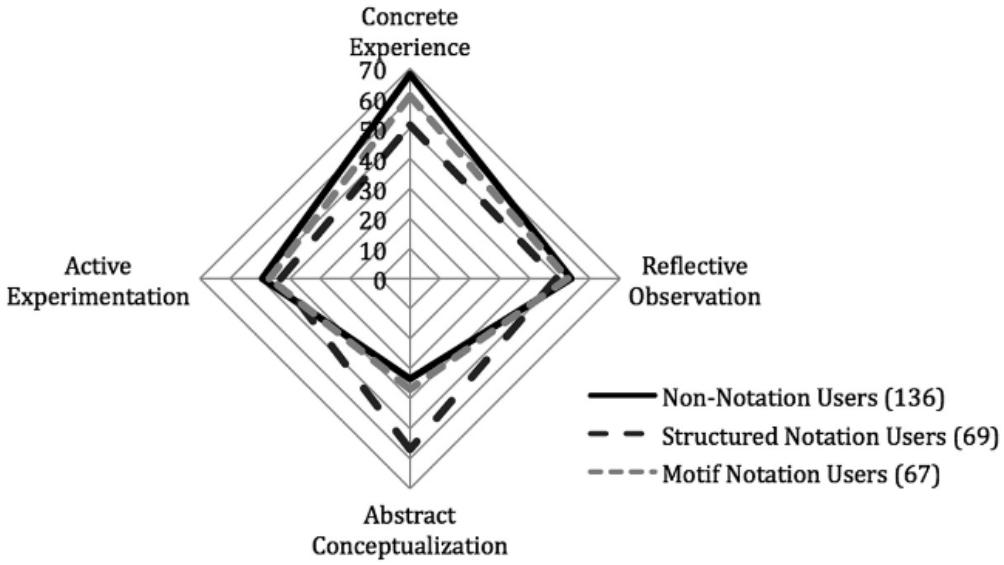
for Abstract Conceptualization differed significantly by group, $F(2, 269) = 14.62$, $p = 0.00$. Tukey's HSD indicated that dancers who are Non-Notation Users had significantly greater Abstract Conceptualization scores than both other groups. Descriptive statistics for all three groups are shown in Table 5 and Figure 5. The results between Non-Notation Users and Structured Notation Users represent opposition along the continuum of 'grasping experiences.' Non-Notation Users' scores are high for Concrete Experience, while Structured Notation Users' are high with Abstract Conceptualizations. Motif Notation Users' scores were fairly similar to the Non-Notation Users' scores. All of the subgroups have a slightly stronger inclination on the continuum of 'transforming experience' toward Reflective Observation over Active Experimentation, albeit low. Learning Cycle scores for Active Experimentation did not differ significantly by group, $F(2, 269) = 0.92$, $p = 0.40$, and neither did Reflective Observation, $F(2, 269) = 0.61$, $p = 0.54$. Tukey's HSD indicated that there were no significant differences between groups for the AE to RO continuum, as shown in Table 5 and Figure 5.

Table 5. Results of the measures of the learning cycle for All Dancers, Non-Notation Users, Structured Notation Users, and Motif Notation Users.

	Concrete Experience (Mean)		**Reflective Observation**		**Abstract Conceptualization**		**Active Experimentation**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
All Dancers (272)	61.99	29.21	52.17	30.52	40.25	31.48	47.10	30.61
Non-Notation Users (136)	68.04*	25.69	53.72	30.21	33.45*	28.76	49.22	30.48
Structured Notation Users (69)	51.14*	32.66	48.74	27.74	56.96*	31.85	43.10	31.31
Motif Notation Users (67)	60.87	29.27	52.54	32.1	36.85*	30.55	46.90	30.20

*Tukey HSD $p < .05$.

