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Reassuring Students that Intensive Strategies, Authentic Instruction and Self-Assessment Lead to Authentic Learning

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Abstract - The Plant and Soil Sciences eLibrary (PASSEL) offers worldwide access to animations and content lessons. Application lessons were added to show how key concepts are used in occupations. Such lessons cannot be effective if students make superficial or no use of them. What assurance can we offer that their time and effort will pay off? University students in a first-year Plant Sciences course were asked to read a lesson on Transpiration Principles and an application called "Greening up the Greens," then answer survey and assessment items. One asked, "Which strategy best describes your use of the application lesson?" Only 7% of the 149 students said they did not read the application, 24% scanned the lesson but did not answer the practice questions, 30% read the lesson and answered the questions but did not check all their answers, and 42% said they read it, answered the questions and checked their answers. On seven of the eight items, the 42% who said they used the most intensive strategy out-performed the class average. That 42% had even more advantage on more difficult items, providing evidence that engagement with the lessons is related to better understanding of a key concept as measured by assessment items.

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REASSURING STUDENTS THAT INTENSIVE STRATEGIES, AUTHENTIC INSTRUCTION AND SELF-ASSESSMENT LEAD TO AUTHENTIC LEARNING

Strictly as per the compliance and regulations of:

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Carol A. Speth [α] & Donald J. Lee [σ]

Abstract - The Plant and Soil Sciences eLibrary (PASSEL) offers worldwide access to animations and content lessons. Application lessons were added to show how key concepts are used in occupations. Such lessons cannot be effective if students make superficial or no use of them. What assurance can we offer that their time and effort will pay off? University students in a first-year Plant Sciences course were asked to read a lesson on Transpiration Principles and an application called "Greening up the Greens," then answer survey and assessment items. One asked, "Which strategy best describes your use of the application lesson?" Only 7% of the 149 students said they did not read the application, 24% scanned the lesson but did not answer the practice questions, 30% read the lesson and answered the questions but did not check all their answers, and 42% said they read it, answered the questions and checked their answers. On seven of the eight items, the 42% who said they used the most intensive strategy out-performed the class average. That 42% had even more advantage on more difficult items, providing evidence that engagement with the lessons is related to better understanding of a key concept as measured by assessment items.

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I. Introduction

On-line learning environments provide developers with platforms for creating learning resources which have advantages over printed text books. Ease of distribution, editing, customization and translation can cost effectively amplify the impact of the work invested in developing on-line learning environments. The Plant and Soil Science eLibrary (PASSEL) (http://passel.unl.edu) is one on-line platform that offers free public access to a growing repository of hundreds of animations and content lessons. The content and learning focus is plant and soil science foundational to understanding our food and natural resource systems.PASSELbeen accessed from as many as 126 countries per week. Animations and text have been translated into several languages (including Portuguese, Hebrew and Ukrainian). There are 12 animations in Spanish so far. Communitydevelopment and collaboration environments have recently emerged in PASSEL with the development of virtual group meeting rooms, discussion board and video conferencing tools.

Exploring better methods in on-line resource development has been a companion goal with growing learning resources for PASSEL. Content crafted into eLibrary lessons has emphasized multimedia integration since the early days of PASSEL and its predecessor, the Crop Technology Library. Animations developed for visualizing molecular, cellular, organism and system level processes often employ active elements such as click and drag selection. Pop up questions in text provide choice and feedback to promote cognition. More recent learning environment development in PASSEL has taken advantage of increasing bandwidth to stream high quality video that transports learners to the labs and fields where plant and soil science is applied and discovered. Previous studies,have demonstrated that college level students adopt various methods for consuming these on-line resources and student learning styles or approaches can influence their use and perceived impact of their use (Speth, Lee, and Hain, 2006, and Speth and Lee, 2013).

An overarching goal for individuals and teams that have developed and shared educational resources through PASSEL is to promote the learning of plant and soil science principles and their application in food and natural resource system problem solving. On-line curriculum designed to teach both science principles and application of those principles in a science discovery or problem solving context has several advantages potential for the learner. First, the learner can expand their vision of science careers. Second, the context to a real world problem increases the chance of learners connecting new concepts to a familiar or relevant framework. Finally, crafting application stories to promote active learning provides meaningful repetitions for learning the principle. The on-line environment can provide a robust platform to develop multiple application stories that applies the same set of principles.

