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Teaching University Students Knowledge and Implementation of the Assessment of Basic Learning Abilities (ABLA)

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Keywords

Assessment of Basic Learning Abilities (ABLA), Web-based Computer-Aided Personalized System of Instruction (WebCAPSI), self-instructional manual, demonstration videos, training university students

Abstract

As an analogue of staff training, we evaluated the effectiveness of a training package to teach university students to administer the Assessment of Basic Learning Abilities (ABLA), a direct behavioural assessment of several visual and auditory discrimination skills. The training package included a self-instructional manual, mastery-based unit tests, and demonstration videos. The package was delivered by a Web-based computer-aided personalized system of instruction (WebCASPI) program. The intervention was evaluated in a multiple-baseline design across three undergraduate students. Each student showed large improvements in knowledge and skill acquisition immediately following the intervention and during follow-up. Students rated the videos as the most useful training component. The present study is one of the first to evaluate the effectiveness of a self-instructional manual delivered through a CAPSI program.

The learning of behavioural assessment procedures and relevant knowledge development are major practical priorities for direct-care providers to work with individuals with autism and other developmental disabilities. The common training approach relies primarily on direct instruction. However, given an increasing demand for direct-care staff and high employee turnover in this field (Larson & Lakin, 1999; Test, Flowers, Hewitt, Solow, & Taylor, 2003), a considerable amount of time and resources are required for a trainer to provide face-to-face instruction. Moreover, successful training often depends on maintaining a stable teaching structure, which requires a large amount of trainer expertise. Thus, direct instruction is costly. Research is needed to develop effective, yet low-cost, procedures for staff training.

Some researchers have developed self-instructional manuals to fill this need. For example, Fazzio, Martin, Arnal, and Yu (2009) examined the effectiveness of a self-instructional manual for discrete-trials teaching (DTT; an instructional strategy for implementing behavioural interventions to children with autism and other developmental disabilities). They asked five university students to study the DTT manual and to master the answers to the study questions in the manual. Results indicated that all students increased their performance over baseline in conducting DTT. In addition, those who did not achieve the mastery criterion (90%) did so with additional feedback-plus-demonstration sessions.

In another study, DeWiele, Martin, and Garinger (2000) evaluated the effectiveness of a self-instructional manual (DeWiele & Martin, 1998) for the Assessment of Basic Learning Abilities (ABLA; Kerr, Meyerson, & Flora, 1977), a direct assessment of how quickly a person with developmental disability learns six basic motor, visual, and auditory discrimination skills. The ABLA tasks described by Kerr et al. include an imitation, position discrimination, visual discrimination, matching-to-sample, auditory discrimination, and auditory-visual discrimination. The tasks, called levels, need to be administered sequentially in difficulty, involving different antecedents and target behaviours, and each task receives a pass-or-fail score. Performance on the ABLA has been found to be predictive of learning other skills that require similar position, visual, and auditory discriminations, suggesting that the ABLA is useful for selecting and sequencing training tasks for individuals with developmental disabilities. For more information about the ABLA, readers are referred to a Special Issue on the ABLA in this journal (Martin & Yu, 2000) and to a more recent review paper by Vause, Yu, and Martin (2007). In the study by DeWiele et al., results indicated that the participants (both university students and direct-care service providers) who worked through the self-instructional manual showed superiority over participants who studied the Kerr et al. information package in accurately completing a comprehension exam to assess knowledge of ABLA testing procedures, a speed exam to assess speed and accuracy of responding to questions about the ABLA, and a task classification exam to assess ability to classify tasks according to ABLA levels. Moreover, the self-instructional manual showed superiority in teaching participants to accurately apply the ABLA with individuals role-playing a client after both groups received some practice in this.

A common feature of these manuals is that they apply a behavioural approach based upon a personalized system of instruction (PSI; Keller, 1968) in that the materials are presented in small units and learners are asked to master each unit by passing a test on the given unit before proceeding to the next. Unlike traditional PSI, however, unit tests are self-administered and self-evaluated. A potential limitation of self-instructional manuals is that their effectiveness relies on the assumption that the learners will adhere to the mastery-before-proceeding-to-the-next-unit contingency. Deviating from this contingency will likely diminish the manuals' effectiveness. The Internet may offer a practical solution.