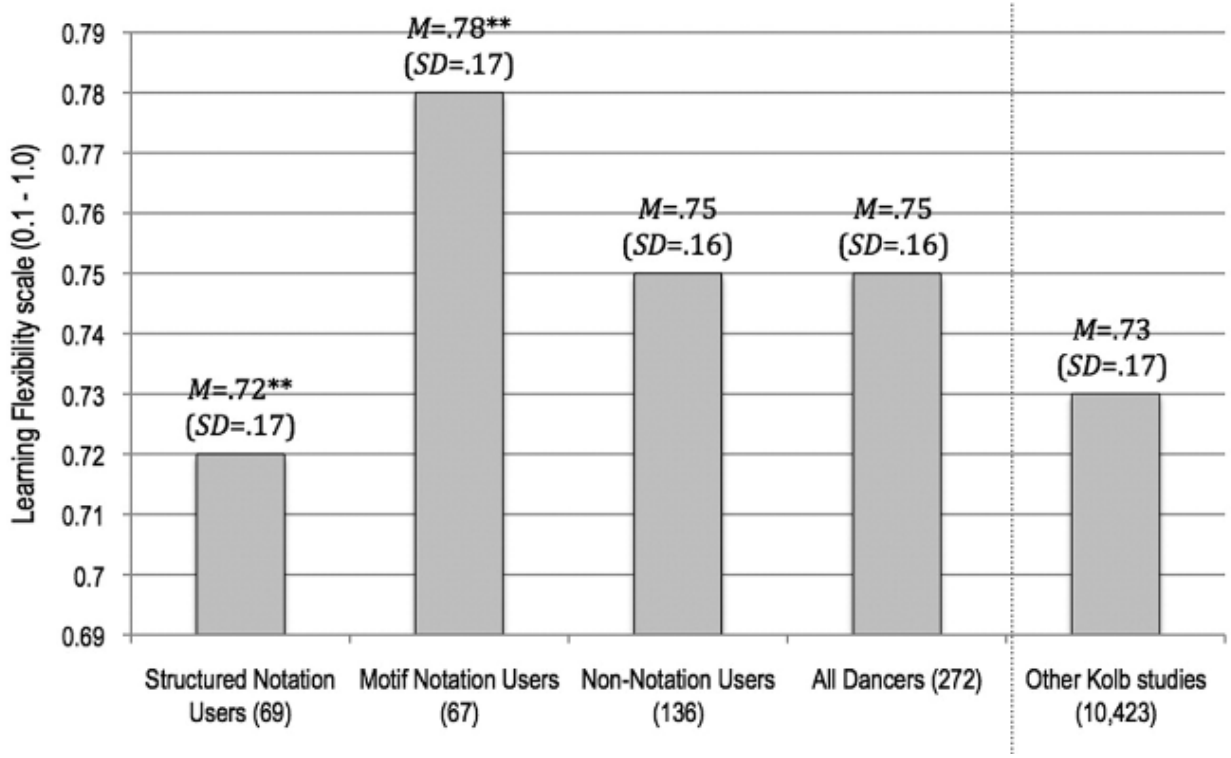
Figure 5. Mean results of learning cycle categories for Non-Notation Users, Structured Notation Users, and Motif Notation Users.



Flexibility

The Learning Flexibility scores, provided by the Kolb Survey service, were created by Kolb and Kolb using a Kendall's Coefficient of Concordance or W of the Learning Cycle scores that compares the two continuums of CE to AC and AE to RO using a non-parametric statistic measuring degree of agreement. As stated earlier, the average Learning Style Flexibility scores of 10,423 people (Kolb and Kolb Citation2013, 78) was M = 0.73 (SD = .17). As is depicted in Figure 6, the score of all dancers together was M = 0.75 (SD = .16), which shows more learning flexibility than the 10,423 studied. Among the dancers, the Non-Notation Users score matched the mean of all dancers. Motif Notation Users scored highest in Learning Flexibility, and Structured Notation Users scored the lowest, slightly lower than the average of the 10,423 Kolb studies participants. The differences among the three groups were not significantly different, $F(2, 269) = 2.72$, $p = 0.07$. The average Learning Flexibility scores for each group are shown in Figure 6.

Figure 6. Mean (and SD) learning flexibility scores of Structured Notation Users, Motif Notation Users, Non-Notation Users, All Dancers, and the average of 10,423 participants from other Kolb studies (Kolb and Kolb Citation2013, 78).



Learning Styles

Results for the Learning Styles assessment of all 272 dancers together are depicted in Figure 7, shown from lowest percentage to highest for each of the nine Learning Styles. The Learning Styles of All Dancers (272 participants) are somewhat similar to those found in the Kolb data for Fine and Applied Arts (140 participants) (Kolb and Kolb Citation2013, 186–187), with Imagining, Initiating, and Experiencing results being the highest, but again, in reverse order.

Figure 7. Percentage of learning styles among All Dancers (272).

