Traditional Lecture Versus Video/Discussion-Based Instruction And Their Effects On Learning Behavior Guidance Techniques

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Traditional Lecture Versus Video/Team-Based Instruction And Their Effects On Learning Behavior Guidance Techniques

ABSTRACT

Purpose: To compare traditional lecture-based instruction versus video and discussion-based instruction and their effects on student learning of behavior guidance techniques (BGTs) and student perceptions about the methods of instruction with videos.

Methods: Videos of pediatric dentists performing BGTs were recorded. Dental students in their 3rd year of training were recruited to participate in the study in March, 2016 (n=70). The students were divided into 2 groups: 1) contemporary instruction (CI) and 2) traditional instruction (TI). The CI group watched a 20-minute “mini-lecture” that simulated an online module. CI group members then divided into discussion groups, which were led by calibrated pediatric residents and faculty. The TI group received 45 minutes of traditional lecture with videos incorporated in the lecture presentation. At the completion of the course, students completed a questionnaire. The questionnaires assessed the individual student’s understanding of the objectives of the course and his/her perceptions of the learning experience.

Results: Students in the CI group performed significantly better on the post-test questionnaire (p=0.001). Female post-test scores were higher than male scores (p=0.004). After instruction, students felt most comfortable employing Tell Show Do and Positive Reinforcement. Students’ perception of the usefulness of video examples of BGTs was high with mean 4-point Likert scores of 3.53 (CI) and 3.52 (TI).

Conclusions: Education in the area of behavior guidance for pre-doctoral students could
be enhanced by the use of videos and discussion-based learning. The CI format improved
the students’ learning of the topic as assessed by test scores.

Keywords: Education, Professional; Professional education; Dental; Pediatric Dentistry;
Teaching Method; Online; Teaching; Active Learning; Behavior Guidance Techniques
INTRODUCTION

Behavior Guidance Techniques are an essential set of skills for treating children and those with special needs. The techniques enable practitioners to help patients learn correct responses to stimuli, communicate fears and anxieties, and cope with a difficult appointment. The techniques are meant to help patients have a positive view of dental appointments, which in turn fosters long-term relationships with dental practitioners and develops long-term investment in dental health. This study focused on communicative behavior guidance. These techniques are the foundation of the practice of behavior guidance and can be employed by all dental practitioners and support staff. The communicative techniques include positive pre-visit imagery, direct observation, Tell-Show-Do, Ask-Tell-Ask, voice control, nonverbal communication, positive reinforcement and descriptive praise, distraction, memory restructuring, and parental presence/absence.¹

Educators in the healthcare profession are challenged with creating new ways to instruct a growing classroom of a tech-savvy generation.²⁻⁴ In addition, it is difficult to keep a class engaged in learning through a passive², traditional lecture-based format. Active engagement in learning has been shown to provide better results.⁵ Activities provide students with the opportunity to construct scenarios that they can use later in real-life events because they have drawn from material which they have learned prior to class, interacted with others who may have a different perspective, and been provided with feedback in a safe environment from an instructor.⁴⁻⁶,⁷ Curricula based around engaged learning have been met with high student satisfaction.⁸
Active learning can be implemented in many ways. Providing lecture materials before class delivers flexibility to students and allows class time to be used for review and active learning.9, 10 This concept is referred to as a flipped classroom. Team-based learning (TBL) also uses class time for activities. It adds structure to the classroom activities and requires that the students prepare prior to class and work in teams where the aim is not only to improve learning but also to reinforce the value of teamwork.11, 12 Group work has been shown to be quite valuable even when students report that they prefer to learn individually.13

With active learning as the goal, videos of behavior guidance techniques (BGT) may provide a valuable tool for instruction. Videos in learning have been reported to be useful in many other studies.2, 14, 15 Weeks, et al. cites several benefits to using videos in instruction which include more enjoyment and engagement from the students, more authentic representations of clinical scenarios, and better use of technology familiar to this generation of students.2 Also Hafen et al.15 noted that delivery of information via video might help convey the importance of certain topics and concepts often glanced over by students; for example, communication skills. Video format can bolster a topic that is difficult to teach and can offer the chance to learn vicariously.16 Empathetic learning develops episodic memory, which is the memory of experience. This type of memory transitions into semantic memory, which is a generalized form that can be applied to other events or situations.17 Furthermore, recordings of genuine scenarios can be critiqued and dissected by students who will be entering clinic and have been shown to change practitioner performance.15
The purpose of this investigation was to compare traditional lecture-based instruction versus video and discussion-based instruction and their effects on student learning of behavior guidance techniques (BGTs) and student perceptions about the methods of instruction. The new instruction method would be supported by the study’s primary aim, which was to show that the use of videos and discussion groups improve students’ learning over the traditional lecture format often employed by educators. Secondarily, the study aimed to determine if the use of videos help students feel more comfortable employing the BGTs.

