A Comparison of Learning Styles Across the Decades

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Abstract

Purpose: To determine whether "Millennial" students' approach to learning in our Southern College of Optometry (SCO) curriculum is different from a previous class of optometric students classified as Generation Xers. Methods: The 1976 format of the Kolb LSI Learning Style Inventory was placed on the intranet. Students currently enrolled in all four years of the SCO optometric curriculum were invited to voluntarily complete the survey. The primary investigators determined which category of learner the students were based on the survey answers. These findings were compared to the research done in 1993 using the graduated Class of 1994. Results: There were 167 respondents, 90 females and 77 males. They completed the 12-question survey, identifying which learning statement was most like them. Upon review of the data, a demonstrable shift in learning styles between the class surveyed in 1993 and that of 2010 was found. Given that the data are categorical, a non-parametric test was used. A chi-square test showed that the distribution of learning styles is different (p<0.0001). In 1993, SCO's Gen-X learners were primarily comprised of two major categories, Assimilators (45.3%) and Convergers (37.2%). Diversers accounted for 12.7% of responses, with very few Accommodators (4.6%) found. The 2010 data revealed a fairly even distribution between Assimilators (28.1%) and Diversers (26.3%), followed by Accommodators (20.9%) and Convergers (16.7%), while 7.7% students were placed into the Mixed category as they did not demonstrate a strong preference for any individual learning style. The data revealed a significant decrease (45%) in the percentage of students who are classified as Convergers and a 62% decrease in those who are classified as Assimilators. It also revealed a significant increase (200%) in the number of students classified as Diversers. The greatest change (450%) was found in those students who were classified as Accommodators. Conclusions: The data revealed a significant drop in the percentage of students who prefer to learn through abstract conceptualization. It also revealed a significant increase in those students who prefer to rely on concrete experience, their own imagination and intuition when learning. The greatest change found was the number of students who prefer to combine concrete experience and active experimentation to learn and solve problems using their own intuition. Key Words: Teaching, educational assessment

Background

Studies investigating the relationship between learning styles, personality traits and educational achievement can be found in educational and psychological literature. As optometric educators, it behooves us to be aware of the learning styles and personalities of our students so that we may enhance the delivery of our curriculum and the environment in which it is presented. It is not our intention to 'label' a student using a personality profile questionnaire or learning style category, but to identify the personality/learning styles of our students to allow both the instructor and the student to improve the learning process for the successful matriculation through our optometric curriculum.

Today's students think and process information fundamentally differently from previous generations that have been educated in our optometric program. Presentation of the optometric curricula, both didactic and clinical, requires that students be able to acquire information in a manner that is deemed meaningful, presented in a format that is easy to assimilate, allows transfer of knowledge attained to knowledge-in-use, and considers their individual learning styles. Much has been published about the current changes in adult learner/worker attitudes and performance; management techniques are also evolving in academic and workplace settings. Review of the generational characteristics of the Baby Boomers, Generation X and the present generation, which is labeled Generation Y, The Millennials or Digital Natives, will demonstrate how the latter approaches relationships, meaning and value of education, role in society, family and learning.

Our current student population is accustomed to rapid acquisition of information, whether it is for education, recreation or social/relationship purposes. The ever-changing and upgrading of cellphone technologies has already made traditional computers obsolete. Downloading of images and documents no longer requires a laptop or desk-based computer.

Studies of learning styles and testing instruments used have been based on J.D. Vermunt's Inventory of Learning
He theorized that four learning styles existed: meaning directed, reproduction directed, application directed and undirected. Vermunt postulated that students falling in the undirected learning style category may have difficulty processing the material, discriminating the key points in the material, and be overwhelmed with the amount of material to be studied. The student who uses the reproduction directed learning style will “study for the test” and then forget what is learned. Students using the application directed style will try to assimilate the information and then apply the knowledge gained in the real-world arena. Students who use a meaning directed approach to learning try to assimilate the information and then develop their own interpretation of its meaning and application.

The four styles identified by Vermunt correlate nicely with Kolb’s categori- es of concrete experience, active experimen- tation, reflective observation and abstract conceptualization as well as his classifications of Converger, Accommo- diator, Assimilator and Diverger.

