Teaching and Learning Styles: Implications for More Effective Pedagogy

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ABSTRACT

A review of educational research identified teaching to students' learning styles as an important component of effective instruction. The evolution of temperament and learning styles was traced. Prominent paradigms of learning styles were explained, emphasizing that one's teaching style reflects one's learning style and will not effectively reach students with different learning styles. Three examples incorporating different learning styles were presented to illustrate teaching across learning styles. Two implications of incorporating various learning styles into one's teaching which emerged from the literature were (1) improving one's students' abilities to understand Family Science concepts and (2) modeling ways for Family Science graduates to present information to their future clientele.

INTRODUCTION

Effectively teaching Family Science undergraduate students is sometimes daunting. Some of the students will go on to academic careers, others into service-related occupations. In addition, our students are often of varying ages and backgrounds. Further, not all students learn in the same way. Stellar teachers may intuitively take the above-mentioned factors into account, but by definition such teachers are rare.

The rest of us struggle to effectively teach our students what we think they should know. Are we reaching them as we impart important foundation content that will allow them to succeed in a variety of occupational settings? We may also wonder, as Family Science is an applied field, if we are modeling for our students the appropriate ways of transmitting important information to their future clientele.

LITERATURE

Numerous books and articles have directly addressed the importance of modes of communication and teaching, though not always in the context of teaching--lectures. Lecturing is an effective method of conveying abstract/theoretical information. Unfortunately, not all of our students are equally attuned to process abstract material presented in this way. Paradoxically, many of us expect our students to understand that people have a variety of ways for obtaining information, and thus, a variety of personal preferences for visual, sensory, hands-on, exploratory, relevant, and applicable. If our students have experienced different teaching styles, they may revert to the style they have found most--the lecture.

The purpose of this paper is threefold. First, it documents the importance of teaching and learning styles that are well-documented in the literature; (2) it presents matching teaching methods to the needs of students; and (3) it provides concrete examples of how to integrate traditional standard lecture format into their own Family Science courses to improve their teaching effectiveness and thus provide students with models for students to emulate should they become Family Science teachers.

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Ironically, however, as much as our students hear about different modes of communication and teaching, they may only be exposed to one form of teaching—lectures. Lecturing is an effective mechanism for imparting large amounts of abstract/theoretical information to highly motivated learners. Unfortunately, not all of our students are highly motivated or well-suited to process abstract material presented in a lecture format. In addition, paradoxically, many of us expect our students after graduation to understand how to make information easily digestible for their clientele. We expect our student to understand that people have a variety of learning styles (preferences for obtaining information), and thus, a mix of teaching methods (auditory, visual, sensory, hands-on, exploratory) will make topics more interesting, relevant, and applicable. If our students have had very limited exposure to different teaching styles, they may revert to presenting information in the style they have experienced most—the lecture.

The purpose of this paper is three-fold: (a) to identify and describe the multitude of different learning styles and corresponding teaching methods that are well-documented in the literature; (b) to emphasize the importance of matching teaching methods to the needs and preferences of learners so that effective learning can take place; and (c) to give the readers of this paper concrete examples of how to integrate methods of teaching outside of the standard lecture format into their own Family Science courses in an effort to improve their teaching effectiveness and to provide different teaching methods for students to emulate should they become teachers themselves.

LITERATURE REVIEW

Numerous books and articles have been written to assist teachers (college/university professors, high school, elementary, preschool) with their classroom effectiveness. Our discussion will be limited to authors who specifically address the needs of adolescent and adult learners. Authors of these resources often note that an ever-increasing repertoire of teaching methods is required to motivate adolescent and adult students to learn and that learning is more likely if the way material is presented is relevant to the learner (Felder & Silverman, 1988; Grasha, 1996; Kolb, 1984; McKeachie, 1994; White & Buskist, 1998; Wlodkowski, 1999). A number of these authors have based their work on studies and theories of adult learning associated with temperament or personality types (Felder & Silverman, 1988; Grasha, 1996), or they have developed their own theories (Kolb, 1984; White & Buskist, 1998, Wlodkowski, 1999). Some authors have written for a particular discipline; others have directed their work to a broad range of disciplines. The broad literature on this topic is organized into three sections that follow. The first section examines the literature on personality types. The second section examines how personality types may translate into preferred learning styles. In this section the vast array of learning styles that have been identified in the literature will be discussed. The third section examines the link between personality types, learning styles, and teaching methodologies.
Discussion of basic differences in temperament or personality first appeared in the writing of Hippocrates according to McKinnon and Roback (as cited in Kiersey & Bates, 1984). European psychiatrists, Jung (1923) and Kretschmer (1925), wrote about basic differences in temperament at approximately the same time, but Jung’s work became more well known. Jung posited that there were basic styles of functioning and that people had preferences for one style over another and could be “typed” by this preference. Thus, Jung is credited with being the inventor of “psychological types” (Kiersey & Bates, 1984). Isabel Myers, basing her work on Jung’s, developed and refined a procedure for determining an individual’s type (Kiersey & Bates, 1984).

