Strategies for Bridging Learning Styles

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ABSTRACT

Regardless of the instrument used to determine learning styles, it is commonly accepted that people learn in different ways. As Professors, we tend to teach in a style that matches the way we ourselves learn. This may or may not match the learning styles of the students in our classroom. As Graphics educators, we cannot meet every student's learning style at all times, however we can use our understanding of learning styles to address the differences between our teaching style and the students' learning styles.

This paper is follow-up of a paper presented at the ASEE Annual Conference in Portland, June 2005. The Portland paper reported the results of a survey administered to graphic professionals and graphics students. Using the results of that one survey we can generalize that graphic professionals strongly favor (70 percent) the Concrete Sequential learning style, while only 34 percent of graphics students favor this style. On the other hand, 51 percent of the students favored the Concrete Random style, which was favored by only 34 percent of the faculty (Sadowski et.al., 2005). Therefore, to increase the effectiveness of their teaching, graphics educators must make an effort to "bridge" the gaps created by the differences in teaching and learning styles. In this paper the authors look at instructional strategies and techniques that graphics educators can employ to teach students with different learning styles. Often basic style adjustments, additional explanations, or alternative activities can help a student learn and achieve success. As educators we need to select the most appropriate style for the learning situation and determine the importance of matching the styles of the learners in order to achieve the intended goal.

INTRODUCTION

A previous paper by the authors reviewed a variety of instruments used to determine learning styles as well as an in-depth look at the Gregorc learning styles (Harris et. al., 2004). Often times, as educators, we design and structure our courses based on our learning and/or teaching style. In many cases, we do not formally determine this through the use of an assessment instrument, rather, we base it on our own experiences as a learner and what we as an individual found to work for us.

McLoughlin (1999) points out that— "instructional materials often remain fixed, unvaried and static, adaptive to individual needs in only minor ways, if at all." Planning instruction suited to the needs of the learners is often difficult in academic settings with large classes. Instruction is often suited to the needs of the situation rather than the learner. In addressing instructional designers, she suggests "…that current research literature in the area of learning styles and strategies can provide instructional designers with insights into individ-

ual differences in learning and performance that can be factored into the design process."

As educators, we need to understand our own learning style and explore how it impacts the way we teach. Butler (1987) states—"Clearly, consideration of style in the classroom takes both teacher and student into account." She points out that educators must be willing to adapt or "bridge" to their students learning styles to ensure their success. In addition, teachers must push their students to adapt to other learning styles to help them grow.

The goal of this paper is to outline appropriate activities that are suited to the four learning styles as defined by the Gregorc assessment instrument. It is hoped that graphics educators can define course instruction based on the different styles in order to accommodate our students.

GREGORC'S LEARNING STYLE

Gregorc defines four types of mediation abilities—perception, ordering, processing, and relating. His categorization of learning styles is based on perception and ordering. Gregorc defines perception as how we "grasp information" and ordering as the way we "arrange, systemize, reference and dispose of information (Butler, 1987).

PERCEPTION

Perception is defined as concrete or abstract. Terry (2002) describes concrete and abstract learners as follows. Concrete learners "rely on their physical senses to understand and mentally register ideas." Abstract learners are able to "mentally envision ideas and use rationality to understand them".

Ordering

Ordering is defined as sequential or random. Terry (2002) describes sequential and random learners as follows. Sequential learners "methodically categorize and organize information in a linear manner." Random learners "process alternative sources of information simultaneously in a multidimensional manner."

The four resulting learning styles are Concrete/ Sequential (CS), Abstract/ Sequential (AS), Concrete/ Random (CR), and Abstract/Random (AR). Most learners have one of these as their dominant style with another as a secondary style.

COMPONENTS OF LEARNING STYLE

Lemire (1996) defines three components of "learning style" —modality, cognitive style and personal style. The first component, modality, refers to how we acquire information— visually, auditorally, and kinesthetically (www.learnativity.com/learningstyles .html). Butler (1987) describes how each type of learner handles modality. Note that the graphics students surveyed (Sadowski et al., 2005) were about evenly split between AS (48%) and CR (51%) styles.