A computer-managed PSI, called computer-aided personalized system of instruction (CAPSI), allows leaners to progressively study contained units from the materials sequentially and to complete unit tests on a basis of demonstrating mastery on one unit before proceeding to the next (Pear & Kinsner, 1988; Pear, Schnerch, Silva, Svenningsen, & Lambert, 2011). Research indicated that academic courses that incorporate WebCAPSI, the Web-based version of CAPSI, produce superior performance (Sevenningsen & Pear, 2011). Recently, videos that demonstrate correct behavioural and assessment procedures have been embedded into WebCAPSI. In addition, unlike previous versions of CAPSI that used peer review, unit tests in the version used in this study consisted of fill-in-the-blank or single-choice questions that were marked (i.e., graded) automatically by the computer.

The purpose of the present study was to determine, as an analogue of staff training, the effectiveness of a training package, consisting of 1) a self-instructional manual and 2) unit tests and demonstration videos delivered via WebCAPSI, on teaching university students knowledge and the ability to conduct sessions at an acceptable criterion. This research was approved by the Psychology/Sociology Research Ethics Board of our university.

Method

Participants

Participants were three undergraduate university students – two males (Participants 1 and 2) and one female (Participant 3) – recruited through a research advertisement. Each participant contracted to receive 50 dollars for participation contingent on participating in all phases of the study regardless of performance. Participant 1 was enrolled in the School of Business, Participant 2 in the Faculty of Science, and Participant 3 was in the Faculty of Human Ecology. All participants had completed an Introduction to Psychology course and did not have previous experience working with individuals with autism or other developmental disabilities.

Materials

The study materials consisted of an ABLA self-instructional manual, mastery-based unit tests, and demonstration videos. Materials for administrating the ABLA included two containers (viz., a yellow can and a red box) and three manipulanda (viz., a piece of foam, a cube, and a cylinder). A digital video camera and a tripod were used to record testing sessions for later scoring. A brief survey was used to obtain the participants' subjective views on the usefulness of the training components.

The WebCAPSI program contained software for presenting unit tests consisting of study questions that were drawn from the manual, for automatically marking answers on the tests, and for uploading demonstration videos. Each unit test included 10 fill-in-the-blank and single-choice (including true-or-false) questions randomly selected by the program from the pool of study questions for each unit. The total of all five units included 77 fill-in-the-blank and 9 single-choice questions. (Although the ABLA self-instructional manual had been shown to be effective for teaching, we are not aware of any study that evaluated content or predictive validity of study questions included in the manual.) Five videos depicted actors (graduate students) demonstrating correct procedures and common errors in administering the ABLA.

Setting

The participants could access the study materials, write unit tests, and view the demonstration videos via WebCAPSI wherever they were able to connect to the Internet. Thus, the "training setting" could be anywhere the participants chose (e.g., home, computer lab). However, knowledge-based written tests and tests with a simulated client were conducted in person in a testing room at the university.

Design, Dependent Variables, and Data Collection

A multiple baseline design across participants was used. The dependent variables were (a) knowledge of the ABLA, (b) accuracy of conducting the ABLA with a simulated client, and (c) the participants' subjective judgments of the usefulness of the training components. ABLA knowledge was measured by a written test regarding concepts, principles, and procedures. The test was scored by the first author using an answer key. The performance on conducting sessions with a simulated client was evaluated using behavioural checklists (available from the first author upon request), which consisted of 20 to 33 behaviours depending on the level being tested. For example, to administer ABLA level 2 correctly, the participant was required to provide the proper set-up, a demonstration, a guided trial, and an opportunity for independent responses. The participant then had to commence the first test trial with verbal instruction, praise for a correct response, and an error correction procedure for an incorrect response.

The trial was recorded on a data sheet provided by the first author. The first two of dependent variables were measured during baseline, post-training, and follow-up. The third was measured by a brief questionnaire only after the completion of training.

Procedure

Baseline knowledge test: During the first session, each participant was given 15 minutes to read a two-page written description and outline (available upon request) for administering the ABLA and was asked to complete a written test, consisting of 15 fill-in-the-blank and single-choice (including true-or-false) questions about the ABLA within 10 minutes after reading the written description and outline. The test was repeated once and twice for Participants 2 and 3, respectively. The questions varied across tests for each participant, but the same tests were used across participants.

Baseline test on conducting a session with a simulated client: During this assessment, in which the first author played the role of a person with developmental disabilities, each participant was asked to conduct 3 trials for each of the following five ABLA levels: a basic motor response that may involve imitation, a position discrimination that involves both position and visual cues, a simple visual discrimination, a quasi-identity visual-visual conditional discrimination, and an auditory-visual conditional dis-

crimination. Level 5 – an auditory-discrimination – was omitted because research has shown that it overlaps with the auditory-visual conditional discrimination (Martin & Yu, 2000). Each participant was asked to let the experimenter know when he or she had finished a trial and was going on to the next trial. The first author's response on each trial was scripted so that all participants encountered the same responses during the assessment. The levels were administered in a random order to minimize any systematic bias (e.g., practice effect) that might arise from administering the ABLA levels in order. Administration of each level was separated by a brief break (30 seconds) to allow the participant to prepare the necessary materials for the next level. All sessions were videotaped for later scoring. The ABLA evaluation form, consisting of a behavioural checklist for each level, was used to measure the accuracy with which the participants conducted the test on a step-by-step basis.