The Myers-Briggs Temperament Inventory, published in 1962, evolved from 20 years of extensive research. Much of the early research provided only indirect evidence of learning style differences via correlational data (Lawrence, 1984). After reviewing research on the Myers-Briggs Type Indicator (MBTI) as a reflection of Jung’s personality typology and as a psychometric instrument, Murray (1990) concluded that the MBTI might measure categories of people based on the way they prefer to use their minds better than it measures Jungian personality traits. However, he noted that the MBTI had contributed substantially to understanding individual differences in styles of gathering information and decision making. Murray said the MBTI was “. . . the most widely used personality instrument for nonpsychiatric populations . . .” (p. 1187) and that application of type theory to education and several other spheres has been extensive and well received. Lawrence (1984) and McCaulley (1982) had earlier concluded in their literature reviews that temperament types could be applied to help people understand differences in learning and teaching styles.

Although the terms “personality” and “temperament” have at times been used interchangeably, others have defined the two concepts differently. According to Strelau, temperament should be used to refer to “. . . early developing, stable individual differences that relate to more stylistic behavioral tendencies based on the constitutional or biologically determined makeup of individuals (Strelau as cited in Angleitner & Ostendorf, 1994, p. 69). In contrast, personality is seen as the broader concept, containing characteristics that are primarily determined by social factors like values, attitudes, and interests.” After testing the fit between what psychologists are calling the Big Five model of personality factors and various temperament questionnaire scales (see Halverson, Kohnstamm, & Martin, 1994, for research comparing other personality models with the Big Five model), Angleitner and Ostendorf concluded that temperament and personality-trait spheres may not be completely congruent. While new research on personality types may be path-breaking and have many clinical and school-based applications (Victor, 1994), little has been written about implications or applications of the Big Five model for learning and teaching in nonclinical classroom settings.

Implications and applications of learning styles have been incorporated into numerous educational paradigms. Essentially, students who tend to look for general trends (lumpers) often learn to see first. Splitters, on the other hand, are very detailed oriented and learn in much depth. The Myers-Briggs Temperament Inventory, published in 1962, evolved from 20 years of extensive research. Much of the early research provided only indirect evidence of learning styles differences via correlational data (Lawrence, 1984). After reviewing research on the Myers-Briggs Type Indicator (MBTI) as a reflection of Jung’s personality typology and as a psychometric instrument, Murray (1990) concluded that the MBTI might measure categories of people based on the way they prefer to use their minds better than it measures Jungian personality traits. However, he noted that the MBTI had contributed substantially to understanding individual differences in styles of gathering information and decision making. Murray said the MBTI was “. . . the most widely used personality instrument for nonpsychiatric populations . . .” (p. 1187) and that application of type theory to education and several other spheres has been extensive and well received. Lawrence (1984) and McCaulley (1982) had earlier concluded in their literature reviews that temperament types could be applied to help people understand differences in learning and teaching styles.

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LEARNING STYLES

Implications and applications of temperament research have been incorporated into numerous educational articles and books although sometimes loosely (see, for example, the research review by Lawrence, 1984). A basic premise in the educational literature, whether written by academics in education or engineering, is that learning and teaching styles reflect a person's temperament (e.g., Felder & Silverman, 1988; Grasha, 1996; Kiersey & Bates, 1984). A discussion of the entire array of learning styles, which have been identified in the literature, is beyond the scope of a single journal article. However, Table 1 highlights some of the most prominent learning-style paradigms.

Cohen (1967) divided learners into "lumpers" or "splitters." Essentially, students who tend to look at "the big picture" are considered lumpers. They often learn how to do something best by watching someone else do it first. Splitters, on the other hand, are characterized as students who tend to focus on details and learn best by obtaining information through marked steps or in their own idiosyncratic way.

French (1975) developed a system based on how students take in information and how they learn concepts. He posited that students perceive information in sequential order, rely on impulse, and/or use logic to reach conclusions. Mechanisms for taking in information include sensory input (reading versus writing), level of speaking, level of listening, response to visual stimuli, need of movement, and use of taste and smell.

Dunn and Dunn (1978) developed an inventory consisting of 24 elements related to learning style. These elements were grouped into four areas: elements in the environment, emotional elements, sociological elements, and physical elements.

Kolb (1984) revolutionized learning style theory in many ways, and his work continues to be extremely influential. His work eventually became the basis for the 4MAT system developed by McCarthy (1990). Kolb suggested that most people learn either primarily by feeling or by thinking, and from this he developed four groups: (a) imaginative learners (reflective in problem solving, able to integrate experiences); (b) analytic learners (theory builders who become engrossed in ideas); (c) common sense learners (experimenters who integrate both theory and practice); and (d) dynamic learners (trial and error learners not dependent on logic).