AUDITORY

Auditory learners absorb information they hear and like to express themselves through discussion (www.ferris.edu/htmls/academics/sla/LS_Study_Links.htm). The following examples illustrate how students with the different learning styles prefer to handle auditory information.

- **CS** learners like to *listen and respond* to information.
- **AS** learners like to *hear lecture and debate*
- **CR** learners like to *talk out* ideas, interests, problems and possibilities
- **AR** learners like *dialogue and discussion* (Butler, 1987)

VISUAL

Visual learners absorb information from written words or illustrations, diagrams and other graphics that help them remember information (www.learnativity. com/learningstyles.html). The following examples illustrate how students with the different learning styles prefer to handle visual information.

- **CS** learners like to *see information*—charts, diagrams, lists…
- **AS** learners like to *see content*—written descriptions…
- **CR** learners like to *see possibilities*—brainstorming…
- **AR** learners like to *see meaning*—visualization, interpretive illustration…(Butler, 1987)

KINESTHETIC

Kinesthetic learners learn from physical manipulation by acting out a process or creating a product (www.ferris.edu/htmls/academics/sla/LS_Study_Links.htm). The following examples illustrate how students with the different learning styles prefer to handle kinesthetic information.

- **CS** learners like *structured hands-on activities*—build a model, create a drawing…
- **AS** learners like to *hold, examine and analyze* things they are studying—study a manufactured part, analyze the stress on a surface…
- **CR** learners like *creating a product* of their own design…
- **AR** learners like *trial and error* experimentation…(Butler, 1987)

The second component, cognitive style refers to how information is processed—how information is received, organized and retained. A cognitive process is an internal process that learners use to select and modify how they attend, learn, and remember (Gagne et.al.1992). A cognitive strategy is an internally organized skill that governs intellectual processing. These skills are used when we strategize on how to solve a unique problem. The cognitive study of an individual is the manner in which the learner manages their own thinking (Gagne et. al., 1992).

The third component, personal style refers to the characteristics of the individual and how they impact learning style. Each individual brings a variety of characteristics that determine how information is retrieved and processed. Personal style is not affected by daily instruction; rather it develops over a longer period of time, months or years. Individuals rely on objective logic, critical thinking, and challenging their own and others' positions to establish truth and make moral judgments (Felder, 2005).

FOUR LEARNING STYLES

CONCRETE/SEQUENTIAL - CS

This was the predominant learning style for the graphics professionals that were assessed at the conference session. As a group they can be described as "practical, predictable, to-the-point, organized and structured" (Butler, 1987). They move from details to the big picture and like measurable outcomes.

Activity Preferences

CS learners prefer class activities, which are structured, have clear instructions and are practical. Concrete activities are best since they like to learn using their physical senses. Their *concrete* nature means they like hands-on learning and their *sequential* nature requires a step-by-step order (Butler, 1987).

Preferred order of instruction for CS learners

Hands-on activities – the preferred method of learning for CS learners. These should include specific directions and outcomes—a drawing, a model, a solution to a problem.

Demonstrations – CS learners like real-word examples.

Lectures – These learners like lectures that follow a clear outline and provide lots of details.

Reading – CS learners like reading for specific details and answers.

Discussions – CS learners don't prefer group discussions, however they are more receptive if the discussion is orderly and purposeful. These students do not like to be surprised.

Suggested activities for CS learners

Assignments – These students like lab assignments, worksheets, hands-on projects, but want precise directions.

Tests – CS learners prefer concrete answers, remembering detailed information and long-answer questions with only one way to develop the answer. These students will react well to objective questions including true/false and multiple choice type tests.

Uncomfortable activities for CS learners

CS learners are not comfortable with abstract topics, group discussions and team work, problem-solving and open-ended assignments (Butler, 1987, Terry, 2002).

Abstract/Sequential - AS

As a group, AS learners are as analytic, structured and systematic (Butler, 1987).