METHODS

A cohort study was executed to introduce a new method of instruction for teaching dental students behavior guidance techniques for pediatric dental patients. The University of Tennessee Health Science Center Institutional Review Board approved the collection of videos (IRB: 15-03641-XP) and their use in the study (IRB: 15-04325-XP).

Videos of various seasoned pediatric dentists and dental staff performing BGTs were recorded. The videos were incorporated into two different types of instructional methods: 1) contemporary instruction (CI) and 2) traditional instruction (TI). The CI consisted of creating a twenty-minute voice-over PowerPoint (Microsoft® PowerPoint® for Mac 2011, Version 14.6.4) lecture that described each BGT and contained one example video. This presentation was created to simulate a presentation that could be available online for students prior to meeting in a classroom. Additionally, group discussion questions for four other videos of various BGTs were created. For the TI, a PowerPoint lecture was created, and the videos were incorporated within the lecture, with
a video example following each topic of the presentation. Both types of instructions contained the same videos and didactic content.

A questionnaire was developed that collected demographic data (age, gender, ethnicity), student preference of both learning style (audio, visual, reading) and learning format (individual or group), and current level and perception of the student’s experience with pediatric patients. The questionnaire also collected the student’s perceived comfort level with various types of BGTs after exposure to the course and the student’s perception of the format of the course and the usefulness of the videos. A post-test was also created which collected correct and incorrect responses to didactic information that was presented in both types of instruction. The post-test was piloted prior to use in the study for validity of measuring knowledge about BGT’s.

The post-test portion of the course consisted of twelve questions. To validate the instrument, six pediatric dental residents and eight first year dental students (D1) took the post-test without prior instruction. Pediatric residents were chosen because the residents should be familiar with BGTs. Residents took the test prior to being calibrated for the discussion groups and prior to seeing the instructional material. D1 students were chosen because they had not yet been exposed to any BGT instruction thus far in their curriculum. An independent samples t-test was completed to evaluate statistical significance between the groups thereby demonstrating a difference between students that know and understand BGTs versus students that are not familiar with BGTs.

Dental students in their third year of training were recruited to participate in the study (n=70). The students were recruited via email and flyers. Incentives for participating in the survey included an opportunity to learn more about BGTs, which
could enhance their practice as dentists and an opportunity to earn clinical credit in the undergraduate pediatric clinic equivalent to about one point being added to their clinical average in that clinic. Also, lunch was provided after the participants completed the study. The students were divided into two groups: 1) contemporary instruction (CI) and 2) traditional instruction (TI). Instruction was held in separate lecture rooms with projector and visual/ audio capabilities. Participants were randomly and equally assigned to the groups as each subject sequentially presented for participation. In the CI group, eight discussion subgroups existed. Students were given a number, one through eight, sequentially as they walked through the classroom door and joined the discussion subgroup accordingly. The discussion subgroups had three to six participants. For the TI, the primary investigator delivered the forty-five minute traditional lecture. To ensure that every student in the CI group would be exposed to the voice-over presentation, the CI group watched the voice-over presentation first, which contained one video. Following the presentation, videos of tell-show-do, positive reinforcement, distraction, modeling, voice modulation, and an infant exam were played. Several videos contained more than one type of BGT for a total of four videos for the discussion section. After playing each video, five minutes were allotted for group discussion of each video. Pediatric dental residents and faculty who were previously calibrated led the group discussions. After completion of each course, the questionnaire and post-test were administered.

A multifactorial ANOVA was completed to examine the effects of teaching method (CI/TI), learning style (group/individual), and method of learning (reading/listening/visual) on the post-test scores. Separate one-way ANOVAs were completed to examine the effects of ethnicity, gender, method of learning
Independent sample T-tests were completed to evaluate statistical significance of post-test scores within the learning style (group/individual) groups and within the teaching method (CI/TI) groups. Also to validate our 12-item post-test, a t-test was completed to examine the difference between post-test scores in the dental resident group versus the D1 group.

RESULTS

Seventy questionnaires were collected. One was disqualified for incomplete data, resulting in sixty-nine total surveys analyzed for this study. Forty-eight of the respondents were male, and twenty-one were female (Table 1). The average age was 25.9 years with a range of 23-36 years. The average student participant in this study had five to nine patient encounters in the pediatric clinic (range=0-15+) with a self-scored comfort level with treatment of children lying somewhere between uncomfortable and comfortable (mean=2.71/4; min=1, max=4; range=(1) extremely uncomfortable- (4) extremely comfortable) and a positive rating on these encounters overall (mean= 3.06/4; min=2; max=4; range= (1) extremely negative- (4) extremely positive) (Table 2). The majority of students reported that their favorite way to learn was by watch videos (Table 1).

