How We Learn

First-year medical students prefer multiple learning styles

Heidi L. Lujan and Stephen E. DiCarlo

Department of Physiology, Wayne State University School of Medicine, Detroit, Michigan

Submitted 29 July 2005; accepted in final form 10 October 2005

Lujan, Heidi L., and Stephen E. DiCarlo. First-year medical students prefer multiple learning styles. Adv Physiol Educ 30: 13–16, 2006; doi:10.1152/advan.00045.2005.—Students have preferences for the ways in which they receive information. The visual, auditory, reading/writing, kinesthetic (VARK) questionnaire identifies student’s preferences for particular modes of information presentation. We administered the VARK questionnaire to our first-year medical students, and 166 of 250 students (66%) returned the completed questionnaire. Only 36.1% of the students preferred a single mode of information presentation. Among these students, 5.4% preferred visual (learning from graphs, charts, and flow diagrams), 4.8% preferred auditory (learning from speech), 7.8% preferred printed words (learning from reading and writing), and 18.1% preferred using all their senses (kinesthetics: learning from touch, hearing, smell, taste, and sight). In contrast, most students (63.8%) preferred multiple modes (2 modes (24.5%), 3 modes (32.1%), or 4 modes (43.4%)) of information presentation. Knowing the students preferred modes can 1) help provide instruction tailored to the student’s individual preference, 2) overcome the predisposition to treat all students in a similar way, and 3) motivate teachers to move from their preferred mode(s) to using others.

visual, auditory, read/write, kinesthetic; learning modes; medical education; knowledge transfer

THE TRANSITION FROM UNDERGRADUATE TO first-year medical education can be difficult for students because of the dramatic increase in the volume of content. Furthermore, today’s medical students represent a broad spectrum in terms of age, experience, culture, ethnicity, and level of preparedness as well as learning preferences and styles. This diversity is welcomed; however, it also presents a challenge for instructors to meet the educational needs of all students. Specifically, student motivation and performance improves when instruction is adapted to student learning preferences and styles (22). Thus, because students have significantly different learning styles, it is the responsibility of the instructor to address this diversity of learning styles among students and develop appropriate learning approaches (33).

A learning style or preference is the complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn (16). One characterization of learning styles is to define the learners’ preferred mode of learning in terms of the sensory modality by which they prefer to take in new information. VAK is an acronym that stands for three major sensory modes of learning: visual, aural, and kinesthetic, depending on the neural system with which a learner prefers to receive information. Thus VAK is a perceptual, instructional preference model that categorizes learning by sensory preferences. Recently, Fleming (11) expanded VAK to VARK to include reading/writing as an additional type of mixed sensory learning modality. Although learners can use all of these sensory modes of learning, one mode is often dominant and preferred. For example, visual learners learn through seeing drawings, pictures, and other image-rich teaching tools. Auditory learners learn by listening to lectures, exploring material through discussions, and talking through ideas. Reading/writing learners learn through interaction with textual materials, whereas kinesthetic learners learn through touching and experiences that emphasize doing, physical involvement, and manipulation of objects.

We were interested in learning the preferred learning styles of our first-year medical students so that we could develop appropriate learning approaches. To achieve this goal, we designed a descriptive study, a study that attempted to reveal patterns associated with a specific group without an emphasis on prespecified hypotheses. Sometimes these types of studies are called hypothesis-generating studies (to contrast them with hypothesis-testing studies). The rational for this descriptive study was to help us design a lesson plan that addressed all students and to identify areas for further research. We used the VARK Inventory Tool for assessing individual preferences for learning with sensory domains. The VARK questionnaire, developed by Fleming (12), was administered to our first-year medical students.