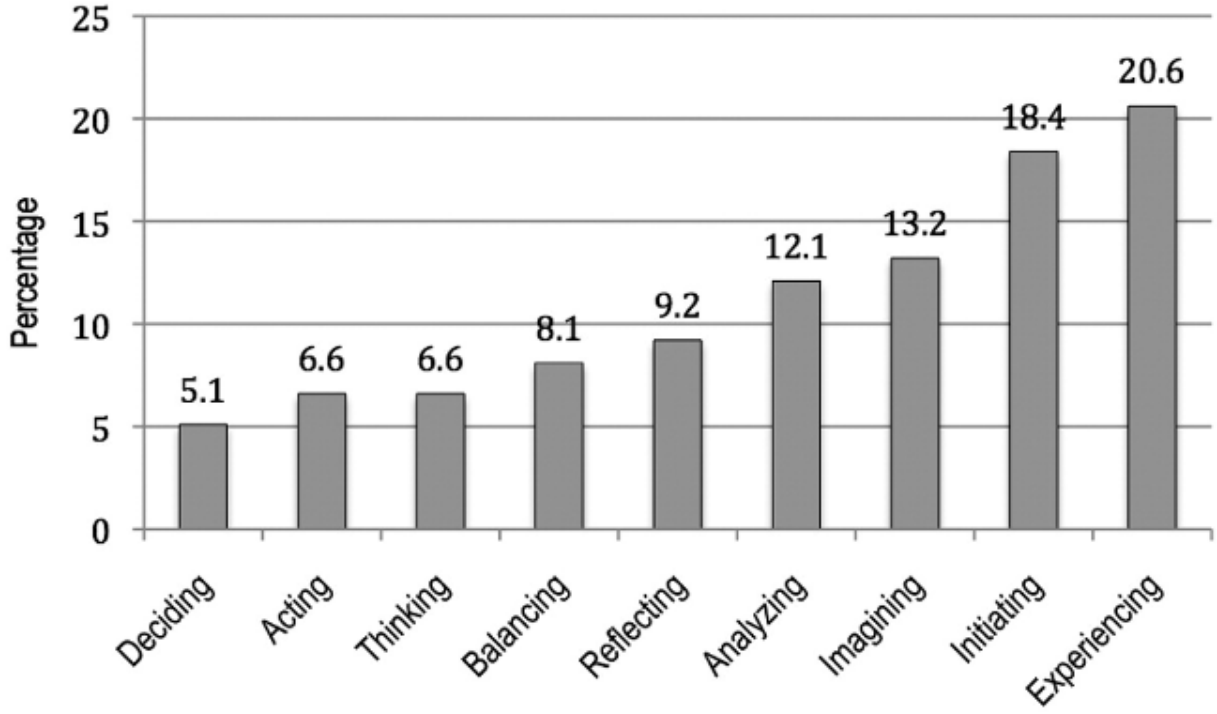


Table 6 reveals that the top three learning styles among All Dancers in this study were Experiencing (20.6%), Initiating (18.4%), and Imagining (13.2%). These are the same three learning styles reported in the Kolb report of Fine and Applied Arts (Kolb and Kolb Citation2013, 186–7); however, the ranking order is reversed, with Fine and Applied Arts having Imagining highest (22.9%), Initiating second (20.0%), and Experiencing (13.6%) third. Interestingly, in the Fine and Applied Arts, Balancing scored lowest (3.6%), while Dancers in this study scored 8.1% for Balancing. The Balancing Learning Style is assigned to participants whose scores reveal more equal representation among all the Learning Styles. These participants are known to weigh the pros and cons of acting versus reflecting and experiencing versus thinking – the two intersecting dialectics of the Learning Cycle (Kolb Citation2015, 8). A chi-square test for independence showed no statistically significant difference ($p = .747$) between the categories of All Dancers and Fine and Applied Arts, Yates' $\chi 2(8) = 5.10$, $p < .05$.

In Figure 8, the Learning Styles are shown for all three sub-groups, Non-Notation Users, Structured Notation Users, and Motif Notation Users. Again, the Learning Styles of the Non-Notation Users are similar to the Fine and Applied Arts results from Kolb studies, with Imagining, Initiating, and Experiencing results being the highest, but again, in reverse order to the Kolb holistic data (Kolb and Kolb Citation2013, 186–187). The results of the top three learning styles have a higher percentage than the results for All Dancers. The learning style with the highest percentage is Experiencing (24.3%), Initiating is 20.6%, and Imagining is 16.2%. Thinking is the lowest at 2.9%. A chi-square analysis showed that the nine learning styles of three groups were significantly different from each other, Yates' $\chi 2(16) = 33.25$, $p = .006$.