The post-test was validated using first year dental students, who had an average score of 3.5 out of 12, and pediatric dental residents, who had an average score of 9.0 out of 12. The difference between the groups was statistically significant with a p-value < .001. Post-test scores for the CI group were significantly higher than for the TI group (p<.001).
The female post-test score average (9.24) was significantly higher than male score average (7.69)(p<.004). Seventeen of the twenty-one female participants were in the CI group. Independently, there was no statistical difference in post-test scores between method of learning (reading/listening/visual) (p=.310), between learning style (group/individual) (p=.138), or between the four ethnic groups (p=.580). A three way ANOVA was completed looking at Teaching Method (CI, TI), Learning Style (group, individual), and Method of Learning (reading text, listening to lecture, watching videos) and their effect on the post-test scores. The only factor that made any significant difference was teaching method, the other two factors’ effects were not significant and there were no significant interactions among the three factors on the post-test scores (Table 3).

A series of perception questions were evaluated on a 4-point Likert scale (Table 2). Students felt most comfortable (higher scores indicated higher comfort level) with Tell-Show-Do (mean=3.28) and Positive Reinforcement (mean=3.26). They felt least comfortable with Voice Modulation (mean=2.78). CI students reported slightly higher satisfaction scores on teaching module usefulness, format of the course, and usefulness of the videos, but this was not statistically significant. The students’ perception of the usefulness of the videos in contributing to their understanding of BGTs was high regardless of group assignment with scores of 3.53 (CI) and 3.52 (TI). Furthermore, 53.6% of the students overall responded that the videos were “extremely useful” (score of 4/4). Another 44.9% of the students scored the video usefulness as a 3, “useful”. Only one student, who was in the TI group, rated the usefulness of the videos as “not useful” (score of 2/4). The same student also rated the module usefulness and satisfaction with
the course as not useful (2/4) and unsatisfactory (2/4), respectively.

DISCUSSION

A recent survey of the preparedness of first year pediatric dentistry residents showed that only 61% of program directors felt that first year residents were adequately prepared with Tell-Show-Do upon enrollment in the residency. Adequacy dropped precipitously for voice control and immobilization. Assuming that the students entering pediatric dentistry residencies are likely the most motivated students to learn BGTs in dental school (and those most likely to seek additional pediatric experience), the Rutkauskas et al. study highlights the inadequacy of predoctoral education in pediatric dentistry, even with the most basic behavior guidance technique: Tell-Show-Do. Hence, attempting to improve student learning in this area is warranted.

The post-test was designed to test knowledge gained through BGT instruction. The post-test did show a significant difference between groups (D1 students vs. pediatric dental residents). Though the sample group for validation was small, the extreme gap between the scores strengthened the conclusion that the post-test accurately showed a difference between the knowledge base of those that have been exposed to BGTs and those that have not yet learned BGTs.

Several factors regarding learning, participant demographics, and experience were examined for effect on post-test scores. Teaching method, when paired with a particular learning style and/or method of learning had no significant effect on the post-test scores. The only significant effect was Teaching Method. This lends evidence that the teaching methodology (CI/TI) seems to have a significant effect across different learning styles.
and methods of learning. The average score of the CI group (8.94) approached the average score of the residents (9.00) who took the test to validate the instrument. Furthermore, the CI group score mean (8.94) was significantly different from the TI group mean of 7.30, which indicates a very strong association between the CI format and the group’s learning outcome.

The only other statistical difference that was found existed in the category of gender. The female participants did significantly better on the post-test than the male participants. Gender groups were not evenly distributed, with more than twice as many males participating in the study. However, seventeen females of the twenty-one were in the CI group. This shows again that the CI group’s learning was better.

With 98.5% of the students giving positive ratings, the impressive majority of the study group found the videos to be a welcomed contribution to their learning of BGTs. Weeks et al. used videos for instructing physical therapy students in Australia. The study showed that 98% of the students agreed that the use of videos facilitated their learning.² In the current study questionnaire, the some students commented that videos were helpful, and they would like them to be available for viewing. Making resources, like videos of behavior guidance techniques, available for instructor use may allow better teaching practices to be employed with less stress on the instructor, who may struggle to use different methods.⁴ Students would also benefit from access to such resources that would provide reinforcement and examples of lecture materials.