Felder and Silverman (1988) developed five categories by which they thought learners differentiated among stimuli: (a) perception, (b) input, (c) organization, (d) processing, and (e) understanding. Within each of these 5 categories, there are 2 dichotomies into which learners fall. For example, in the perception category learners are either sensory (they like to obtain information by touching, smelling, tasting, seeing, hearing) or intuitive (learners have sort of a "gut instinct" about information and can easily take in abstract ideas without physically perceiving them in a sensory way). Felder and Silverman then expanded their theory by incorporating corresponding teaching styles to correspond with the preferred learning styles. In line with the previous example,
TABLE 1
Prominent learning style paradigms in the literature

<table>
<thead>
<tr>
<th>Preferred Learning Style</th>
<th>Corresponding Teaching Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory/intuitive perception</td>
<td>Concrete/abstract content</td>
</tr>
<tr>
<td>Visual/auditory input</td>
<td>Visual/verbal presentation</td>
</tr>
<tr>
<td>Inductive/deductive organization</td>
<td>Inductive/deductive perspective</td>
</tr>
<tr>
<td>Sequential/global understanding</td>
<td>Sequential/global perspective</td>
</tr>
<tr>
<td>Active/reflective processing</td>
<td>Active/passive student participation</td>
</tr>
</tbody>
</table>

Cohen (1967)
Lumper
Splitter

French (1975)
Sensory intake (reading vs. writing)
Level of speaking
Level of listening

Dunn & Dunn (1978)
Environment (sound, light, temperature, design)
Emotion (motivation, persistence, responsibility, structure preferences)
Sociological (learning alone, peer-oriented, learning with adults, variety of ways)
Physical elements (auditory vs. visual, time of day, length of learning episode)

Campbell, Campbell, & Dickinson (1999)
Multiple Intelligences

Verbal – Linguistic
Logical – Mathematical
Kinesesthetic
Visual – Spatial

iNtuitive – Thinkers (NTs)
iNtuitive – Feelers (NFs)

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iNtuitive – Feelers (NFs)


Kiersey & Bates (1984); Kroeger & Thuesen (1989); Keirsey & Bates (1984);
Lawrence (1984); Myres & Myres (1980)

Four Continua

(E) Extraversion
(N) Intuition
(T) Thinking
(J) Judging

Introversion
Sensation
Feeling
Perceiving

Musical
Interpersonal
Intrapersonal
Naturalist

Sensing – Perceivers (SPs)
Sensing – Judgers (SJp)

Marots-Baden, Osborne, & Hunti...
If a learner prefers to perceive information sensorally, then the best match would be concrete content. Conversely, the learner who prefers to perceive information intuitively would be best matched with abstract content.

Campbell, Campbell, and Dickinson (1999) are authors of a text for students preparing to become teachers. Teaching and Learning Through Multiple Intelligence, in its second edition, is widely used in teacher preparation programs throughout the U.S. Campbell et al. have taken the eight intelligences developed by Gardner (as cited in Campbell et al., 1999) and added dozens of practical teaching techniques to match them. A very simplified look at Gardner’s eight intelligences is as follows: (a) linguistic intelligence (the ability to think in words and to use language to express complex meanings); (b) logical-mathematical (the ability to calculate, quantify, consider propositions and hypotheses, and to conduct complex mathematical problems); (c) spatial (the capacity to think in three-dimensional ways as do sailors, pilots, sculptors—to perceive external and internal imagery, to recreate, transform, modify, to navigate through space); (d) bodily-kinesthetic (the ability to manipulate objects and fine tune physical skills); (e) musical (a sensitivity to pitch, melody, rhythm, tone); (f) interpersonal (understands and interacts effectively with others); (g) intrapersonal (constructs an accurate view of oneself and uses that knowledge to plan and direct one’s life); and (h) naturalist (the ability to observe patterns in nature, to identify and classify objects, to understand human and natural systems). The premise of their text is that everyone specializes in one or more of these intelligences and that designing and delivering instruction that matches the particular intelligence(s) of students is the best way to ensure their academic success.

An important set of literature contends that a person’s learning style can be measured by where the individual falls on four continua (Grasha, 1996; Kiersey & Bates, 1984; Kroeger & Thuesen, 1989; Lawrence, 1984; Myers & Myers, 1980). These continua are extraversion (E) and introversion (I), intuition (N) and sensation (S), thinking (T) and feeling (F), and judging (J) and perceiving (P) as depicted in Table 1. Kiersey and Bates and Kroeger and Thuesen contend that the dominant characteristics of a person’s temperament are defined by where a person falls on two of the four continua. According to this perspective, people may be categorized as iNtuitive Thinkers (NTs), iNtuitive Feelers (NFs), Sensory Perceivers (SPs), or Sensory Judgers (SJ). A description of each type follows.