II. Previous Literature

The rationale behind development of the application lessons is compatible with the ideas of

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authentic instruction and authentic assessment described in several articles by Gulikers and various colleagues. Their ideas influenced the development of this study, the survey questions and choice of content questions from the practice questions offered within the lesson. Gulikers et al. (2004) said to change student learning in the direction of competency development, a combination of authentic instruction and authentic assessment are needed. They defined authentic assessment as that which requires students to use the same competencies or combinations of knowledge, skills or attitudes that they need to apply in professional life.

Gulikers et al. (2007) asked several questions, including whether authentic assessment, or the perception of it, affect how students study and learn. Does practical experience (or even a simulated or virtual practical experience) affect how authentic assessment affects student learning? They also said that authentic assessment is directed toward stimulating deep studying activities.

Kasworm and Marienau (1997, p. 7) wrote about principles for assessment of adult learning, emphasizing that “Key differences exist between assessment for abstract knowledge and objective, non-contextual problem solving and the real world of solving messy problems and creating knowledge in the complex contexts of adult lives. In these settings, to know and apply what is known is to be effective.”

Martens et al. (2004, pp. 369-370) mentioned that most studies look at effects of extrinsic or intrinsic motivation, but neglect the process by which motivational orientation interacts with the actual study behavior. They also said that “We do not know what students actually do with the learning materials provided to them.”Martens et al. expressed some dissatisfaction with the multiple choice test of factual knowledge they used for their study.

This study was designed to get at “what students actually do with the learning materials provided to them,” the question raised by Martens et al. (2004), but using the kind of multiple choice items already found within the lesson, analyzing them individually, with the realization that the items vary in difficulty.

An objective of this study was to investigate whether student time and effort with the application lesson on transpiration was related to better understanding of a key concept as measured by assessment items. Are better strategies, i.e., more intensive use of online learning resources associated with better learning? Does the ease or difficulty of the items make a difference in the effectiveness of strategies?

III. Materials and Methods

The University of Nebraska-Lincoln Institutional Review Board approved the study protocol (IRB#2009069284EP) and all participants provided written informed consent prior to participation in the study.

Table 1 lists three principle lessons and six application lessons, all using a similar instructional design, developed from grant support provided by the American Distance Education Consortium (ADEC). Principles lessons were designed based on learning outcomes expected in an introductory plant science, botany or biology course. Application lessons were based on stories involving six diverse plant science researchers or professionals. The lesson development team included faculty from three universities with an expertise in the plant science area and instructional designers from two universities who created animations, assembled lessons and co-authored some of lessons.

Teachers using PASSEL as a resource for student learning can assign any combination of principle and application lessons for their students. In this study all nine lessons were assigned to students in a 100 level plant science course. Lesson assignment was made by linking lesson URLs to the course management site (Blackboard®). A graded weekly problem set in the course included questions used in the lessons. Lesson animations, videos or images were also included in the weekly problem set and recitations.

Students could consume the lesson by scrolling through the pages or navigate from specific topics on the left menu. The lesson includes a comprehensive and interactive animation that illustrates most of the learning objectives in the lesson.

Student use of the lesson resources was not monitored or required during class or recitation times. However, lesson use was encouraged by referral to specific items from the lesson during lectures and the incorporation of questions from the lessons in the graded problems.

Application lessons were designed with a similar look and feel to the principle lessons but they did not repeat the same plant science content. Rather, they served as brief case studies. The application lessons included questions that required the learner to recall or apply concepts from the principles lessons. Students could also chose to link from the application lesson back to the principle lesson by using the content link associated with each question. This allowed them to revisit the specific part of the principle lesson related to the application.

Since the early days of the Plant and Soil Science e Library and its predecessor, the Crop Technology Library, some evaluative survey questions have been asked consistently to assess how intensively students were using its various features and how valuable they thought it was to their learning (Hain, 1999). Eventually, actual content assessment items were included in the survey instruments. One characteristic evaluation strategy is to use student responses on the survey items as independent variables to analyze their answers to the content items. Most of the content items in this study were selected from practice items in the lessons. Two were added to ask students to go beyond the information given.

This study used data collected from three years of Plant Science 131 from 2009-2011. Students were recruited by means of a PowerPoint presentation. Participation was voluntary. Students could obtain five points of exam extra credit. This extra credit process was kept separate from the survey itself (to preserve confidentiality). There are other opportunities to obtain extra credit in the course, so students need not feel obligated to participate in this study. After completing the lesson and survey questions, which were distributed in Survey Monkey, students could take a three-item quiz in Blackboard® that went directly into the grade book. This is similar to when students read the lessons for class, answer the practice questions within the lesson in the Plant and Soil eLibrary if they want to, and then take the quiz for credit in Blackboard®.