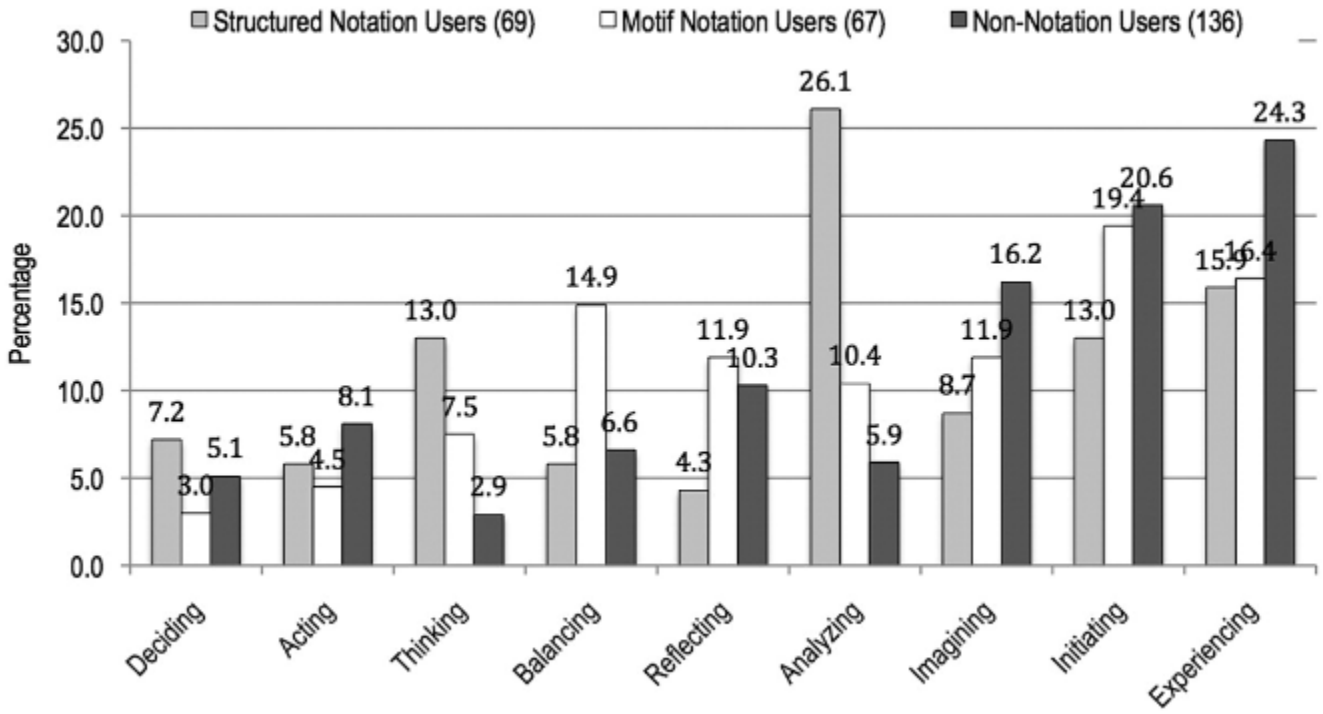
The Learning Styles for the Structured Notation Users differ greatly from the Non-Notation Users. The category of Analyzing (26.1%) is extremely high compared to all other groups, and it is the highest score for any Learning Style of any group. For example, Analyzing resulted in only 5.8% for the Non-Notation Users. The categories that were highest for the Non-Notation Users are much lower for Structured Notation Users (Experiencing 15.9%, Initiating 13.0%, and Imagining

Table 6. KLSI results from prior fine and applied arts and all dancers in this study.

	Deciding	Acting	Thinking	Balancing	Reflecting	Analyzing	Imagining	Initiating	Experiencing	Total #
All Dancers	5.1% (14)	6.6% (18)	6.6% (18)	8.0% (22)	9.2% (25)	12.1% (33)	13.2% (36)	18.4% (50)	20.6% (56)	272
Fine and Applied Arts	8.6% (12)	5.7% (8)	9.3% (13)	3.6% (5)	7.9% (11)	8.6% (12)	22.9% (32)	20.0% (28)	13.6% (19)	140

Sample of learning style types of fine and applied arts (Kolb and Kolb Citation 2013, 186–187).

Figure 8. Percentage of learning styles compared across Structured Notation Users (69), Motif Notation Users (67), and learning styles of Non-Notation Users (136).



8.7%). Thinking, which was quite low for the Non-Notation Users group is fairly high, at 13.0%, for the Structured Notation Group.

The Motif Notation Users group's results differ the most from all the other dance groups. Initiating has the highest percentage (19.4%), followed by Experiencing (16.4%), and then Balancing (14.9%). The Motif Notation Users group is the only group to have a high percentage of Balancing. One of the main differences between the Motif Notation group and the other dance groups is that, while the scores Deciding and Acting are quite low, the differences between the other seven Learning Styles is not as varied. The results show that the Motif Notation group self-assesses that they use their learning styles moderately more evenly, and the high Balancing score also represents this trend. The Motif Notation Users' Flexibility score, which is statistically significantly higher than the Structured Notation Users' score, has a similar pattern to the high percentage of the learning style of Balancing among the Motif Notation Users'.

Age

Tukey's HSD indicates that the 60+ year-olds trended toward higher Learning Flexibility scores than the 30–39 age group. $F(4,267) = 1.98$, $p = .098$. No other remarkable similarities could be found in relation to age.