The simulated use of the flipped classroom concept as implemented in this study proved beneficial and is supported by research.¹⁹,²⁰ In a study by CB Ratta, TBL was implemented for part one of a two-semester course. The major student complaint was
lack of lectures to provide base knowledge. In part 2 of the course, recorded lectures were provided for viewing prior to class leading to higher satisfaction in the course. It seems that it may be important to students to provide information in a structured method through lectures to guide pre-class learning.\textsuperscript{4} Offering PowerPoint-style learning modules with voice over instruction prior to class time will require both engaged instructors and students and will lend to better use of class time for discussion and interaction to reinforce learning.

Another observation of interest was student response to the question, “As a result of this teaching module, how comfortable do you feel with utilizing the following techniques?” High comfort ratings were given to tell-show-do, positive reinforcement, and distraction, indicating that there may be decreased anxiety implementing these techniques after the conclusion of the module. However, a pre-test was not administered; thus, students could have self-reported high comfort ratings with these BGTs prior to the instruction. Though, high ratings would seem unlikely given that the average student in this study had experienced only 5-9 pediatric patient encounters.

Team-based learning and flipped classroom format influenced the structure of the current teaching method proposed. However, the small group discussions were not constructed according to the guidelines of the TBL format; rather a blend of teaching methodologies was used to create an active learning environment. A similar approach was taken by Ratta in a study instructing nursing students, where both TBL and flipped classroom were employed.\textsuperscript{4} The activity provided to students in TBL follows the 4S’s (significant problem; same problem; specific choice; simultaneous report).\textsuperscript{11,12} The discussion group questions did not have a specific choice. Communicative management
as a whole is a process that resembles an art form as well as a science; therefore there are many acceptable ways to implement the skills that often reflect the personality of the practitioner. Therefore the discussion was not meant to provide students with specific answers, but rather encourage them to become comfortable with communicating with children through various BGTs and implement them in a way the individual found effective. Though full implementation of TBL was not employed in the current study, the well-studied structure of TBL is quite valuable and has been implemented in healthcare instruction in several areas including dentistry. Takeuchi et al. showed that Japanese students in a fixed prosthodontics course scored better on examination questions derived from TBL material. They commented that active learning helped students commit knowledge to long-term memory leading to higher scores at the end of the course.

Limitations of the study included sample size and lack of even distribution among gender and ethnicity. Also a computerized system of randomization may strengthen the outcomes but such technology was not feasible given the time limit and the size of the study. An interesting question to include in the questionnaire might have been, “Do you have children?” Participants that have children may or may not have knowledge of behavior guidance gained from both instinct and experience from their own children. Wells et al., noted in a recent survey of pediatric dentists that over 70% agreed with the statement: “Parenthood has had a significant impact on my behavior guidance style with patients.” An additional limitation of the study was that the effect of reflection on the new knowledge was not tested because of the time limit of a one-hour learning session, and reflection may be an important part of learned material becoming applied skills. Finally, administering a pre-test would have given a baseline perception level of the BGT
comfort levels and didactic knowledge of the skills. This is an aspect that should be added to a future study that implemented the teaching method to the length of an entire course.

More information could be gathered about the effectiveness of the current study’s teaching methodology if it were employed during an entire course. Future implementation of a discussion-based format with the use of videos may improve the learning of students in many settings and has been supported by research. However not all studies show improvement in test scores when active learning techniques are employed. For instance an article regarding the use of the flipped classroom in an veterinary medicine skills course showed statistically lower scores for the flipped classroom cohort compared to the traditional classroom cohort.\textsuperscript{28} Therefore, periodic reassessment in the education process cannot be taken for granted. Use of software to make videos searchable or “interactive” may be an improvement to video instruction demonstrated by Zhang et al., where students with interactive videos and lecture material in an online course scored better and had higher satisfaction ratings.\textsuperscript{29} Lastly, making instructional materials such as videos available to instructors will save them time and money while constructing their own course.

The classroom contains individuals with different learning preferences and needs. Consequently, lecture recordings and videos made available to students may allow them to learn at their own pace and provide those that prefer to learn independently the ability to do so.\textsuperscript{2} Better learning can close the gap between the classroom and clinical/work experience and enhance the future of any profession. Importantly, improved learning may lead to fewer initial mistakes by new physicians, dentists, nurses, and healthcare
personnel, leading to better service to the consumer, better consumer satisfaction, and decreased new practitioner anxiety.