This student sample included 149 students: 125 resident and 24 distance students. The 149 included a total of 53 department majors, 64 majors from the College of Agriculture and Natural Resources, and 32 from outside the college.

As part of the "Greening up the Greens"application lesson, students are told, "You are a student intern for summer at Fall Oaks Golf Course in eastern Nebraska. After working there for a month you notice that the greens are not in the greatest condition.

"In the morning, the greens are a lush green color, but then during the middle of the day, areas turn bluish-green to brown. The greens seem to recover their color later in the day, but the plant density has been steadily decreasing since you started working there in early June.

"You decide to impress your boss by taking the initiative to determine how to correct the problem. Before you can make a recommendation, though, you need to gather some information to figure out what the problem is and how it can be remedied."

IV. Results and Discussion

Students were asked which strategy best describes their use of the application lesson.

- I read the Application lesson, answered the questions and checked my answers. (62 students)
- I read the Application lesson and questions but did not check all my answers. (44 students)
- I scanned the Application lesson but did not answer all the practice questions.(32 students)
- I did not read the Application lesson because I already knew the terms and ideas. (4 students)
- I did not read the Application lesson. (6 students)

Figure 2uses a line graph to summarize the item data shown below, so that the highest strategy use (answering the practice questions and checking their answers) is contrasted with the class average for each of the eight assessment items. The horizontal axis represents the ranking in terms of ease or difficulty, with 1 being the easiest and 8 being the most difficultfor the high strategy group rather than the class average. The vertical axis represents the percentage that got the item right, comparing the highest strategy group with the class average.

Item 1. No Transpiration (Easiest)

- "If the grass plants are not transpiring, what will happen to them?" Answer: All of the above. Who passed?
- Answer checkers=94%
- Read no checking=80%
- Scan not answer=90%
- Knew already=100%
- Did not read =100%

High strategy not rewarded as much on this easy question.

Item 2. Bentgrass

- "The creeping bentgrass plants on the greens protect themselves from losing too much water by.." Answer: Close stomates to stop transpiration.
- Answer checkers=86%
- Read no checking=77%
- Scan not answer=84%
- Knew already=75%
- Did not read=83%

Item 3. How Cool?

- "How do plants cool themselves?"
- Answer: Transpiration. Who got it right?
- Answer checkers=84%
- Read no checking=68%
- Scan not answer=84%
- Knew already=50%
- Did not read=17%

High strategy users beat the average. The low strategy users did very poorly.

Item 4. Evening/Morning

- Why do the greens seem to recover in the evenings and mornings? Answer: Make the air cooler. Who got it right?
- Answer checkers=83%
- Read no checking=66%
- Scan not answer=53%
- Knew already=100%
- Did not read=83%

Those who said they knew it already actually did.

Item 5. Why Brown?

- "What was most likely causing the grass to be yellow or brown?" Answer: Heat stress. Who passed?
- Answer checkers=79%
- Read no checking=64%
- Scan not answer=56%
- Knew already=25%
- Did not read=33%

High strategy users beat the class average.

Item 6. Also Try

- "To preserve their bent-grass greens, Karsten Creek might also try . . ." The best answer was mist or syringe. Who got it right?
- Answer checkers=68%
- Read no checking=47%
- Scan not answer=44%
- Knew already=75%
- Did not read=0%

The high strategy users beat the class average.

Item 7. Why Fans?

- "The Karsten Creek Golf Course at Stillwater, Oklahoma, was developed from a hilly wooded area by a lake. This spot is quite humid in the summer. The greens are planted with bent-grass. Why do you think the course manager installed big fans on each green?"
- The right answer was A and B. Who got it right?
- Answer checkers=67%
- Read no checking=66%
- Scan not answer=81%
- Knew already=50%
- Did not read application=83%

This was written to ask students to go beyond the information given in the lesson. Perhaps it is not surprising that more intensive use of the Application didn't help.

Item 8. Not Result (Most difficult item)

- "Which of the following is NOT an important result of transpiration?" Answer: Toxins exit. Who got it right?
- Answer checkers=60%
- Read no checking=40%
- Scan not answer=38%
- Knew already=50%
- Did not read=33%

The high strategy users did better than the class average on this difficult item.

V. Conclusions

An objective of this study was to investigate whether student time and effort with the application lesson on transpiration was related to better understanding as measured by assessment items. Are better strategies, i.e., more intensive use of online learning resources associated with better learning? Does the ease or difficulty of the items make a difference in the effectiveness of strategies?