Preferred order of instruction for AS learners

AS learners prefer reading and analysis, lectures and discussion. They see the "big picture" as an overview of the content. Their *abstract* nature means they relate to the world through ideas and concepts and their *sequential* nature requires logic and structure (Butler, 1987).

Lectures – AS learners like lectures that are substantive and show the expertise of the instructor. These should be presented in a sequential, orderly manner.

Reading – AS learners are avid readers and prefer to work independently and often in a quiet environment. They like reading about ideas and problems.

Discussions – AS learners prefer discussions with the instructor (not classmates) about theories

Demonstrations – AS learners prefer an analytical approach.

Hands-on activities –This not a preferred activity for AS learners. AS learners have difficulty with hands-on learning. These students will enjoy writing the report more then watching or participating in the activity.

Suggested activities for AS learners

Assignments – AS learners like reading-based assignments, computerized instruction, lab experiments, analysis, debates, reports and presentations

Tests – AS learners like concrete answers, detailed information and long-answer questions that require analysis. Take home tests are appropriate for AS learners.

Uncomfortable activities for AS learners

AS learners are not comfortable with repetitive tasks, group projects, many specific rules and regulations and open-ended assignments (Butler, 1987, Terry, 2002).

Abstract/Random - AR

This was the predominant learning style for half of the graphics student population that was assessed by the authors (Sadowski et al., 2005). Individuals in this category prefer to focus on themes, ideas, feelings and activities that allow for group interaction and communication (Butler, 1987). They have natural curiosity and like to explore options (Terry, 2002).

Preferred order of instruction for AR learners

AR learners prefer group projects, discussions and teaching/learning teams. Their *abstract* nature means they relate to the world through feelings and their *random* nature requires a non-linear structure (Butler, 1987).

Discussions – AR learners enjoy class discussions and group work and group projects. They favor discussions that allow them to express their impressions and feelings.

Reading – AR learners prefer to make their own reading selections and like independent study.

Demonstrations – AR learners "associate the medium with the message" (Gregorc, 1979) so movies or multimedia might be effective.

Lectures – AR learners prefer short presentations with Q&A or discussion following.

Hands-on activities – AR learners prefer multimedia and movies, although they do experience difficulty with computerized instruction (Davidson & Savenye; Ross & Schulz, Ross et al.).

Suggested activities for AR learners

Assignments – AR learners like group projects, problem-solving and abstract learning tasks. These learners like to explore lots of options. Multiple, opened ended assignments with lots of options will appeal to AR learners.

Tests – AR learners prefer short essay-answer questions over objective formats; they prefer interpretation over synthesis and analysis. These students will do well when tested by means of an oral exam or presentation.

Uncomfortable activities for AR learners

AR learners are not comfortable with giving exact details, restrictive assignments, computerized instruction, tasks with sequential steps and meeting deadlines (Butler, 1987, Terry, 2002).

Concrete/Random - CR

This was the predominant learning style for half of the graphics student population that was assessed by the authors (Sadowski et al., 2005). Individuals in this group prefer experimentation and problem-solving approaches to learning and like activities, which encourage active investigations and applications (Butler, 1987).

Preferred order of instruction for CR learners

Activities include independent study projects, experiments, case studies or discussions. Their *concrete* nature means they like working with real-world problems. Their *random* nature means they order the world in a non-linear way.

Discussions – CR learners like to brainstorm and discuss ideas. They interact well with other students and respond positively to group projects and discussion.

Hands-on activities – CR learners like to explore alternatives and discover things on their own.

Demonstrations – CR learners like participating in classroom games and simulations.

Reading – CR learners do not like extensive reading. They prefer concise, summarized material.

Lectures – CR learners get the gist of ideas quickly and do not like being told information. Scheduling short question and answer session during a lecture will keep them engaged and allow the instructor to keep the lecture on track.

Suggested activities for CR learners

Assignments – CR learners like individual and group projects, brainstorming, problem-solving exercises.