CONCLUSIONS

Education in the area of behavior guidance for students could be enhanced by the use of videos and discussion-based learning. The following conclusions may be drawn to support the use of videos and discussion groups in teaching methodology:

1. The overall satisfaction of either course was high. Many students commented on the survey that the inclusion of videos was very helpful. The positive attitude about the method from students supports its use.

2. Students reported high comfort levels on some basic BGTs after viewing video examples further supporting use of videos for teaching these skills.

3. The CI format (“online mini-lecture” and discussion groups) proved to be significant in the students’ learning of the topic. Therefore, not only are videos helpful and positively viewed, but also the value of using classroom time for interactive learning and discussion is correlated with better understanding of course objectives.
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Disclosures: The authors have nothing to disclose regarding this study.
References:


5. Bonwell C, Sutherland T. The active learning continuum: choosing activities to engage students in the classroom. New Dir Teach Learn 1996;67:3-16.


Table 1. Demographics

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>% (n)</th>
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<tr>
<td>Total n= 69</td>
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<tr>
<td><strong>Gender</strong></td>
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<tr>
<td><strong>Patient Encounters</strong></td>
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<td>0-4</td>
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<td>10-14</td>
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<tr>
<td>Individual</td>
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<tr>
<td><strong>Preferred Method of Learning</strong></td>
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<td>Listening to audio</td>
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<tr>
<td>Watching videos</td>
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Patient encounters refer to the number of separate pediatric appointments the student has seen in the pre-doctoral clinic.

Table 2. Means of Student Perception Among Groups and Overall

<table>
<thead>
<tr>
<th>PERCEPTION TOPIC</th>
<th>CI MEANS</th>
<th>TI MEANS</th>
<th>OVERALL MEANS</th>
</tr>
</thead>
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<tr>
<td>Comfort with treatment of children</td>
<td>2.78</td>
<td>2.64</td>
<td>2.71</td>
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<tr>
<td>Feeling about treatment encounters overall</td>
<td>3.14</td>
<td>2.97</td>
<td>3.06</td>
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<tr>
<td>Comfort with Tell Show Do</td>
<td>3.31</td>
<td>3.24</td>
<td>3.28</td>
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<td>Comfort with Distraction</td>
<td>3.25</td>
<td>3.09</td>
<td>3.17</td>
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<td>Comfort with Positive reinforcement</td>
<td>3.33</td>
<td>3.18</td>
<td>3.26</td>
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<tr>
<td>Comfort with Voice Modulation</td>
<td>2.81</td>
<td>2.76</td>
<td>2.78</td>
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<td>Comfort with Nonverbal Communication</td>
<td>3.08</td>
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<td>Perception of the Module Usefulness</td>
<td>3.39</td>
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<tr>
<td>Satisfaction with Course Format</td>
<td>3.42</td>
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<td>3.38</td>
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<tr>
<td>Perception of Video Usefulness</td>
<td>3.53</td>
<td>3.52</td>
<td>3.52</td>
</tr>
</tbody>
</table>

*Contemporary Instruction. +Traditional Instruction. ~ Means given based on a Likert scale; Range: 1-4; 1 being the least positive and 4 being the most positive.

Table 3. Comparison of Specific Groups to Post-test Score Mean

<table>
<thead>
<tr>
<th>GROUP TYPE</th>
<th>POST-TEST MEAN (n)</th>
<th>Sig.</th>
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</thead>
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<tr>
<td><strong>Type of Instruction</strong></td>
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<tr>
<td>Contemporary Instruction (CI)</td>
<td>8.94 (n=36)</td>
<td>p&lt;.001</td>
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<tr>
<td>Traditional Instruction (TI)</td>
<td>7.30 (n=33)</td>
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<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
<td>7.69 (n=48)</td>
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<tr>
<td>Female</td>
<td>9.24 (n=21)</td>
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<tr>
<td><strong>Learning Style</strong></td>
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<td></td>
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<tr>
<td>Group</td>
<td>8.55 (n=33)</td>
<td>p=.138</td>
</tr>
<tr>
<td>Individual</td>
<td>7.81 (n=36)</td>
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</tr>
<tr>
<td><strong>Method of Learning</strong></td>
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<tr>
<td>Reading</td>
<td>9.90 (n=11)</td>
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<tr>
<td>Listening to audio</td>
<td>7.50 (n=4)</td>
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<td>Watching videos</td>
<td>8.04 (n=54)</td>
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<tr>
<td><strong>Ethnicity</strong></td>
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<tr>
<td>African American</td>
<td>7.67 (n=3)</td>
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<tr>
<td>&gt;15</td>
<td>8.43 (n=7)</td>
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*All a 12-point scale. *Number of pediatric patient appointments in the undergraduate clinic prior to the course.