

## Enabling Tutors to Identify Learning Style Preferences in Students with Learning Disabilities

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Academic success for students with learning disabilities is of critical importance as more students with disabilities enter higher education. Colleges and universities provide a variety of services for these students ranging from simple accommodations to fee-for-service support programs, and many students with learning disabilities receive tutoring services designed to improve their opportunity for success in the classroom. Often, tutors are academically successful students who have no specific training in working with persons with learning disabilities. As a result, the type of study skills promoted by these student tutors typically match their own learning styles without regard for the learner's needs. Additionally, they may have little knowledge of the specific intrinsic processing strengths and deficits associated with their student's learning disability. Mitchell and Sedlacek (1995) reported that study skills training designed to meet individual strengths and weaknesses is important, and that this lack of knowledge both of the disability characteristics as well as appropriate study techniques commonly results in tutoring sessions that may be only moderately helpful. Olson and Platt (2000) reported that students with learning disabilities should receive tutoring that includes both an academic emphasis as well as cognitive strategies that tap into the student's learning style profile.

### Rationale for Investigating Learning Characteristics

Higher education success is often perceived as content-laden rather than linked to the mastery of fundamental, and complex principles and concepts contained within a knowledge base (Murray-Harvey & Keeves, 1994). Students with learning disabilities may fail to master simple content-related tasks such as memorization and appear to be unable to pass a given course. With appropriate instruction, however, they may prove capable of learning and utilizing the principles and concepts required for successful course achievement.

The reasons behind academic failure for students with learning disabilities may include a variety of intrinsic processing problems such as poor information processing, lack of efficient strategies for learning both content and underlying principles, and failure to recognize learning preferences as well as strengths and weaknesses. Without specific knowledge about intrinsic processing strengths and weaknesses, students with learning disabilities and their tutors must simply guess about the reasons for their academic failure.

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Postsecondary student learning processes and progress in higher order thinking have been explored by Murray-Harvey and Keeves (1994). College faculty members may presume that students have the ability to master both a “body of knowledge” (content) as well as the “how to learn” (process) without their direct intervention. For students with learning disabilities, problems in university instruction occur when they are not prepared to meet both sets of academic demands and have limited resources for dealing with their “ineffective strategies and misconceptions” (Murray-Harvey & Keeves, 1994, p. 4).

Murray-Harvey and Keeves (1994) highlighted the following keys to higher education academic success: an internal locus of control; high levels of motivation, persistence, and responsibility; adaptability to a variety of physical learning environments; independent study skills; and well developed meta-cognitive processing skills (i.e. self-knowledge about what it takes to learn). Information critical to success at the university level includes student knowledge about personal learning preferences, skills, strategies, and academic strengths and weaknesses. Providing tutorial services that emphasize the student’s strengths as opposed to accentuating the disabling condition allows for more comprehensive learning opportunities.

### Intrinsic Processing as Learner Characteristics

Intrinsic processing disorders are defined as “physiologically-based mental actions or operations that lead to an end” (Hammill & Bryant, 1998, p. 7). Students with learning disabilities engage in processing strategies that are ineffective and lead directly to difficulties in reading, writing, or other academic areas. By pinpointing these behaviors and highlighting the student’s intrinsic processing strengths, a tutor can develop strategic study activities.

“Individuals with learning disabilities deal with certain kinds of information differently which is why they have learning disabilities” (Hammill & Bryant, 1998, p. 7). The Learning Disabilities Diagnostic Inventory (LDDI) provides information about a student’s intrinsic processing skills. This information, obtained through self-report (Lock & Layton, 2001), can provide a tutor and student with a better understanding of which abilities to emphasize in order to avoid using deficit intrinsic processing skills during a tutoring session.

### Identifying Classroom Learning Style Preferences

Riechmann and Grasha (1974) described the Grasha Riechmann Learning Styles Scale (GRLSS) for use with college students to explore classroom learning style preferences. The scales focus on student interactions in learning situations by categorizing social indicators. The GRLSS is organized into three categories: competitive/collaborative; avoidant/participant; and dependent/independent. The scales require the selection of one type of learning style from each of the three categories that characterize academic classroom activity preferences. The student’s learning style profile is then identified within the three categories.