NTs gather information “...consisting largely of abstractions and possibilities (iNtuition), which they filter through their objective decision-making process (thinking)” (Kroeger & Thuesen, 1989, p. 283). They conceptualize and see relationships relatively easily. NTs strive for competency, put principles together objectively, and look for contradictions. They learn by reading, self-instruction such as independent study and tutorials, and like organized teacher lectures and systematically organized courses. NTs are filled with curiosity but may have less developed social skills and are less moved to display emotions.

NFs “look at the world and see possibilities (iNtuition), then translate those possibilities interpersonally and intrapersonally (Feeling)” (Kroeger &
Thuesen, 1989, p. 281). Nfs are depicted as being on a lifelong quest for sense of self. The NF can work independently but thrives on frequent, positive, and/or constructive feedback. Nfs learn by interaction, work well in groups, and usually have excellent communication skills. They learn better in cooperative activities than in competitive activities.

Sps learn by doing. Their “...data collection is practical and realistic (Sensing) to which they bring spontaneity and flexibility (Perceiving)” (Kroeger & Thuesen, 1989, p. 284) which gives the impression of living in the here and now. The SP learner may dismiss the relevancy of theory in favor of the practical and immediate. Hands-on exploratory learning and activity are best. This learner thrives on competition and risk taking.

Sjs are responsible, dependable, punctual, and neat. Their “...information-gathering process is practical and realistic (Sensing) to which they prefer to give organization and structure (Judging)” (Kroeger & Thuesen, 1989, p. 284). Sjs respond well to organization but can be rather rigid. Sjs like and need structure and will do their best as long as they know how to proceed with a task. They like instruction which is structured, didactic, and sensory rich. Sjs are much more comfortable with facts and figures than with speculation and invention.

The link between personality, learning styles, and teaching methods.
Grasha (1996) contended that teachers’ individual temperaments define how they conduct their classes. With students and teachers each attempting to mold the other to his/her own temperament style, learning and teaching styles interact. As teachers have more authority than students, they potentially have a greater influence on class interaction (Grasha, 1996; Shehan & Berardo, 1998). To be an effective, motivating teacher, Grasha said it was important to understand the differences between one’s teaching style and the learning styles of one’s students and to bridge to the students’ styles.

Grasha (1996) underscored the potential dissonance of teaching-learning style differences by citing results of personality/temperament type research. Faculty and student temperaments varied most in amount of extraversion vs. introversion and sensing vs. intuition according to data he presented. Specifically, 70% of the students sampled were extroverts as compared to 46% of the faculty sampled, and 70% of the students were sensing compared to only 36% of the faculty. Grasha interpreted these differences in extraversion and sensing in terms of behavior. “Unlike many of their instructors, most students get their energy from the world of people, objects, and events. They prefer to see, touch, and feel things in order to gather information. Their orientation is more to the hands-on experiences and the practical implications of issues” (Grasha, 1996, p. 44). According to Grasha, instructors were more likely to work by themselves, gathering information from research and theory.

Applications from the literature review. A myriad of factors may dictate teaching methods, only one of which is the learning style of the audience members. Other factors that play an essential role in choosing a teaching method include: the content of the material (abstract versus concrete); the limitations of the classroom (low-technology classrooms may preclude some techniques from being used—lecture halls, space, etc.); limited resources (preparation time, cost, the instructor); and acceptable practices across institutions (some institutions may be more parochial than others, e.g., may not allow field trips, etc.). Best practices should be filtered through the instructor.

While students probably can learn regardless of their preferred learning styles (e.g., Felder & Silverman, 1988; Grasha, 1996), the idea then is to identify the various preferred teaching styles and to teach to those styles. One model borrowed from concomitant learning theory is that students learn better if teaching styles match learning styles (e.g., Felder & Silverman, 1988). Grasha's book, Teaching to a variety of learning styles, presents the topic of various teaching styles and introduces the idea of teaching to a variety of learning styles. A second model, also recommended, is the concept of teaching to a variety of learning styles. The premise here is that teaching to a variety of learning styles does more than aid the student-learner relationship and to learn in a way the students can best learn. Teaching to a variety of learning styles can help all students learn more effectively, regardless of their preferred learning styles. Students who are extroverts may need more hands-on activities than introverts. The SP learner may dismiss the relevancy of theory in favor of the practical and immediate. Hands-on exploratory learning and activity are best. This learner thrives on competition and risk taking.