Training: Each participant received a shortened copy of the ABLA self-instructional manual (with the sections of study questions and answer keys deleted) that described the basic concepts, principles, and procedures for conducting the assessment. The manual included 5 sections covering the 5 levels of the ABLA that were used, as described above. The participants were asked to read the manual sequentially on a level-by-level basis and to access a mastery-based unit test and a demonstration video online through WebCAPSI after studying each level. Participants were told that the manual would take approximately 3.5 hours to complete if one were to read it straight through; however, they were given one week to complete the training so that they could proceed at their own pace.

The master criterion for each unit test, which was delivered by WebCAPSI, was to reach at least 90% accuracy on randomly sampled questions. Each test needed to be completed and submitted online within 15 minutes. The WebCAPSI program automatically marked the test and immediately provided feedback to all questions. Each correct answer was followed by a praise statement (e.g., "well done" "excellent" "good work") on the computer screen, and each incorrect answer was followed with a presentation of all acceptable answers. If the participant scored above 90% correct, he or she would be complimented (e.g., "congratulations") with a result of a "pass" and could proceed to the next unit. If a participant scored below 90% correct, the program would notify the participant with the statement that he or she was required to restudy the materials and rewrite the unit test, at least 15 minutes after the previous failed attempt. After passing a unit test, each participant was asked to view a demonstration video online corresponding to that unit via WebCAPSI. According to the participants' self-report, the entire training process took a mean of 4.5 hours (range: 3.75 to 5 hours).

Post-training tests: Post-training tests occurred after passing the last level of the ABLA and closely followed the format and structure of the baseline tests. Thus, the post-training knowledge test consisted of a novel set of 15-questions to be answered in writing without referring to the manual. The post-training test on conducting an ABLA session consisted of 15-trials (3 at each level) administering the ABLA to a simulated client. Participants did not receive any further training or feedback on their performance during this phase. After the post-training tests, each participant completed a brief survey to rate the usefulness of the manual, the mastery-based unit tests, and the demonstration videos on a scale of 1 (least useful) to 9 (most useful), and commented on the training experience. Participants were requested not to study the manual prior to the follow-up phase of the study.

Follow-up tests: Follow-up tests were conducted on average 9 days (range: 7 to 14 days) after the completion of the post-training tests and closely followed the format and structure of the baseline and post-training tests. Thus, the knowledge test, with novel questions, and an assessment with a simulated client were repeated during the follow-up.

Interobserver Agreement and Procedure Integrity

Interobserver agreement on the simulated assessment was assessed by having an independent observer – a graduate student who was familiar with the ABLA – randomly view selected samples of 40%, 40%, and 36% of all videotaped sessions for Participant 1, 2, and 3,

respectively. The experimenter and observer independently recorded either the occurrence or nonoccurrence of the participant's behaviours on each trial of these samples on a step-by-step basis using behavioural checklists. An agreement was defined as experimenter and observer both making the same judgment on whether a correct behaviour occurred or did not occur. A disagreement was defined as a discrepancy between the experimenter and observer. Interobserver agreement per session was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by100% (Martin & Pear, 2011). Mean agreements across sessions were 97% (range: 92% to 100%), 95% (range: 94% to 97%), and 94% (range: 80% to 100%) for Participant 1, 2, and 3, respectively.

For procedural integrity, the observer also recorded whether or not the experimenter's behaviours were performed in accordance with a script. The script indicated the experimenter's response (correct, incorrect, or no response) on each trial of the simulated assessment to ensure that all participants encountered the same frequency of each type of responses. Procedural integrity data were collected on a randomly sampled 60% of the sessions for all participants. The mean accuracy of the experimenter's responses across the sampled sessions was 97% (range: 87% to 100%).

Results

Figure 1 shows the accuracy of knowledge-based written tests for each participant during baseline, post-training, and follow-up. Participant 1 increased knowledge-test accuracy from 44% during baseline to 91% after training and 94% during follow-up. Participant 2 increased accuracy from a mean of 50% during baseline to 89% after training and 91% during follow-up. Participant 3 increased accuracy from a mean of 32% during baseline to 68% after training and 72% during follow-up.