Busato, et. al., found that a correlation existed between Vermunt’s ILS personality styles and Kolb’s learning styles. Five personality factors were named in his study: extraversion, agreeableness (also referred to as sociability), conscientiousness, neuroticism, and openness to experience (also referred to as intellect or culture). These five personality traits were also found to be educationally relevant in research done by de Radd and Schouwenburg as noted in Busato’s paper. Extraversion and conscientiousness were highly correlated with the learning styles that were meaning directed, reproduction directed and application directed. This may resemble the attributes of Kolb’s Convergers (thinking and doing) and Accommodators (feeling and doing). Conscientiousness and openness to experience were negatively correlated with the undirected learning style, while neuroticism also correlated positively with the undirected learning style.

Kolb’s research resulted in the identification of four basic learning style categories: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE). He then divided learners into four categories: Convergers, Diversers, Assimilators and Accommodators characterized by a dual combination between the actions of the aforementioned categories as listed below.

Kolb’s classifications are presented as follows:

**Convergers**: Combination of Abstract Conceptualization (AC) and Active Experimentation (AE)
- Find practical applications for ideas and theories
- Generally, more technical than social

**Thinkers and Doers**

**Diversers**: Combination of Concrete Experience (CE) and Reflective Observation (RO)
- Tend to assess a situation from several viewpoints
- Combine concrete experience with reflective observation

**Feelers and Watchers**

**Assimilators**: Combination of Abstract Conceptualization (AC) and Reflective Observation (RO)
- Organize information into a concise, logical form
- Usually find theoretical logic more significant than practical application

**Feelers and Watchers**

**Accommodators**: Combination of Concrete Experience (CE) and Active Experimentation (AE)
- Depend heavily on practical hands-on experience
- Tend to act on what feels appropriate rather than what is logical

**Feellers and Doers**

Felder & Solomon identified four dichotomies of active/reflective, sensing/intuitive, visual/verbal and sequential/global for their learning styles categories, which Lizotte used in his research. They have postulated, like Kolb, that knowledge of one’s preferred learning style can be used to assist and enhance one’s journey through the educational arena. Modification and broadening of one’s learning style is possible through strategies recognized in the instructional arena.

With all of this being said, questions arise. Have new technologies changed the learning styles of our students? Do the students of today approach learning the same way as those of previous generations? This research project provides insight into how members of Generation Y, aka the Millennials, approach learning as compared to our previously surveyed graduated Class of 1994, aka Generation X.

**Methods and Materials**

The 1976 Kolb Learning Style Inventory was chosen as the vehicle to use to determine our students’ learning style. Of note is that the 1993 survey was done on paper and hand-graded by the first author (a “digital immigrant”). The present survey was placed on the institution’s intranet and scored via Microsoft Excel spreadsheet (at the recommendation of the co-author (a “digital native”).

Students currently enrolled in all four years of our optometric curriculum were invited to voluntarily participate in this project, which was first reviewed by the IRB. The 1976 format of the Kolb LSI Learning Style Inventory was placed on the intranet with 167 students responding. Ninety females and 77 males anonymously completed the 12-question survey in which they identified which learning statement was most like them. The primary investigators then determined which category of learner the students were based on the survey answers. The data were reviewed and compared to the responses of the 1993 research by one of the authors.

**Results**

Upon review of the data, a demonstrable shift in learning styles between the class surveyed in 1993 and the class surveyed in 2010 was found. Given that the data are categorical, a nonparametric test was used. With four degrees of freedom (one minus the number of categories), the Chi-square test showed that the distribution of learning styles is different. (p< 0.00001).

In the 1993 research, Gen-X learners enrolled in our optometric program were primarily comprised of two major categories, Assimilators (45.3%) and Con-
vergers (37.2%). Divergers accounted for 12.7% of responses, and there were very few Accommodators (4.6%). The 2010 data (Table 1) revealed a fairly even distribution between Assimilators (28.1%) and Divergers (26.3%), followed very closely by Accommodators (20.9%) and Convergers (16.7%), and 7.7% of students were placed into the Mixed category, as they did not demonstrate a strong preference for any individual learning style.