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While students probably can learn from a variety of teaching styles regardless of their preferred learning styles and innate abilities, the assumption is that students learn better if teaching styles are congruent with their learning styles (e.g., Felder & Silverman, 1988; Grasha, 1996; Wlodkowski, 1999). One idea then is to identify the various preferred learning styles in one's class and to teach to those styles. One model borrowed from secondary education is to consider teaching to a variety of learning styles across units of instruction. For example, if three lectures are being devoted to the topic of toddlers in an introductory Human Development course, the instructor might consider presenting the topic of toddlers in a different way for each of the three class periods so that nearly all students will have had information about toddlers presented to them in a way that closely matches their preferred learning style.

A second model, also recommended for high school educators, is based on concomitant learning. The premise here is that teaching to different learning styles does more than aid the student-learning process by offering information in a way the students can best learn. The exposure to different models of teaching/learning helps students become better able to present material in alternate ways. In addition, including a social interaction learning component where students are expected to problem solve increases the relevancy of the material and retention of knowledge learned. Students learn content and process and, as a result, become better at solving complex problems in a social context, a common goal of faculty for their Family Science students.

Teaching to a variety of learning styles is more difficult and labor intensive for most instructors than lecturing. Fortunately, numerous books and articles offer helpful suggestions. One of the more popular books appears to be McKeachie's *Teaching Tips* as it was in its 9th edition in 1994. Several journals, such as the *Illinois Teacher* and *Teaching Sociology*, are specifically focused to aid in teacher preparation. Other journals have devoted special issues to the subject. These include the 1998 Volume 11, No. 1 issue of *Family Science Review*, the 1981 Volume 30, No. 4 and 1992 Volume 41, No. 1 issues of *Family Relations*. In addition, Blaisure, Talbot, Edwards, Walcheski, and Hirschy's (1998) annotated bibliography of over 50 Family Science college teaching resources provides an overview from "how to get started teaching" to Internet resources. Also recommend are Grasha (1996) and Felder and Silverman’s (1988) materials as resources and models to reach students of different temperaments. Grasha's book, *Teaching With Style*, contains several methods an instructor can use to modify one's teaching to reach students with different temperaments. Felder and Silverman’s approach is not as detailed but perhaps offers the busy instructor sufficient guidance to achieve the same objective. On the basis of their model, Felder and Silverman (1988, p. 675)
hypothesized that "... instructors who adapt their teaching style to include both
poles of each of the given dimensions should come close to providing an
optimal learning environment for most (if not all) students in a class." To aid
instructors, Felder and Silverman developed a list of 13 teaching techniques they
believed would address all learning styles. In summary, these techniques are:

1. To motivate students inductively and globally, present material
   sequentially (relating to what has been covered before to what will come later),
   to the students’ personal experiences, and to what they have learned in other
courses.

2. Present material for both sensing and intuitive learners by balancing
   facts, data, and other concrete information with abstract concepts such as
theories.

3. Balance an emphasis on material requiring a fundamental
   understanding for the intuitive/reflective learners with material requiring
   practical problem solving for the sensing/inductive learners.

4. Encourage sensing and intuitive students to learn information in
   both learning styles by providing explicit illustrations of sensing patterns (e.g.,
   attention to detail, observation of surroundings) and intuitive patterns (e.g.,
   generalizations, logical inferences, pattern recognition).

5. Use the scientific method to present theoretical material. First,
   provide concrete examples of the phenomena the theory predicts or describes for
   the sensing/inductive learners. Then for the intuitive/inductive/sequential
   learners, develop the theory or model. For deductive/sequential learners, show
   how to validate the theory or model and how to deduce logical consequences.
   Finally, for the sensing/deductive/sequential learners, present applications.

6. Present pictures, schematics, demonstrations, and other visuals
   before, during, and after the presentation of verbal material for the
   sensing/visual learner. Then, use hands-on applications or activities to reach
   sensing/deductive/active learners.

7. Use computer-assisted instruction for sensing/active learners.

8. Cultivate reflective learning by providing intervals during the class
   for thinking.

9. Intersperse intervals of group activities, such as small group
   brainstorming, for active learners.

10. For the sensing/active/sequential learners, drill or provide practice
    of material being taught, but do not overdo or the intuitive/reflective/global will
    lose interest. The intuitive/reflective/global learners do well with open-ended
    exercise problems and problems which require analysis and synthesis.

11. Promote active learning with cooperative homework assignments.

12. Applaud the creative efforts of intuitive and global learners to help
    them thrive even if the solutions are incorrect.

13. Reassure learners of all styles in class, and when advising. Suggest
    that any difficulty they are having might be due to differences in learning and
    teaching styles.

A first step incorporating different styles might be identifying one’s
particular teaching style. Assuming that one capitalizes on one’s strengths,
knowledge of one’s temperament might help a teacher understand why some
students are easily reached and others not. One can work on incorporating teaching techniques from other learning styles. Both Grasha’s (1996)
contain instruments for assessing temperament.