While all students exhibit a variety of the learning styles identified on the GRLSS in

varying degrees, most students benefit from instruction that matches their preferences and encourages the development of the dormant styles (Grasha & Yargarber-Hicks, 2000). Therefore, information about student learning style preferences can be used to provide meaningful instruction particularly for students with other learning difficulties. For example, a student who self-identifies a learning style in the collaborative/participant/dependent category will prefer instruction that allows work in groups with a teacher who provides direct instruction and has clear expectations for class performance. For tutors of postsecondary students with learning disabilities, this information provides additional, valuable input regarding both the role of the tutor and the needs of the student in study sessions.

### The Role of Modality Preferences in Successful Tutoring

Sensory modality preferences are typically conceived of as auditory, tactile/kinesthetic, and visual (Wallace, 1995). Like the GRLSS, while students exhibit a learning modality preference, most people utilize the modalities in fairly evenly distributed ways. While people may be able to identify one modality preference, they will concede that all three are useful in their learning process. Vail (1992) proposed that most people have a predominant style with secondary strengths that complement their abilities. For students with learning disabilities, however, the absence or faulty operation of one modality may cause the student to depend on one of the three more heavily (Vaughn, Bos, & Schumm, 2000). Many checklists exist to enable students to easily self-identify their learning modality preference, but the Learning Style Inventory (LSI) is the most commonly used and one of the most powerful instruments to identify modality preference/functioning (Wilson, 1998).

For students with learning disabilities, this information is critical and provides the third piece of the instructional puzzle for their tutors. Students with auditory modality deficits will experience difficulty when presented with isolated auditory learning tasks (i.e. lecture courses without visual aids). Likewise, tutors who insist on using visual examples for students with visual modality deficits may be wasting valuable time. The identification of the student's modality strengths and weaknesses clarifies the tutor's understanding of the most appropriate methods for facilitating the student's learning.

### Linking Multiple Intelligences to Effective Studying

Jordan (1996) proposed that one reason for academic boredom and lack of motivation in secondary students can be attributed to a failure on the part of the teacher to use strategies that look beyond the typical reading and mathematics emphasis in the curriculum. She described student learning as coming from a multitude of intellectual sources such as those described by Gardner (1993) in his Multiple Intelligences Theory (MI). Gaining competence in typical school curriculum can be accomplished more readily when utilizing a variety of unique intelligences.

Gardner (1993) described the theory of MI as a pluralistic method for viewing the

mind in which nine different types of cognitive strengths and styles are identified. These specific strengths and styles are descriptive of the person's ability to solve problems or design products. Gardner suggested that the utilization of a person's area of MI strength in order to reinforce learning will enhance performance and ability to learn.

## Effective Tutor Training

To maximize the effectiveness of tutoring sessions and ensure that the student masters the material at a more complex level, tutors working with these students need additional training (Mitchell & Sedlacek, 1995). In order to examine a method for increasing the tutors' ability to create more complex and effective tutoring sessions, a training session was developed for the current study. The session highlighted the following areas: the significance of knowledge about a student's intrinsic processing strengths and weaknesses in the learning process as identified by the Learning Disabilities Diagnostic Inventory, (LDDI) (Hammill & Bryant, 1998); the relevance of discovering specific classroom learning styles as demonstrated in the Grasha Riechmann Learning Styles Scale, (GRLSS), (Hruska-Riechmann & Grasha, 1982); the importance of recognizing and utilizing the strongest modality in study sessions as shown in the Learning Styles Inventory, (LSI), (Dunn & Dunn in Wilson, 1998); and the identification of strong multiple intelligence areas, (Armstrong, 1994) as well as modality strengths to create productive study sessions and subsequent learning.

While the importance of learning style preferences, multiple intelligences, modality factors, and intrinsic processing strengths and weaknesses is critical for quality learning, questions remain as to whether tutors will actually be able to utilize this information to plan effective tutoring sessions. After the training session, this study examined the ability of a group of tutors to increase their selection of appropriate learning strategies to match a student's individual cognitive preferences on the LDDI, GRLSS, the LSI modality strengths scale and the MI profile. The following research question was addressed: Is there a difference between the tutors' selection of learning strategies after training with and without a visual reminder (see Figure 1) of the concepts on the LDDI, GRLSS, LSI, and the MI?

## Methodology

### Participants

A total of 68 tutors participated in this study. Each tutor was a currently enrolled undergraduate student representing various academic colleges at a research-focused university. Each student was classified as a junior or senior, and included 28 males (41%) and 40 females (59%).