Discussion

The goal of this study was to use the KLSI 4.0 experiential learning assessment tool with dancers to learn how they perceive of their learning preferences. This study identifies the predominant learning Cycles, Learning Styles, and the Mean level of Learning Flexibility of a group of dancers and its various subgroups to explore how dancers tend to perceive their learning experiences. The results of All Dancers reveal a group of learners, who perceive that, across the Kolb dialectic of 'grasping experience,' they depend on Concrete Experience more than Abstract Conceptualization. Less of a difference was found in the 'transforming dialectic' between All Dancers' use of Active Experimentation and Reflective Observation.

Dancers, who are Non-Notation Users, reported Learning Style preferences that most closely match the disciplines, in decreasing order, of Communication, Education, Fine and Applied Arts, Languages, Physical Education, and Humanities (Kolb and Kolb Citation2013, 186–187). See Table 7. The category of Fine and Applied Arts does share the same top three Learning Styles; however, the categories differ in ranking order. A Yates' chi-square test shows that the Learning Styles of the two groups, Dancers who are Non-Notation Users and the Fine and Applied Arts, are not significantly different, Yates' $\chi 2(8) = 7.28$, $p < .05$. The fields of Business, Science and Mathematics, Computer Science, and Engineering were the only three fields to have a statistically significant difference from Non-Notation Users. This group's role as educator would likely bridge between Coach and Facilitator. See Figure 3. (Kolb Citation2015, 145).

Dancers, who are Structured Notation Users, have Learning Style preferences that most closely match the disciplines, in decreasing order, of Law, Humanities, Computer Science, Medicine, Business, Science and Mathematics, Education, Engineering, and Communications (Kolb and Kolb Citation2013, 186–187). See Table 8. The category of Fine and Applied Arts shares only one Learning Style, Experiencing, with the Structured Notation Users, and it is only the third highest learning style for Fine and Applied Arts. The predominant learning style of Dancers who are Structured Notation Users is Analyzing, which is the top learning style for both Law and Science and Mathematics. A Yates' chi-square test shows that the learning styles of the two groups, dancers who are Structured Notation Users and the Fine and Applied Arts, are indeed significantly different, Yates' $\chi 2(8) = 15.59$, $p < .05$, and they rank 1 and 11 on this chart. This difference represents how the results from this study of Structured Notation Users and the prior studies of Fine and Applied Arts, are comprised of people in the arts who perceive their learning preferences to be different from each other, and, indeed, they do differ at a statistically significant level. The fields of Fine and Applied Arts, Languages, and Physical Education were the only three fields to have a statistically significant difference from Structured Notation Users.

Table 7. Disciplines with learning styles that are most similar to Non-Notation Users.

		Yates' chi-square	Thinking	Deciding	Balancing	Analyzing	Acting	Reflecting	Imagining	Initiating	Experiencing	Total #
1	(Dancers) Non-Notation Users		2.94%	5.15%	6.62%	5.88%	8.09%	10.29%	16.18%	20.59%	25.0%	136
2	Communications	1.99	7.2%	6.8%	5.9%	8.1% (4)	7.2%	6.8%	18.0%	20.3%	19.8%	222
3	Education	3.29	7.6%	5.7%	9.0%	9.0%	9.7%	9.2%	15.4%	18.2%	16.1%	422
4	Fine and Applied Arts	7.28	9.3%	8.6%	3.6%	8.6%	5.7%	7.9%	22.9%	20.0%	13.6%	140
5	Languages	8.61	6.1%	9.2%	10.2%	9.2%	7.1%	15.3%	19.4%	9.2%	14.3%	98
6	Physical Education	11.69	7.9%	0.0%	18.4%	5.3%	7.9%	13.2%	10.5%	13.2%	23.7%	38
7	Humanities	13.14	12.0%	5.4%	6.5%	14.7%	13.0%	7.6%	15.2%	13.0%	12.5%	184
8	Law	15.31	12.5%	8.7%	7.9%	15.3%	8.3%	13.6%	9.1%	11.6%	13.6%	242
9	Business	15.59*	12.1%	8.7%	9.3%	11.4%	11.0%	10.5%	10.7%	15.2%	11.1%	1708
10	Computer Science	30.80*	19.0%	12.1%	12.1%	17.2%	5.2%	8.6%	6.9%	8.6%	10.3%	58
11	Science and Mathematics	34.98*	16.8%	13.9%	9.2%	18.4%	11.2%	9.5%	6.1%	8.1%	6.8%	800
12	Engineering	40.58*	19.2%	17.0%	11.2%	15.9%	9.6%	7.3%	4.5%	10.0%	5.3%	798

*p < .05, Kolb and Kolb (Citation2013, 186–187).

Table 8. Disciplines with learning styles that are most similar to Structured Notation Users.