Students who are actively involved in learning have a fuller knowledge base that they can apply (Smith, 1997). They are more likely to
agree with the DeGenova, Strouse, & Voege, 1996) on the benefits of active
learning, that is, learning through incorporating student’s participation and attitude. Examples of using active learning techniques in teaching
students in the learning process so that they can think about the concepts and apply it” (p. 186).

THREE EXAMPLES OF TEACHING IN FAMILY SCIENCE

Three examples of teaching techniques styles used in human development and family
education in the university follow. All three examples are specific to the sensing/visual learning. Each learning activity or task is designed to
foster active learning through incorporating student’s participation and illustrating the relevancy of concepts taught.

EXAMPLE 1

The first, an inductive teaching concept that each generation as it moves
students enjoy hands-on and minds-on experiences:

Music, fashion, and literature are used as concrete examples of symbols relevant
to help students understand the concept of cohort identification. The phonograph
is playing the music of the 1950’s as a broad discussion of adolescence, the professor
is reading excerpts from Donovan, or Jefferson Airplane to help create
an atmosphere of the times. As the students enter the classroom, the
fabric that was hand printed in the zodiac

Marotz-Baden, Osborne, & Hunts
Students are actively involved in their own learning retainer this knowledge better than those who are passive learners (e.g., Kolb, 1984; Olson & Smith, 1997). They are more likely to engage in critical thinking (Long, DeGenova, Strouse, & Voege, 1996) and develop high cognitive abilities and affective development (National Institute of Education, 1984, as cited in Benjamin, 1985). In fact, Benjamin pointed out that active learning was identified as the number one priority in higher education in the National Institute of Education’s 1984 report.

Based on his literature review, Benjamin (1985) defined active learning “. . . as a term used to describe a broad array of learning situations in which students enjoy hands-on and minds-on experiences” (p. 70). Long et al. (1996) defined active learning “. . . as any activity (e.g., discussion, problem solving, role playing, case studies, writing, or paraphrasing) that substantially engages students in the learning process so that they think about what they are learning and apply it” (p. 186).

THREE EXAMPLES OF TEACHING ACROSS LEARNING STYLES IN FAMILY SCIENCE CLASSROOMS

Three examples of teaching techniques incorporating different learning styles used in human development and family classes at a western land grant university follow. All three examples utilize active sensing/auditory and sensing/visual learning. Each learning activity has been designed to increase learning through incorporating student’s personal experiences with the goal of illustrating the relevancy of concepts taught.

EXAMPLE 1

The first, an inductive teaching technique, is used to explain the concept that each generation as it moves through adolescence establishes a personal identity as well as a cohort identity. Visual and auditory artifacts are used as concrete examples of symbols relevant to a particular age cohort to help students understand the concept of cohort identity. Facts and observations are presented, and the instructor helps the students infer the underlying principles.

Music, fashion, and literature are key elements in defining a particular historical period. Such items mark each generation’s identity in time. Thus, in a discussion of adolescence, the professor brings in props from her/his high school and college years (Russell, 1987).

As the students enter the classroom, appropriate props are in place. A phonograph is playing the music of the Chad Mitchell Trio, Joan Baez, Donovan, or Jefferson Airplane to help create the mood of the 1960s. Wardrobe items, such as hand batiked clothing, hippie beads, and a dress made out of fabric that was hand printed in the zodiac sign of the professor are on display.
Such items of auditory and visual memorabilia assist the students to see that all generations, including the generation of the professor, seek to break away and create a separate identity. The professor interacts with the students to get them to discuss (an interactive strategy) what music they listen to (Berns, 1997), what items of clothing, jewelry, or hairstyle may mark their generation, and so on.

Adolescence is a unique time for each cohort. The struggle to establish a personal identity in the context of the cohort identity is discussed once the students appear to understand the concept of cohort identity.

EXAMPLE 2

The second teaching technique uses a deductive metaphor or simile to teach the concept that successful relationships require work and care. The metaphor used is plants. Based on a concrete visual simulation of common house plants in various stages of health, students are asked to help deduce consequences and make applications to family relations. This active learning technique is particularly suited for sensing deductive/sequential learners. Students are also encouraged to give concrete examples from their own experiences with relationships.

The plant metaphor is presented twice during an introductory Family Science course, entitled Courtship, Marriage, and Family Relationships. The concept of the metaphor is explained in detail the first time; that is, that relationships, such as marriage and family, like living plants, require work, such as nourishment and attention, to be fulfilling and functional (Stinnett, Stinnett, DeFrain, & DeFrain, 1997).

The concept is conveyed in the following way. Four flower pots are placed on a table in front of the class. The first contains the stalks of a dead plant, the second is a flowering silk plant, the third is a healthy plant, and the fourth is a plant that was once neglected but is now recovering.