The application lessons were created to show how key concepts are used in occupations. Students were encouraged to use the lesson but made their own decisions about how intensively to go about it. This study at least assessed students' self-reported strategies (Martens et al., 2004). Only six out of 149 admitted to not reading them. Their self-reported strategies showed that on seven of the eight items included in this analysis, the answer-checking strategy users out-performed the class average. With this small number of items, it looks like as the items got more difficult, the most intensive strategy of reading the lesson, answering the practice questions, and checking the answer, pays off more in terms of a higher percentage of right answers for those who used that strategy.

This result is no surprise to instructors but might be reassuring to students to indicate that time and effort spent in reading and self-assessment seems to pay off.This is especially true of students lacking in academic self-confidence. Speth and Lee (2013) wrote about how that lack of self-confidence and poor learning strategies can be measured by instructors, providing helpful insights to instructors wanting to understand their students better and then design instruction that helps students get more out of their courses. Such students often come to science courses feeling "doomed" by inadequate prior learning or lack of an "aptitude" for that subject. This will allow instructors to provide guidance as to how to best go about learning from new educational resources.

Funding agencies who supported development of these materials because of a perceived need to increase levels of science competency in the general population can be told that 93% of the students who participated in this study chose to use the lessons at some level and there is evidence that more intensive uses of the self-assessment feature resulted in better learning, especially on the more difficult items. The developers of the application lesson made every effort to writeauthentic assessment items.

This type of analysis could be used with more items and on more lessons to better understand the relationship between learning strategy, ease or difficulty of items, and successful learning as measured by assessment items.

Gulikers et al (2004) suggested that development of student competencies can be encouraged by applications that expose them to the kinds of situations and decisions real professionals might encounter. However, some filtering may be necessary so that beginning students are not exposed to more complexities than they can process. Item 7, did not come from the lesson but was written by the evaluator, confronts students with humidity as well as air temperature. Humidity was not included in the lesson. So the trend of slightly higher percentages of accuracy by more intensive uses of the self-assessment was upset. Kasworm and Marienau (1997) warned that authentic situations tend to be messy.

There were several open-ended evaluation questions that provided additional insights on the success of the application lesson. One asked whether students saw applications of the transpiration concept beyond the narrow confines of golf course turf maintenance. One student said understanding transpiration would be helpful for "Any job pertaining to growing or maintaining plants. For example, turf grass managers, landscape management, greenhouse production." Another wrote, "Farming, ranching, cooperatives, feed stores, and any job related to agronomy, plant science, animal science, and almost every job involving air, water, or soil."

Students were also asked if they had any interest in the kinds of jobs that might use an understanding of transpiration. Some were quite honest and said "No." One said he or she would "like to be responsible for something that requires some advanced knowledge of the environment and how my actions would affect it." Another wrote, "Possibly. Using problem solving techniques taught by courses similar to this, I believe that I could be educated enough to have a job like that [which] would use this knowledge."

References Références Referencias

1. Gulikers, J., T.J. Bastiaensand P.A. Kirschner. (2004). "A five-dimensional framework for authentic assessment."ETR&D, vol. 52, no. 3, pp. 67-86.
2. Gulikers, J., L. Kester, P.A. Kirschner and T.J. Bastiaens. (2007). "The effect of practical experience on perceptions of assessment authenticity, study approach and learning outcomes". Learning and Instruction, vol. 18, pp. 172-186.
3. Hain, P.M. (1999). "Designing and evaluating Internet-based lessons to teach crop genetic engineering." Unpublished master's thesis, Dept. of Agronomy and Horticulture, 279 Plant Science, Univ. of Nebraska, Lincoln, NE 68583-0915.
4. Hain, P. and Gaussoin, R. (2005). "Greening up thegreens: Transpiration application scenario."Plantand Soil Sciences library [On-line]. Available:http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=1126892811 (Accessed 4June 2013).
5. Kasworm, C.E. and C.A. Marienau.(1997). "Principles of assessment of adult learning." New Directions for Adult and Continuing Education, vol. 75, Fall, pp. 5-16.
6. Martens, R.L., J. Gulikers, and T. Bastiaens.(2004). "The impact of intrinsic motivation on e-learning in authentic computer tasks."Journal of Computer Assisted Learning, vol. 20, pp. 368-376.
7. Speth, C., and Lee, D. (2013). "Insights from using the Approaches to Studying as an evaluation tool for educational resource development." Global Journal of Human Social Science, vol. 13, pp. 33-40.
8. Speth, C., Lee, D. and Hain, P. (2006). "Prioritizingimprovements in Internet instruction based on learning styles and strategies."Journal of NaturalResources and Life Sciences Education, vol. 35, pp.34-41.