		Yates' chi-square	Balancing	Acting	Reflecting	Deciding	Imagining	Initiating	Thinking	Experiencing	Analyzing
1	Structured Notation Users (Dancers)		5.8%	5.8%	4.34%	7.25%	8.7%	13.04%	13.04%	15.94%	26.09%
2	Law	6.41	7.0%	8.3%	13.6%	8.7%	9.1%	11.6%	12.8%	13.6%	15.1%
3	Humanities	6.70	6.5%	13.0%	7.6%	5.4%	15.2%	13.0%	12.0%	12.5%	14.7%
4	Computer Science	6.79	12.1%	5.2%	8.6%	12.1%	6.9%	8.6%	19.0%	10.3%	17.2%
5	Medicine	7.90	8.9%	11.6%	8.3%	11.3%	10.3%	12.8%	14.8%	8.1%	14.0%
6	Business	8.92	9.3%	11.0%	10.5%	8.7%	10.7%	15.2%	12.1%	11.1%	11.4%
7	Science and Mathematics	9.37	9.2%	11.2%	9.5%	13.9	6.1%	8.1%	16.8%	6.8%	18.4%
8	Education	12.50	9.0%	9.7%	9.2%	5.7%	15.4%	18.2%	7.6%	19.8%	9.0%
9	Engineering	13.30	11.2%	9.6%	7.3%	17.0%	4.5%	10.0%	19.2%	5.3%	15.9%
10	Fine and Applied Arts	15.59*	3.6%	5.7%	7.9%	8.6%	22.9%	20.0%	9.3%	13.6%	8.6%
11	Languages	18.56*	10.2%	7.1%	15.3%	9.2%	19.4%	9.2%	6.1%	14.3%	9.2%
12	Physical Education	29.07*	18.4%	7.9%	13.2%	0.0%	10.5%	13.2%	7.9%	23.7%	5.3%

*p < .05, (Kolb and Kolb Citation2013, 186–187)

It has been articulated that Labanotation, a form of structured notation, appears to be similar to engineering code, that it must require logical mathematical intelligence, and that it is a second language. While these comments are based on perceived similarities, the learning styles of Structured Notation Users are statistically similar to the Learning Styles reported for the disciplines of Science and Mathematics and Engineering (Kolb and Kolb Citation2013, 186–187). The learning styles preferences found for the field of Languages, however, are not statistically significantly similar to the Structured Notation Users.

The KLSI 4.0 reveals that dancers who are Structured Notation Users would likely tend to like learning by integrating and systematizing ideas into concise models, finding meaning from deep involvement in experience and abstract and logical reasoning, while initiating action to deal with experiences and situations. Their role as educator might bridge between Subject Expert, Coach, Facilitator, and Evaluator (Kolb Citation2015, 145). While the learning style of Analyzing is high for both Structured Notation Users and the Science and Mathematics disciplines, the two differ greatly in that Structured Notation Users have Experiencing as their second highest learning style, while Science and Mathematics have Thinking and Deciding – the key difference is sensing via felt experience to analyze or thinking without felt experience to analyze.

Dancers, who are Motif-Notation Users, have Learning Style preferences that most closely match the disciplines, in decreasing order, of Education, Physical Education, Communications, Business, Languages, Law, Humanities, Fine and Applied Arts, and Medicine (Kolb and Kolb Citation2013, 186–187). See Table 9. The category of Fine and Applied Arts shares only two of these same top three Learning Styles. The predominant learning style of Dancers who are Motif-Notation Users is Initiating, while Fine and Applied Artists' predominant Learning Style is Imagining. A Yates' chi-square test shows that the learning styles of the two groups, Dancers who are Motif-Notation Users and the Fine and Applied Arts, are not significantly different, Yates' $\chi 2(8) = 11.12$, $p < .05$; however, they rank 1 and 9 on this chart. The fields of Computer Science, Science and Mathematics, and Engineering were the only three fields to have a statistically significant difference from Motif Notation Users.

It is interesting to note that the learning styles among Motif Notation Users are more similar to Education, Physical Education, and Communication, while the learning styles for Structured Notation Users differ greatly from those of Education and Communication and are statistically different from those of Physical Education.

Results indicate that dancers who are Motif-Notation Users tend to prefer learning by initiating action to deal with experiences and situations, finding meaning from deep involvement in experience, and adapting to situations by weighing the pros and cons of acting versus reflecting and experiencing versus thinking. Their role as educator could bridge strongly between Coach and Facilitator, yet also as Subject Expert and Evaluator (Kolb Citation2015, 145). The learning style of Balancing, which is fairly high among the Motif Notation users, represents a use of a wide variety of the eight learning styles. It is interesting to note that Balancing is higher among the Motif Notation Users than Structured Notation Users or Non-Notation Users. This higher percentage implies that Motif Notation User perceive that they prefer to use a wide array of learning styles, and by association, possibly teaching approaches.