## Training

Tutor training consisted of three areas. First, the tutors were provided with an informational session concerning classroom learning style preferences, modality preferences, the theory of multiple intelligences, and the role of intrinsic processing deficits in learning disabilities. Second, the instruments for each of these concepts were demonstrated (LDDI, GRLSS, LSI, and MI). And finally, each tutor designed a personal program for a case study illustrating a postsecondary student with learning disabilities both with and without a learning style chart.

## Data Analysis

The data obtained from each tutor's analysis of the case study completed in the training session were analyzed by examining four factors: the inclusion of the four variables identified by using the LDDI, GRLSS, LSI, and the MI; the number of responses produced with and without the learning style chart; the responses that were obtained from the tutors most frequently; and finally the most appropriately designed suggestions offered by the tutors that matched the data presented in the case study. In evaluating the tutors' ability to include the information provided by the LDDI, GRLSS, LSI, and the MI assessment devices, each response page (utilizing the case study information) was analyzed by two examiners independently. The examiners pinpointed the specific study suggestions that matched the information elicited from each assessment device. Tallies were kept for each tutor. There was 100% inter-rater reliability between the examiners.

The examiners also tallied the number of responses for each tutor with and without the learning style chart (Figure 1). Again, each examiner tallied independently with 100% inter-rater reliability. The number of responses for each category was then averaged to determine the mean. The two examiners then analyzed the types of responses provided by the tutors by listing all responses and tallying the number of times each was repeated. T-tests were computed to determine if there was a significant difference between the responses when tutors used the learning style chart (Figure 1) or did not. Finally, the responses were reviewed to determine which best fit the information provided in the case study and demonstrated a unique study method for the student described in the case study.

## Results

The results indicated that all 68 of the tutors were able to identify some learning style needs even without using the learning style chart (Figure 1) to aid them in remembering all of the student's strengths. Depending on the category, the percentages of response without the chart ranged from a low of 22% identifying strategies in the MI variable, to a high of 83% identifying strategies in the LSI variable. In the LDDI variable, the identification of strategies was accomplished by 38% of the respondents,

while in the GRLSS, the strategies were identified by 46% of the participants. In the second part of the analysis, the descriptive statistics for the sample were analyzed to determine the mean number of responses for tutors both with and without the learning style chart. When the tutors used the learning style chart, the mean response rate was more than twice as productive (see Table 1).

Third, as shown in Table 2, the percentage of responses by the tutors both with and without the learning style chart was calculated. Each variable is represented in relation to the assessment results from the case study and is divided into the sub-components that identify the case study student's strengths. For example, the GRLSS collaborative results are presented in one category with the GRLSS participant results in another. Without the learning style chart, the tutors most easily constructed strategies that represented the student's interpersonal strengths (MI, 100%). Additionally, the collaborative area on the GRLSS was highly depicted in their strategies at 90%. They had the most difficulty with the skills that represented dependent learning styles as identified by the GRLSS (10%).

Next, as shown in Table 3, paired sample t-tests were computed to determine if significant differences existed between the responses obtained with and without the learning style chart. Seven of the 10 sub-components (LDDI reading; GRLSS participant, dependent; MI bodily, musical; and LSI auditory, tactile) were significant at the .001 level. One variable, GRLSS collaborative, was significant at the .05 level. Two variables, MI interpersonal and LSI visual, showed no significant differences.

In the final analysis, the data were reviewed to identify the responses that were most appropriately designed for the student in the case study. Strategies were analyzed using the following criteria: Is the strategy individually designed and does it specifically match the student's needs? Examining the responses, the tutors tended to record more generalized strategies for the student for the case study without the use of the learning style chart. When utilizing the learning style chart, the tutors were able to provide more specific strategies to aid in this student's study procedures. Figure 2 presents a comparison of the strategies both with and without the learning style chart.

## Discussion

This study sought to demonstrate the efficacy of both training and the learning style chart to increase tutors' selection of study activities that reflect an individual student's learning style strengths. The significant differences in the tutors' ability to indicate strategies that reflected each of the four variables (LDDI, GRLSS, LSI and the MI) while using the learning style chart is important. These findings indicate that the tutors were more successful at creating individualized strategy plans for a postsecondary student with learning disabilities when they were visually-cued by the learning style chart.