Table 1 : Principle and Application Lesson Sets in PASSEL

Principle	Topic	Application	Topic
Transpiration: Water movement through the plant	Transpiration Root function Stomate function	Greening up the greens	Heat stress management with water applicationon golf greens.
Transpiration: Water movement through the plant	Transpiration Root function Stomate function	Case of the GE drought-resistant corn plant	Stomate function and productivity in crop plants
Perennial plant response to defoliation	Growth frombuds Source - sink	Defoliation grazing response	Grazing timing and source sink in grasslands
Perennial plant response to defoliation	Growth from buds Source - sink	Deliberate mechanical defoliation of perennial plant	Apical and axillary bud growth in landscape plants
Flowering principles	Flower structures, functions, diversity and crossing	Corn flowers and hybrid seeds.	Monoecious flower structureand pollination in seed corn.
Flowering principles	Flower structures, functions, diversity and crossing	Native plant breeding	Flower structure and manipulationin native plants.

Fig.1 : Questions and feedback in the application lesson

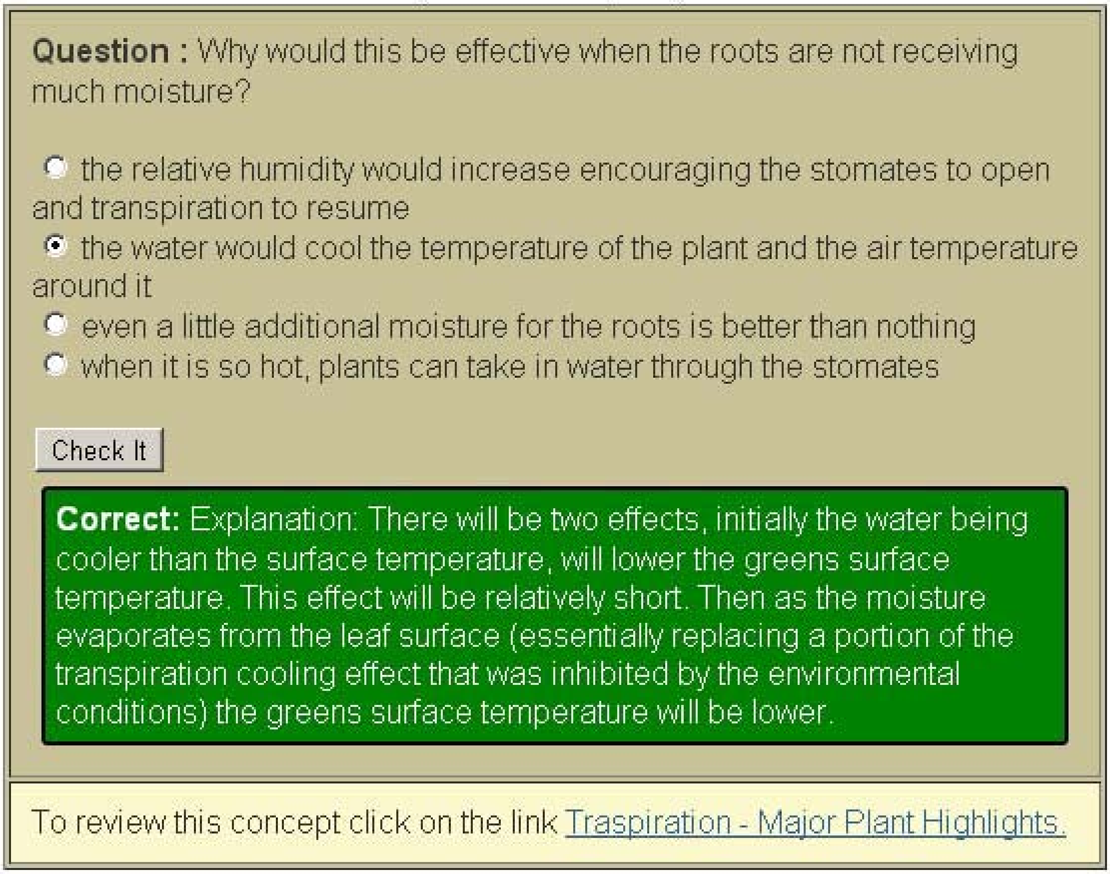

Fig. 2 : Percentage of the "Answer Checkers" who got each item right compared to the class average