Figure 2 shows the accuracy of the simulated ABLA assessments for each participant during baseline, post-training, and follow-up. Participant 1 increased correct responses on conducting the ABLA from a mean of 31% correct across the five ABLA levels during baseline to 93% after training and 90% during follow-up. Participant 2 increased accuracy from a mean of 16% during baseline to 81% after training and 96% during follow-up. Participant 3 increased accuracy from a mean of 31% during baseline to 84% after training and 84% during follow-up.

The mean usefulness ratings across participants were 5.3 (range: 5 to 6) for the manual, 5.7 (range: 5 to 6) for the mastery-based unit tests administered via WebCAPSI, and 7.5 (range: 7

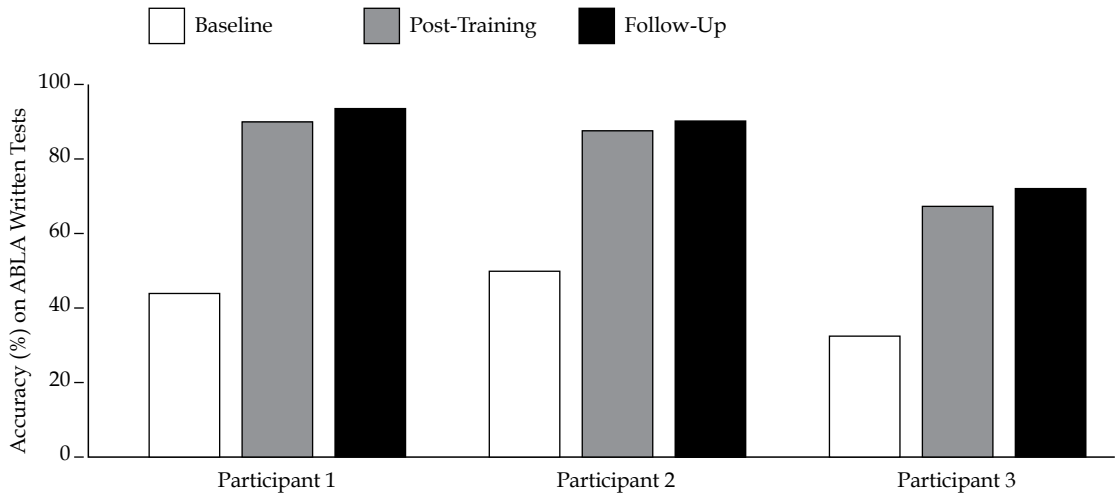

Figure 1. Accuracy (% correct) on written tests about the ABLA during baseline, post-training, and follow-up for each participant.

to 8) for the demonstration videos. Two participants commented that the mastery-based unit tests were helpful to improve their grades on the knowledge-based tests and all 3 participants commented that the videos were very helpful in strengthening their performance on ABLA assessments.

Discussion

In this study, substantial improvements in knowledge and application of the ABLA occurred immediately following training across all three participants in a multiple-baseline design, indicating that the intervention package (i.e., the ABLA self-instruction manual, the mastery-based unit tests, and the demonstration videos) was highly likely to be responsible for the observed effects. Moreover, the effects were maintained at a high level across all participants during follow-up.

DeWiele et al. (2000) showed that the ABLA self-instructional manual plus role-playing with simulated clients (either undergraduate psychology students or direct-care service providers who played the role of individuals with developmental disabilities) was effective in teaching students and direct-care providers to administer the ABLA. In this study, we systematically replicated DeWiele et al.'s findings by successfully teaching university students to conduct the ABLA assessment at a high accuracy using the manual, and mastery-based unit tests and demonstration videos delivered