The tutors were more successful at providing individualized strategies that matched the student's needs in excess of a 2 to 1 ratio. Secondly, when using the learning style chart, the tutors were able to reflect each variable as identified by the LDDI, GRLSS, MI, and LSI assessments at a 100% level with the exception of one indicator (GRLSS

dependent). Furthermore, the dramatic increase in the percentage of responses that matched each category jumped from 47% without the chart to 93% while using the learning style chart.

While examining the quality of the responses provided by the tutors both with and without the learning style chart, an increase was identified in both the specificity and individuality of the responses. These more highly developed, tailor-made learning strategies may prove helpful in enhancing a student's study sessions. The chart may also enable the tutor to generalize knowledge about learning style information to increase their effectiveness with a variety of learners.

## Educational Implications

Knowledge concerning the relationship between learning styles and effective study strategies promises to provide information about quality methods for tutoring individuals with learning disabilities in higher education. The significant differences identified indicate that tutors must not only be aware of learning styles, but must also have methods for increasing their ability to utilize each strength specifically. The results would appear to indicate that tutors are more successful when they have visual reminders such as the learning style chart when planning study strategies for their students.

## Limitations of Study

The current study was conducted at one university, and further exploration across a variety of postsecondary institutions might provide for greater generalization. The case study forced tutors to make educational decisions based on contrived results for one student, using the learning style chart for students with learning disabilities to examine grade point average changes. This further evidence would then provide increased documentation of the method for peer tutors.

## Future Research

While use of tutoring for college students with is widely accepted, methods for tutor training have not been established. Using unproductive pedagogy wastes valuable resources that could be used for constructing strategies that enable tutors to be effective. Research accountability of such training can establish the impact that tutors have on the success of college students with learning disabilities. Another interesting variation of the current study would be to determine the effectiveness of training students with learning disabilities regarding the self-use of learning style data. An in-depth needs assessment of successful tutoring programs can also provide the data needed to drive viable systems to increase the achievement of students with learning disabilities in higher education.

## Summary

The current study explored the use of training with tutors coupled with a visually-cued learning style chart to describe individual cognitive styles. The ability of the tutors to construct specific study strategies was investigated, and tutors were trained and given the inventory results of a hypothetical student. Results from the LDDI, GRLSS, LSI, and the MI inventories were used to formulate a case study profile. The tutors were asked to design a program that incorporated the four learning and cognitive styles into specific study strategies. Moderate success was noted in the tutors' initial attempts. The tutors were then asked to design a program using a visually-cued chart with learning and cognitive factors. Their ability dramatically increased with the use of the learning style chart. Results of the study indicated that training tutors on learning and cognitive styles and providing the learning style chart as a visual reminder enabled the tutors to individually design programs based on specific personal needs and strengths. Consequently, tutor training with the learning style chart may have a positive impact on the academic success of college students with learning disabilities.

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TABLE 1

Descriptive Statistics for Tutors With and Without the Learning Styles Chart.

	Without Chart	With Chart
Mean	2.82	7.82
Range	0-6	4-14
Mode	3	7

TABLE 2

Percentage of Response by Tutors With and Without Learning Styles Chart by Assessment Devices

	LDDI	GRLSS	MI	LSI	UR
<b>With Chart</b>	Reading 100 (68)	Collaborative 100 (68)	Bodily 100 (68)	Auditory 100 (68)	54 (37)
		Participant 100 (68)	Musical 100 (68)	Tactile 100 (68)	
		Dependent 33 (23)	Interpersonal 100 (68)		
<b>Without Chart</b>	Reading	Collaborative 38 (26)	Bodily 90 (62)	Auditory 43 (29)	43 (29) 81 (55)
		Participant 48 (32)	Musical 9 (6)	Tactile 67 (45)	
		Dependent 0 (0)	Interpersonal 100 (68)		

**LDDI**=Learning Disabilities Diagnostic Inventory  
**GRLSS**=Grasha Riechmann Learning Styles Scales  
**MI**=Gardner's Theory of Multiple Intelligences  
**LSI**=Visual, Auditory, Kinesthetic  
**UR**=Unrelated to an assessment device

TABLE 3

Paired Samples t-Test Results Between Responses with and without the Use of the Learning Styles Chart