The Structured Notation Users' Learning Styles are markedly different from the other subgroups, with Analyzing being significantly higher than the other two dance groups or any of the other fields studied. Meanwhile, this group of dancers does have fairly high scores for the same top three learning styles of the Non-Notation Users' group (Experiencing, Initiating, and Imaging); however, Thinking and Initiating share the same score. See Table 8. The Structured Notation

Table 9. Disciplines with learning styles that are most similar to Motif Notation Users.

		Yates' chi-square	Deciding	Acting	Thinking	Analyzing	Imagining	Reflecting	Balancing	Experiencing	Initiating	Total #
1	Motif Notation Users (Dancers)		2.99%	4.48%	7.46%	10.45%	11.94%	11.94%	14.93%	16.42%	19.4%	67
2	Education	3.12	5.7%	9.7%	7.6%	9.0%	15.4%	9.2%	9.0%	19.8%	18.2%	422
3	Physical Education	4.89	0.0%	7.9%	7.9%	5.3%	10.5%	13.2%	18.4%	23.7%	13.2%	38
4	Communications	6.20	6.8%	7.2%	7.2%	8.1%	18.0%	6.8%	5.9%	19.8%	20.3%	222
5	Business	6.45	8.7%	11.0%	12.1%	11.4%	10.7%	10.5%	9.3%	11.1%	15.2%	1708
6	Languages	7.56	9.2%	7.1%	6.1%	9.2%	19.4%	15.3%	10.2%	14.3%	9.2%	98
7	Law	8.01	8.7%	8.3%	12.8%	15.3%	9.1%	13.6%	7.0%	13.6%	11.6%	242
8	Humanities	9.08	5.4%	13.0%	12.0%	14.7%	15.2%	7.6%	6.5%	12.5%	13.0%	184
9	Fine and Applied Arts	11.12	8.6%	5.7%	9.3%	8.6%	22.9%	7.9%	3.6%	13.6%	20.0%	140
10	Computer Science	15.47*	12.1%	5.2%	19.0%	17.2%	6.9%	8.6%	12.1%	10.3%	8.6%	58
11	Science and Mathematics	21.89*	13.9	11.2%	16.8%	18.4%	6.1%	9.5%	9.2%	6.8%	8.1%	800
12	Engineering	25.44*	17.0%	9.6%	19.2%	15.9%	4.5%	7.3%	11.2%	5.3%	10.0%	798

*$p < .05$, (Kolb and Kolb Citation2013, 186–187).

Users, with their high Analyzing and Thinking scores reveal a side of dancers that somewhat parallels those of the Business, Law, Engineering, Science and Mathematics, and Computer Science Learning Styles. While none of these fields match the Learning Styles of the Structured Notation Users group, the dancers who are drawn to learning with Analyzing, Experiencing, Thinking, and Initiating are drawn to learning the logic, patterns, and structures within dance.

Non-Notation Users and Motif Notation Users' results were more similar to each other than they were to the Structured Notation Users. While the Abstract Conceptualization score for Non-Notation Users and Motif Notation Users was moderate and similar to each other, the Structured Notation Users' Abstract Conceptualization score was quite a bit higher, and the Concrete Experience score was lower than the other two. These basic differences along the 'grasping experience' continuum of the Learning Cycle point toward Non-Notation and Motif Notation Users depending on Experiencing, Initiating, and Imagining learning styles, while the Structured Notation users depend on Analyzing, Experiencing, Thinking, and Initiating learning styles. They tend to be opposite in the continuum of 'grasping experiences,' which represents the complexity of learning styles and inroads germane to the field of dance education. Kolb believes people are drawn to things they are good at, and then the culture of our various fields makes us even more refined at what we are interested in and good at. The use of Structured Notation likely attracts people who are good at Analyzing, Experiencing, Thinking, and Initiating, or, it could be true that working with structured notation helps to develop these skills.

This study revealed that the top three learning Styles for All Dancers together are Experiencing, Initiating, and Imagining, with Reflecting close behind. All three share Learning Styles of Initiating and Experiencing, while the Non-Notation group engages in Imagining, the Motif Notation Users engage in Balancing, and the Structured Notation Users engage in Thinking and Analyzing. It is interesting to note that Motif Notation Users engage with Balancing as the third most engaged mode of learning, a Learning Style that is characterized by the ability to adapt, to weigh the pros and cons of acting versus reflecting and experiencing versus thinking. Non-Notation Users perceive that they engage with Thinking the least. Structured Notation Users tend to engage with Reflecting the least, while Motif Notation users engage with Deciding the least. It was hypothesized that the Learning Styles of dancers in this study who use notation would be different from those who do not. This proved true statistically only between the Non-Notation users and the Structured Notation Users.