Tests – CR learners prefer open-ended and problem-solving questions.

Uncomfortable activities for CR learners

CR learners are not comfortable with structured lessons, formal reports, focusing on answers rather than processes and spending time on information that cannot be applied. (Butler, 1987, Terry, 2002).

Bridging Activities

Bridging is the term used for addressing the different learning styles of students. It can mean reaching out to students who have a different learning style and offering alternative or supple-

Figure 1: *Seven instructional activities*

Concrete Sequential Learners	Concrete Random* Learners	Abstract Sequential Learners	Abstract Random* Learners
LECTURES			
Include organization aids & provide detailed information, charts, lists	Add short Q & A sessions within the lecture	Keep information structured & orderly	Break the lecture into short segments & include illustrations
TESTS			
• Multiple choice • True/False	• Open ended questions • Problem-solving questions	• Take home tests • Questions that require analysis	• Short essay questions • Oral exams • Presentations
ASSIGNMENTS			
• Lab assignments • Worksheets • Hands-on projects	• Problem-solving exercises • Independent study • Case studies • Produce a product	• Presentations • Reports • Lab experiments • Term papers • Research papers	• Group projects • Open-ended assignments • Interviews
DISCUSSION			
• Discuss with a plan • Keep it orderly and purposeful	• Brainstorming • Small group work	• Discuss with the instructor • Act as group reporter	• Class discussion • Small group discussion
DEMONSTRATIONS			
• Real world examples • Field trips	• Simulations & games • Case studies • Experiments	• Analytical examples • Documentation of a process	• Movies • Multimedia
HANDS-ON			
• Drawing • Modeling	• Exploring alternatives	• Writing reports	• Exploring multimedia products
READING			
Read for details & information	Read concise summaries of information	Avid readers	Like variety of reading options
CS	CR	AS	AR

* Freshman graphics students scored highest in these two styles

mental activities. This can be accomplished by matching the learning styles of the students or purposely mismatching the styles of the students. Bridging activities can be used with students to help them through a learning difficulty or a style mismatch for which they have no alternative but to accomplish the tasks (Butler, 1987).

According to Seidel (1977), eclecticism is the key to reaching all students, and in order to maximize all students' potential for academic success, a variety of instructional and assessment methods must be employed. While not every activity will be preferred by each student, variety is still an important factor in developing the students' skills in other styles of learning. Figure 1 lists seven instructional activities commonly used by many instructors. Each instructional activity listed includes suggested strategies for bridging to learners with different styles. For example, tests should include objective questions as well as longer answer questions tailored to appeal to CS, AS, AR, and CR learners. Not every test will include every type of question, but over the course of a semester students can be tested by a variety of testing formulas that match or mismatch their cognitive styles (Terry, 2002). Instructors don't need to include all of the strategies in every learning activity. Consider the differences as you are planning instruction and attempt to include some of the different strategies throughout the term.

Feldman (1996) presents the following strategies for ensuring that presentations appeal to a broad range of learning styles.

- Balance conceptual information with concrete information.
- Give experimental observations before presenting the general principle and have the students (preferable working in groups) see

how far they can get toward inferring the latter. Rather then giving them the law up front, ask the students to solve for an unknown and let them figure out the law for themselves.

- Occasionally pause during a lecture to allow time for thinking and formulating questions.
- Assign brief group problem-solving exercises in class that require students to work in small groups
- Encourage cooperation on homework.

CONCLUSIONS

It is impossible for all instructional activities to appeal to every student in our classroom. As graphics educators, there are times when we need to present information in a specific manner, there are other times, however, when we can adapt instruction to be more inclusive of the learning styles of our students. Often, the success of our students depends on how well activities suit their learning styles. Because we know that not all students learn the same way, this paper has presented a variety of activities appropriate for students with different learning styles. As graphics educators, we can offer alternative activities, supplemental learning, or additional explanations for students with different learning styles. These basic style adjustments give us a way to bridge the gap between teaching and learning.

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