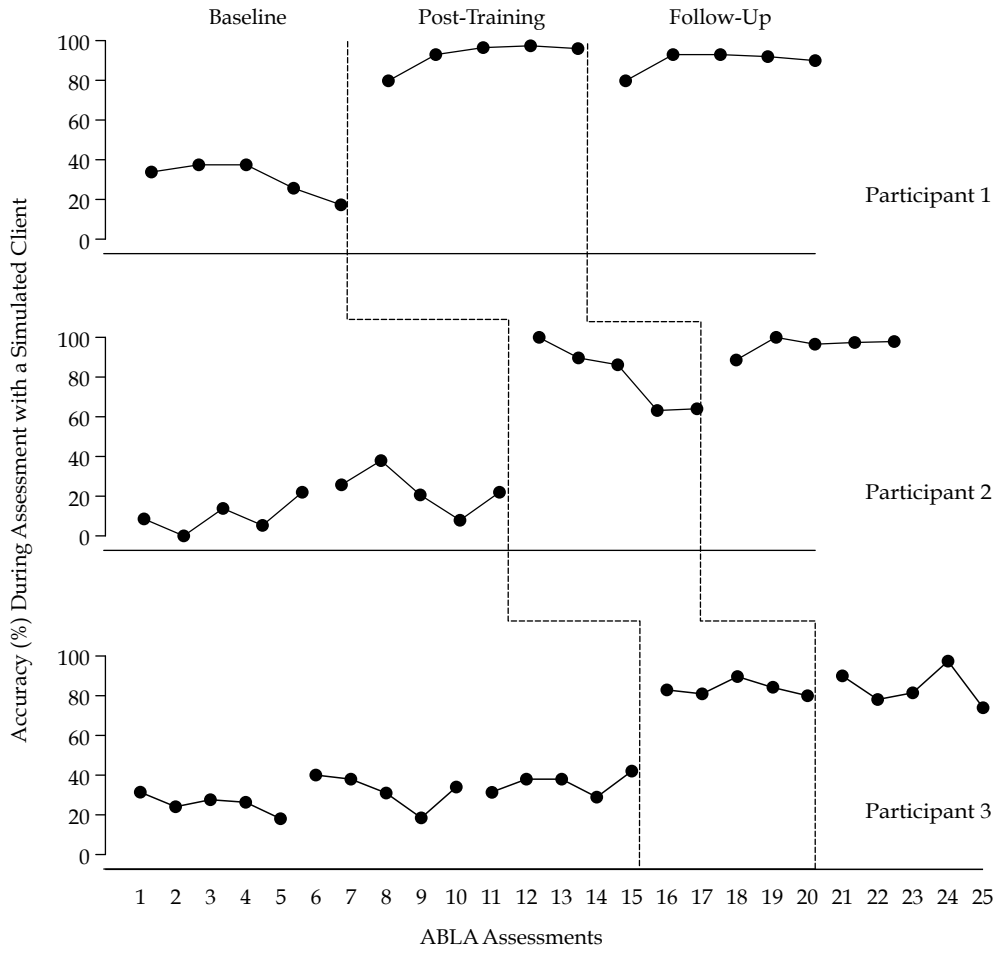

Figure 2. Performance accuracy (% correct) for levels 1 to 6 (with the omission of level 5) of the ABLA during assessments with a simulated client during baseline, post-training, and follow-up for each participant.

through WebCAPSI, without face-to-face training. WebCAPSI has been shown to be effective in developing knowledge and critical thinking (Hu, Svenningsen, & Pear, 2011; Svenningsen & Pear, 2011). The present study shows that the WebCAPSI program, combined with well-prepared study materials, can also be used to develop practical behavioural assessment skills. The findings contribute to the current literature on developing effective and low-cost training approaches to teach not only knowledge, but also the application of behavioural techniques.

Future research is needed to extend the generality of the present findings. First, replications with additional and more diverse participants (e.g., parents and service providers) and with other self-instructional manuals would be beneficial. Second, it would be important to evaluate generalization of the skills developed by including assessments with real clients. Third, requiring a more thorough demonstration of the skills, for example, by having participants complete a full assessment would also strengthen the present results.

This study also points to a number of directions for future research to extend the training technology. First, research is needed to compare self-managed unit tests (i.e., participants complete and evaluate their own performance on unit tests) versus mastery-based unit tests programmed through WebCAPSI. Second, if both of these training methods turn out to be approximately equally effective in promoting knowledge and application, what would be the advantages or disadvantages in choosing one approach over the other? Future research should evaluate this question from both the trainers' and trainees' perspectives. Third, since the CAPSI intervention in this study delivered and managed the unit tests and videos, future research is needed to evaluate the effectiveness of CAPSI in delivering the manual online, in addition to the unit tests and videos. Lastly, the use of demonstration videos appeared to be a useful component in this study based on the participants' comments. Despite the participants' self-report, we did not monitor the number of times each video was viewed or how much studying had occurred. Future research should evaluate the impact of demonstration videos separately from the self-instructional materials and unit tests.

There is a high demand for teaching students and staff evidence-based procedures for working with individuals with developmental disabilities. Self-instructional materials delivered by CAPSI can be a powerful tool in reducing the resources needed to conduct this training and ensuring teaching consistency.

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Key Messages From This Article

People with disabilities: You deserve to have your basic learning abilities accurately assessed by trained and qualified assessors, and to have your abilities strengthened and extended with appropriate tasks based on the assessment.

Professionals: Being able to accurately assess the basic learning abilities of people with disabilities requires an effective training method.

Policymakers: The use of a training method using a computer-aided personalized system of instruction program would be powerful in reducing the resources required for ensuring teaching accuracy and consistency.

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