The professor engages students by asking them to guess what concept these plants illustrate for relationships. With the help of student input, the instructor explains that the first potted plant represents a relationship, such as a marriage, that is dead. The relationship did not meet the various developmental needs of the couple and probably not of the children. It was not a functional family according to Walsh's (1993) definition which requires a functional family to have the ability to reach its goals.

The professor explains that the flowers in the second pot, a flowering silk plant, look like a wonderful family--from the outside. Then the professor pulls the silk flowers out of the pot explaining that outside appearances can be deceiving. This plant represents a family with a great external facade, but it is dead, that is, it is nonfunctional inside with no roots or interpersonal connections. The points made are that without nourishment (water and plant food) for each individual family member and continual work (weeding, care) the family will cease to grow and the roots may wither and die despite outward appearances.

The third plant represents a healthy family which has had consistent attention and nourishment. This is the kind of marriage and family we all expect when we marry. Students are prodded to reach this goal.

The fourth plant may be more typical. There is some unintentional neglect from time to time and problems or crises which stress their growth. Care many of these problems can be overcome and the family becomes healthy again. These families will probably benefit from the work put into it, but the former plant will look up stronger and more functional (see, for example, Walsh's Crisis as adapted in Boss, 1988).

In one of the last classes of the semester, students are asked what they think a family is. After the students present, and students are asked what they think a family is. After the students present, these are some items each, and then, each group is assigned a plant. The professor puts a master list on the board. This approach allows an active learning technique to help class members to recall the important aspects of a family. The items are also a good assessment tool for the professor. They can be used in terms of what they (the students) think is important and how well they think the students have absorbed the material. This also sometimes helps the instructor know what is and is not being understood sufficiently.

EXAMPLE 3

The third teaching technique is used to help students understand the concept that sensory changes in the elderly can affect functioning. The technique used is a role-play simulation (e.g., Martin, Englebrecht, & Chenoweth, 1994; Stinnett, Stinnett, visual and auditory, the simulation uses sensory (e.g., smell) that may be relatively unimportant in engineering (Felder & Silverman, 1988), Family Science. This particular technique can be used in any course, a specific course on developmentally disabled to help students understand adaptive changes in sensory systems that occur with aging are very remote from the students' experience. Reading about changes may have little meaning for the students, however, improve their understanding of why the changes occur.

The class period is divided. First, the students are presented with a list of 10 items each, and then, each group is assigned a plant. The professor puts a master list on the board. This approach allows an active learning technique to help class members to recall the important aspects of a family. The items are also a good assessment tool for the professor. They can be used in terms of what they (the students) think is important and how well they think the students have absorbed the material. This also sometimes helps the instructor know what is and is not being understood sufficiently.

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we marry. Students are prodded to verbalize that few families actually reach this goal.

The fourth plant may be more typical of most relationships/families. There is some unintentional neglect from time to time as members encounter problems or crises which stress their growth and resources. With attention and care many of these problems can be overcome, and the family can become healthy again. These families will probably not look the same as a family that did not encounter such strains, but the formerly stressed family may actually end up stronger and more functional (see, for example, the Roller Coaster Model of Crisis as adapted in Boss, 1988).

In one of the last classes of the semester, the four plants are again presented, and students are asked what they have learned over the course of the semester that will help their special relationships resemble the last two plants rather than the first two plants. Large classes are divided into groups to generate a list of 10 items each, and then, each groups reports its list to the class while the professor puts a master list on the board. The generation of the list in groups is an active learning technique to help class members review the course. The lists are also a good assessment tool for the professor to learn what the students know in terms of what they (the students) think is important. This feedback sometimes helps the instructor know what concepts were not emphasized sufficiently.

EXAMPLE 3

The third teaching technique is used to help students understand the concept that sensory changes in the elderly affect their ability to function. The technique used is a role-play simulation (e.g., Crosbie-Burnett & Eisen, 1992; Martin, Englebrecht, & Chenoweth, 1994; Sollie & Kaetz, 1992). In addition to visual and auditory, the simulation uses sensory channels (i.e., touch, taste, and smell) that may be relatively unimportant in educational environments, such as engineering (Felder & Silverman, 1988), but which are important to Family Science. This particular technique can be used in a general human development course, a specific course on development of the aging, or in a class on the developmentally disabled to help students understand how sensory changes affect functioning.

For many traditional age students, common expected changes that occur with aging are very remote from their personal experiences, and thus, reading about changes may have little meaning. Visual demonstrations, however, improve their understanding of these changes.

The class period is divided. First, the professor gives a brief lecture on developmental changes in sensory systems of the elderly. Then, student volunteers participate in a role play about how sensory changes impact and affect functioning of older adults. The role play provides the volunteers with a simulated experience and the rest of the students with a visual glimpse into how physiological changes have psychological effects on the daily life of the elderly. Four volunteers step out into the hall where they are given their assignments with appropriate props. The scenario consists of aging adults getting together at
one of their homes for lunch. This activity demonstrates affects on common daily activities of deterioration of sight, touch, hearing, and smell.