Instrument	No Chart (N=68)	Chart (N=68)	t	Effect Size
<b>LDDI</b>				
Reading	1.39 (.49)	2.00 (.00)	-10.40**	1.24
<b>GRLSS</b>				
Collaborative	1.91 (.29)	2.00 (.00)	- 2.55*	.31
Participant	1.47 (.50)	2.00 (.00)	- 8.68**	1.06
Dependent	1.00 (.00)	1.39 (.48)	- 5.85**	.81
<b>MI</b>				
Bodily	1.43 (.49)	2.00 (.00)	- 9.49**	1.16
Musical	1.13 (.34)	2.00 (.00)	-20.96**	2.56
Interpersonal	2.00 (.00)	2.00 (.00)		
<b>LSI</b>				
Auditory	1.81 (.40)	2.00 (.00)	- 3.98**	.48
Tactile	1.67 (.48)	2.00 (.00)	- 5.85**	.69
Visual	2.00 (.00)	2.00 (.00)		

**Note:** Standard deviation appears in parenthesis

\*p<.05

\*\*p<.001

FIGURE 1

Learning Styles Chart

<p style="text-align: center;"><b>Learning Disabilities Diagnostic Inventory Intrinsic Processing Strengths</b></p> <p><b>Listening:</b> provide spoken directions, utilize taped lectures, use oral rehearsal</p> <p><b>Speaking:</b> talk about assignments, respond to assignment orally, use group discussions</p> <p><b>Reading:</b> reread assignments, use vocabulary cards, read related materials</p> <p><b>Writing:</b> rewrite notes, write study facts into summaries, select written assignments</p> <p><b>Mathematics:</b> use mathematical thinking to analyze issues, organize notes/assignments numerically</p> <p><b>Reasoning:</b> use problem solving, organize materials, generalize learning</p>	<p style="text-align: center;"><b>Grasha-Riechmann Learning Styles</b></p> <p><b>Competitive:</b> play games, give extra credit, give rewards, set up win-lose situations</p> <p><b>Collaborative:</b> work in groups, provide social interaction</p> <p><b>Avoidance:</b> provide independent studies, internet courses, chances to work independently</p> <p><b>Participant:</b> works in groups, learns from social interaction</p> <p><b>Dependent:</b> provide structure and direction</p> <p><b>Independent:</b> provide time for student to develop own ideas, allow student to use their own ideas</p>
<p style="text-align: center;"><b>Modality Learning Styles</b></p> <p><b>Auditory:</b> Listen to it, listen to your self talk about it; talk about it with others</p> <p><b>Visual:</b> Read it, look at pictures (maps, designs), make lists</p> <p><b>Tactile:</b> Practice it, examine it, touch models, walk though it</p>	<p style="text-align: center;"><b>Multiple Intelligences</b></p> <p><b>Linguistic:</b> talk about it, write about it, read about it</p> <p><b>Logical-Mathematical:</b> put it in sequence, use numbers, place in order</p> <p><b>Spatial:</b> draw pictures to represent concepts</p> <p><b>Bodily/Kinesthetic:</b> perform activities to relate concepts to real world experiences</p> <p><b>Musical:</b> sing it, tap it, use rhythms to remember it</p> <p><b>Interpersonal:</b> work in groups with others</p> <p><b>Intrapersonal:</b> relate to personal experience</p> <p><b>Naturalistic:</b> study outside, take walks with study cards, relate data to environment</p>

FIGURE 2

Examples of Qualitatively Different Strategies Responses Developed With and Without the Learning Styles Charts

		<b>Without Chart</b>	<b>With Chart</b>
<b>LDDI</b>	Reading	Taped texts	Annotate sections Advanced organizers
	<b>GRLSS</b>		
	Collaborative	Group work	Maintain consistent study partners
		Cooperative groups	
	Participant	Group discussions	Role-play discussions Write discussions in rap form
	Dependent		Provide chapter outlines, summaries Consistently pair verbal/written instructions Provide numerous examples
<b>MI</b>	Bodily	Flash cards	Place flash cards in various locations around room Recite while moving
	Musical	Taped background music	Rhythmic mnemonic devices
	Interpersonal	Study partner	Compare written notes and organization with partner
<b>LSI</b>	Auditory	Reread notes into recorder	Use self-talk to organize, study, and plan
	Tactile	Hands on activities Rewrite notes	Take apart and reassemble models
	Visual	Mnemonic devices	Highlight while listening to recorded notes