The data (Table 2) reveal a significant decrease (45%) in the percentage of students who are classified as Convergers (learning through abstract conceptualization, creating theoretical models and applying them to learn, and active experimentation), and a 62% decrease in those who were classified as Assimilators (learning by logical application of information). The data also reveal a significant increase (200%) in those students classified as Divergers (learning by relying on concrete experience, their own imagination and intuition). The greatest change found in an individual learning style category was the four-fold increase (450%) in the percentage of students who were classified as Accommodators (prefer learning by combining concrete experience and active experimentation to learn and solve problems using their own intuition).

**Conclusion**

The distribution of preferred learning styles of optometry students in our educational program has changed significantly over the past 17 years, with the emphasis shifting from learning through abstract conceptualization to learning via experience and experimentation. The data reveal a significant drop in the percentage of students who prefer to learn through abstract conceptualization and a significant increase in those students who prefer to rely on concrete experience, their own imagination and intuition when learning. Awareness of students’ preferred learning styles may be helpful not only in how the curricular content is presented, but in the structural design and instructional technology needed to maximize the learning experience of the future optometry student.

Curricular review is an ongoing process at SCO. Future considerations at our optometric institution include the development of a new multipurpose lecture hall, more areas for small group learning, enhanced library environment, and enhanced utilization of instructional technologies.

The fairly even distribution between the Divergers, Accommodators and Assimilators found in the 2010 survey, the decrease in the percentage of Convergers and Assimilators from the 1993 survey, and the increase in Accommodators from the 1993 survey may lead one to ask several questions. Is the same curricular andragogy (curricular content and its delivery) as effective as it once was? Will knowledge of an individual student’s learning style be useful in cases of remediation? How does the advent of the ever-increasing digital world of internet, computers, texting and video capabilities affect the delivery of the optometric course content?

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### Table 1

**Comparison of LSI Responses, 1993 and 2010**

<table>
<thead>
<tr>
<th>LSI Classification</th>
<th>LSI 1993 Survey</th>
<th>LSI 2010 Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Students</td>
<td>% of Students</td>
</tr>
<tr>
<td>Convergers</td>
<td>32</td>
<td>37.2%</td>
</tr>
<tr>
<td>Divergers</td>
<td>11</td>
<td>12.7%</td>
</tr>
<tr>
<td>Accommodators</td>
<td>4</td>
<td>4.6%</td>
</tr>
<tr>
<td>Assimilators</td>
<td>39</td>
<td>45.3%</td>
</tr>
<tr>
<td>Mixed</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>86</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 2

**Changes from 1993 to 2010**

<table>
<thead>
<tr>
<th></th>
<th>Absolute % change</th>
<th>Relative % change from 1993-2010</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% students (1993) - % students (2010) / % students (1993)</td>
<td></td>
</tr>
<tr>
<td>Convergers</td>
<td>20.5%</td>
<td>45% decrease</td>
<td>0.0005</td>
</tr>
<tr>
<td>Divergers</td>
<td>13.6%</td>
<td>200% increase</td>
<td>0.0206</td>
</tr>
<tr>
<td>Accommodators</td>
<td>16.3%</td>
<td>450% increase</td>
<td>0.0013</td>
</tr>
<tr>
<td>Assimilators</td>
<td>17.2%</td>
<td>62% decrease</td>
<td>0.0094</td>
</tr>
</tbody>
</table>
In their learning and teaching styles paper, Felder et al., discussed methods to assist learners in their educational journeys. Our success in addressing the personality/learning styles of our forthcoming Generation Y students will be measured by the successful completion of the modified optometric didactic and clinical curriculum. The authors would like to invite the other schools and colleges of optometry to share best practices in curricular delivery and to perhaps form an ongoing blog on their didactic and clinical experiences with this new generation of students.

References


14. Vermunt JD. Learning styles and guidance of learning processes in higher education (English translation); Project of Department of Educational Psychology of the Tilburg University, Tilburg, The Netherlands, 1994.