_Sight_. One student wears a pair of eyeglasses smeared with petroleum jelly. In this way cataracts, vision impairment, or blindness is experienced and modeled. For example, the person with changes in sight may have a difficult time walking into the classroom unassisted, thus showing how vision affects gross motor activities as well as fine motor activities such as unbuttoning a coat.

_Touch_. One student wears a pair of gloves and is asked to take a can opener and open a can of soup for the other three friends for lunch. The person opening the can is modeling changes in the sense of touch as well as perhaps arthritis pain in the hands which causes difficulty in manipulating a can opener and preparation of a simple meal of canned soup. The student may also have a difficult time opening the lid, possibly injuring him/herself on the sharp edges of the lid of the can, again modeling changes in the sensation of touch affecting well-being.

_Hearing_. One student puts cotton balls into his/her ears and then puts on earmuffs. The person with a hearing impairment may not hear the instructions given or be able to join in the social dialog at the luncheon. This person will feel (and report later to the class) being somewhat isolated from the others, not knowing what to say or do.

_Taste and Smell_. One student holds his/her nose to mask odors and eats the pretend soup or is assigned to stir the soup and be sure it does not burn. With a diminished sense of smell, the soup may burn. After the role play the professor notes that smell and taste may also be affected by dentures.

After the simulated role play, the students pretending to have the various impairments talk about their experience at the lunch party. Other students in the class pose questions to the students who were in the role play. Often, students recall and share information about their aging family members. The utilization of their life experiences actively brings them into the class, providing real life examples of the concepts illustrated and hopefully increasing the relevancy of the concepts for younger students without such experiences.

Kolb proposed that optimal learning involves varied components and is a cyclical event (1984). Coberly (1996) described Kolb’s 4-stage cycle as concrete experiences, reflective observation, abstract conceptualization, and active experimentation. The situation role play, an active learning activity, is an example of concrete experiences as the students are directly involved. Group discussion about what was observed and experienced from many perspectives is an example of reflective observation. Such reflection is also consistent with Felder and Silverman’s (1988) discussion of dimensions of learning and teaching styles—reflective processing of information. A third mode of learning, abstract conceptualization, also occurs. The professor lectures on theoretical concepts (i.e., physiological aspects of aging), drawing upon the lecture content or required readings. Active experimentation problems as demonstrated by the lunch-party role play and the ensuing class discussion is Kolb’s 4th and final stage according to Coberly. This stage includes the application of gained knowledge to real life situations to make decisions and solve problems.
CONCLUSION

In our high technology age with increasing emphasis in higher education being placed on using the World Wide Web, the Internet, and distance learning, it is important to keep basic pedagogy in mind. Today’s college students range in age, experience, background characteristics, and epistemological development. Each student has a preferred learning style, and each instructor has a preferred teaching style. To be able to motivate students to learn and retain knowledge, instructors should be cognizant of learning/teaching styles and other differences that may exist in their classes in order to effectively use relevant instructional methods in planning appropriate learning experiences for each course. In this paper teaching and learning styles were explained. The most prominent learning style paradigms were discussed. As suggested by several master teachers and authors, instructors were encouraged to vary their teaching techniques in order to offer learning activities appropriate to the different learning styles in the classroom. In addition, it was noted that by modeling various teaching methods students’ repertoires of ways to present information would be increased.

Practicing what was preached, the authors presented 3 different examples to illustrate teaching across different learning styles. The examples utilized visual and other sensory systems to first present concepts in concrete ways to help them understand the concepts and then apply the knowledge to their own experiences. Additionally, each example involved a component of active learning in which the professor attempted to involve all students in the learning process to promote retention of knowledge.

Evaluation of the effectiveness of the three examples has not been systematic. However, students’ verbal and written feedback over the years suggests that new insights were gained. Some students stop on their way out of the classroom after the role play to comment to the professor that they had not realized the difficulties an aging person might encounter with everyday tasks. In formative (mid term) and summative (end of term) open-ended evaluations, students have often noted their appreciation of the active learning components each example provided to their understanding of concepts. In addition, seeing the items, such as the professor’s memorabilia of her college days, the role play, and/or the plants, increased their understanding of the concepts. Anecdotal evidence of knowledge retention comes from comments by former students that the plant metaphor about the importance of continually nourishing relationships has proved useful in their own lives. The authors, however, recommend a more systematic evaluative approach to assess whether the desired result was achieved. One way to accomplish this is to ask in a formal evaluation at the end of the term what each student learned from each specific teaching method/technique and whether the professor should use this approach when the class is taught again.
REFERENCES