METHODS

Design. The VARK questionnaire developed by Fleming identifies the preferences of students for particular modes of information presentation. The following are internet links to the VARK homepage (http://www.vark-learn.com/english/index.asp) and questionnaire (http://www.vark-learn.com/english/page.asp?q=questionnaire). We administered the VARK questionnaire to our first-year medical students to determine their preferred modes of information presentation. The VARK questionnaire (12) was included with the class packet for the physiology course; 166 of the 250 students (66%) returned the completed questionnaire. We administered the questionnaire as a hard copy; however, the VARK questionnaire is freeware that can be completed online. If you are using a virtual learning environment, e.g., the Blackboard Learning System, eCollege, Creation of Study Environment, or WebCT, the administration and analysis of the questionnaire can be completely managed on the virtual learning environment.

Procedures. The VARK questionnaire was administered during the respiratory component of our medical physiology class at Wayne State University School of Medicine. The class consisted of 250 first-year medical students. The VARK questionnaire with instructions can be obtained free of charge (12).
Analysis. The number of students who preferred each mode of learning was divided by the total number of responses to determine the percentage of students in each category.

RESULTS

Figure 1 presents the percentages of students who preferred visual (5.4%), auditory (4.8%), reading/writing (7.8%), kinesthetic (18.1%), and multiple modes (63.8%) of information presentation. Only 36.1% of the students preferred a single mode of information presentation (either visual, auditory, reading/writing, or kinesthetic).

Of the 106 students (63.8% of all students) who preferred multiple modes of information presentation, some students preferred two modes (bimodal, 24.5%), some students preferred three modes (trimodal, 32.1%), and some students preferred four modes (quadmodal, 43.4%). Figure 2 presents the percentages of students who preferred two, three, or four modes of information presentation. Most students preferred three or four modes (76%) of information presentation.

Of the students who preferred three modes of information presentation, some students preferred visual, reading/writing, and kinesthetic (11.3%), some students preferred visual, auditory, and kinesthetic (8.4%), and some students preferred auditory, reading/writing, and kinesthetic (12.3%) (Fig. 3). Of the students who preferred two modes of information presentation, some students preferred visual and reading/writing (4.7%), some students preferred visual and kinesthetic (5.6%), some students preferred auditory and kinesthetic (0.9%), some students preferred auditory and reading/writing (6.6%), and some students preferred reading/writing and kinesthetic (6.6%) (Fig. 3). Obviously, of the students who preferred four modes of information presentation, all students preferred visual, auditory, reading/writing, and kinesthetic (43.4%).

DISCUSSION

In this study, we administered the VARK questionnaire to our first-year medical students to determine their preferred modes of information presentation. One hundred sixty-six of the 250 students (66%) returned the completed questionnaire.

Only 36.1% of the students preferred a single mode of information presentation (either visual, auditory, reading/writing, or kinesthetic). Of the students who preferred a single mode of information presentation, only 5% of the students preferred receiving information by speech (coding auditory by the VARK questionnaire). Similarly, only 8% revealed a preference for accessing information from printed words; these students were coded as reading/writing learners because they use reading and writing as their preference for taking in information. Only 5% of the students preferred the visual. These students prefer information to arrive in the form of graphs, charts, and flow diagrams. They are sensitive to different or changing spatial arrangements and can work easily with symbols. Eighteen percent of the students preferred their learning by using all their senses, including...

Fig. 1. Percentages of students who preferred visual (V; 5.4%), auditory (A; 4.8%), reading/writing (R; 7.8%), kinesthetic (K; 18.1%), and multiple modes (63.8%) of information presentation. Only 36.1% of the students preferred a single mode of information presentation (either V, A, R, or K).

Fig. 2. Percentages of students who preferred two, three, or four modes of information presentation. Of the 106 students (63.8% of all students) who preferred multiple modes of information presentation, some students preferred two modes (bimodal, 24.5%), some students preferred three modes (trimodal, 32.1%), and some students preferred four modes (quadmodal, 43.4%). Most students preferred three or four modes (76%) of information presentation.