Learning Style Flexibility, a relatively new portion of the KLSI 4.0, reveals that Motif Notation Users seem to have a little more Learning Style Flexibility than Non-Notation Users, and statistically significantly more than Structured Notation Users. This distinction represents learners' abilities to switch to a 'back up' learning style, when the dominant learning style seems not to fulfill every learning experience. Motif Notation Users ease with switching between learning styles shows they are engaged easily in different ways. The Learning Flexibility score is highest for Motif Notation Users and Lowest for Structured Notation Users. All three groups together have an average Learning Flexibility score that is higher than the Kolb average of the existing Kolb data for 10,423 participants (Kolb and Kolb Citation2013, 78). So, according to the KLSI 4.0, dancers have higher learning flexibility than most.

Limitations

This study provides insights into the range of learning styles that exist among the dancers studied. While one cannot assume this group of dancers represents all dancers, the study provides a

framework for further discussion about learning styles in dance communities. Because differences in learning styles were found between the Structured Notation Users and the Non-Notation Users, one can make inferences about how teaching approaches involving notation could be geared toward development of curriculum that includes learning styles that provide engagement for the breadth of learning styles dancers find most engaging and the learning styles that seem to be most suited to learning with dance notation.

Gender is known to be a factor among learning styles results; however, in this study, the numbers of male dancers were too low to be analyzed for statistical significance based on gender alone. Culture is also a factor that influences learning styles assessments. This study included an international population, but not with equal numbers from all countries, and the international participants were more often Notation Users than Non-Notation Users. Hypothetically speaking, the international dance population has likely been exposed to a wider variety of teaching approaches than the USA participants because they are from 23 countries. The results of the data analysis may have been affected by the higher number of international students involved in the notation user group. Because the KLSI 4.0 online was only available in English, some international participants reported that they sought assistance from a translator with some of the questions.

Conclusion

The aim in this study is to use these findings to better understand the learning community of dancers and how dance teachers, especially those who use dance notation, might better understand the breadth of dancers' learning styles so that we can be more conscious of dancers' experiences when learning with notation. While researchers have expressed that teaching only to students' preferred learning styles limits students' learning capacity, starting with students' preferred learning styles can make it easier to engage them in learning. Most dancers prefer Experiencing as the main entry into learning dance, so learning with notation would do well to start here and then branch out. It is also important to provide an environment that requires a broad scope of coping skills in order to enhance students' learning flexibility so students are able to handle a wide variety of challenges. There are benefits to dancers who use their less explored learning styles, as they will expand upon their usual understanding of their dance explorations. So including notation activities into experiential creative, cultural, historical, analytical, and technical challenges could enhance the palette of teaching and learning in the dance classroom, thus encouraging dancers to engage in dance experiences using many approaches.

One can make inferences about how teaching approaches involving notation could be geared toward development of curriculum that includes learning styles that provide engagement for the both breadth of exploration of learning styles and appropriate scaffolding for dancers to comfortably engage with notation. For example, if the Structured Notation Users were to consider building curriculum around Non-Notation Users' learning styles, they would focus more on Experiencing, Initiating, and Imagining in order to engage Non-Notation Users in their most comfortable learning styles, and then they could shift gradually into Analyzing and Thinking, or they could weave these experiences together. Howard Gardner (Citation2011) states that a learning style model is simply a hypothesis of how an individual approaches a range of materials, and it is this statement that frames the potential for understanding dancers' learning. Dance teachers can use this information to be more conscious of the ways that dancers are most easily engaged with learning and then expand upon those approaches to support a dance community that can meet a wide variety of learning challenges that will support them through life. Engaging in motif notation

may be an ideal tool to stimulate flexibility for lifelong learning and structured notation seems to encourage analytical skill building.

Need for Future Research

Future studies connecting more in-depth qualitative analysis, focus groups, and fMRI research of the brain with learning style assessments would allow the self-assessment tools to be compared and contrasted. Among dancers, there are those who prefer learning movements from a teacher so that they can achieve mastery toward skill and there are those dancers who prefer improvising or choreographing their own dance movements. Learning flexibility could likely be better understood by employing both the KLSI 4.0 and fMRI explorations of dancers while learning. While the KLSI 4.0 tells us how dancers perceive their learning preferences, the addition of fMRI scans could reveal the breadth of neural engagement humans use when learning through dance. In this study, because the older dancers in this study, those aged 60+, had higher flexibility than the 30–39 age group, it would be interesting to see the use of the brain using the fMRI to better understand how learning dance with and without notation engages the brain and nervous system throughout life.

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Disclosure statement

No potential conflict of interest was reported by the author.

Additional information

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Notes

1. Ipsative is a descriptor used to indicate a specific type of measure in which respondents compare two or more desirable options and pick the one that is most preferred (sometimes called a 'forced choice' scale).

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