Fig. 3. Of the students who preferred three modes of information presentation, some students preferred V, R, and K (11.3%), some students preferred V, A, and K (8.4%), and some students preferred A, R, and K (12.3%). Of the students who preferred two modes of information presentation, some students preferred V and R (4.7%), some students preferred V and K (5.6%), some students preferred V and A (0.9%), some students preferred A and R (6.6%), and some students preferred R and K (6.6%). Obviously, of the students who preferred four modes of information presentation, all students preferred V, A, R, and K (43.4%).
touch, hearing, smell, taste, and sight. This group was described as kinesthetic. These students prefer concrete, multisensory experiences in their learning. Although learning by doing matches their needs, they can easily learn conceptual and abstract material provided it arrives with suitable analogies, real-life examples, or metaphors (11). Most students (64%), however, preferred multiple modes of information presentation. These students had a balanced set of preferences, which means that they prefer information to arrive in a variety of modes. These students may adjust to the different teaching styles faced in a day or they may opt in and out of alternative strategies, such as being visual in cardiovascular physiology and reading/writing in respiratory physiology, for example. Knowing the students preferred modes can provide a focus for developing strategies that are tailored for individuals (11). In so doing, this helps to overcome the predisposition of many educators to treat all students in a similar way (11). The questionnaire can motivate teachers to move from their preferred mode(s) to using others. In so doing, they can reach more students because of the better match between teacher and learner styles (1, 3, 6, 13, 14, 18–20, 22, 25, 30, 34).

Most students (64%) preferred multiple modes of information presentation. These students had a balanced set of preferences, which means they prefer information to arrive in a variety of modes. Thus most students may benefit from active learning strategies over the traditional lecture format. Active learning strategies reach all types of learners in the visual, auditory, reading/writing, and kinesthetic schemes. In contrast, the traditional lecture format assumes that all students are auditory learners. In addition, the traditional lecture format assumes that all students acquire the same information presented orally at the same pace without dialogue with the presenter.

Most students are able to learn effectively as long as the teacher provides a blend of visual, auditory, reading/writing, and kinesthetic activities. However, some students prefer one of the modalities over the other three so strongly that they struggle to understand the subject matter unless special care is taken to present it in their preference mode. To meet these needs, teaching should be multisensory and filled with variety. To achieve this goal, it becomes important to use active learning strategies (28). With active learning strategies, visual learners are targeted by the presence of models and demonstrations (4, 10, 29). Auditory learners are reached through discussion during peer instruction (7, 27), collaborative testing (8, 26), debate (31), games (2, 5, 15, 21, 23, 24), and answering questions (9). Manipulating models (4, 32) and role playing (17) satisfies kinesthetic and tactile learners. Cooperative learning exercises, role playing, simulations, models, debates, and games are active learning strategies that can be used effectively in large classrooms. These activities also promote working in groups and generate high levels of motivation and enthusiasm. This is important because employment opportunities in the future will require employees to work cooperatively to solve problems and develop solutions. Furthermore, investigators have reported an increase in students’ achievement with the use of simulations and games, and students usually expressed positive feeling about the experiences (35). For all these reasons, active learning strategies may be superior to the traditional lecture format in promoting thinking, reasoning, problem-solving, and decision-making skills.

Future directions. The rationale for this descriptive study was to help us design a lesson plan that addresses all students and to identify areas for further research. With regard to future research, several questions regarding learning styles emerged from this study. For example, do multiple-mode learners perform better in the classroom than single-mode learners? From the instructor perspective, should one mode be used more than another? How well do grades correlate with learning styles for specific classes, e.g., do kinesthetic learners perform better in laboratory classes and do aural learners perform better in lecture classes? Are there gender effects on learning styles? How does the professor accommodate both those who prefer only one style and those who prefer many? Simply accommodating the plurality may improve results to some extent but does not address the preferences of all the students. Does accommodating learning preference really address learning outcomes? All of these questions merit further research.

In conclusion, the VARK questionnaire identifies student’s preferences for particular modes of information presentation. Students have significantly different learning styles; it is the responsibility of the instructor to address this diversity of learning styles among the students and develop appropriate learning approaches (33). Knowing the students’ preferred modes can enrich the learning experience.

REFERENCES